AVIATION HAZARDS

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ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self- instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual- skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is

particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self- instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)

PREFACE

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included many tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect. All the best for your studies from our team!

AVIATION HAZARDS

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Aviation Hazards

BLOCK 1 : HAZARDS AND RISK ASSESSMENT

HAZARDS AND RISK ASSESSMENT

Block Introduction :

Safety Management in aviation is as important as oxygen is for breathing. According to Occupational health experts a Hazard is a source that can cause impending damage, harm or adverse health effect. The source of the hazard may be a condition, a situation, an object, an activity or behaviour. The aviation operations are susceptible to different types of hazards continually. Identifying sources that can be potential sources of risk and hazard continually and subsequently eliminating the source is important to avoid any incidents or accidents. In the subsequent units you shall study about what are hazards and how different types of hazards create an impact in aviation operations. You shall also be acquainted to techniques of identifying various types of risks that may turn to potential hazards and learn tools for mitigation of these risks.

Block Objectives :

After reading and understanding this block, learner will be able to :

- Defining Hazards and Risk
- Classification of Hazards
- Biological Hazards
- Aims of risk assessment
- Why is risk assessment done
- Risk assessment process
- Identification of hazards
- Determining criticality of a hazard
- Evaluation of the risks of hazards
- Recording of findings and implementation of measures for hazards
- Review Assessment and Update for hazards
- ALARP model of controlling risks
- The Hierarchy of risk control
- Steps for application of controls

Block Structure :

UNIT 01

Hazards in Aviation

UNIT STRUCTURE

1.0 LEARNING OBJECTIVES :

- To understand the definition of hazards and its impact in aviation.
- To structurally classify the risk assessment process.
- To enumerate the role of each step in the risk assessment process.

1.1 INTRODUCTION :

Imagine you are on a flight to your native place on a cold winter morning. After the security check you have been seated inside the aircraft. There is lot of fog outside yet; your flight is scheduled to depart on time. As the departure time nears, there is an announcement from the cockpit that due to some technical issues at the runway, the flight is not getting permission to taxi. You sit wondering outside the window and again there is an announcement that the flight shall only start once the dense fog cover over the airport clears. After an hour of wait at the terminal the flight finally gets clearance from the airport authorities and departs. Incidents like these are very common in the operation of flights or any medium of conveyance. The fog was a potential source of danger and if the airport authorities would have cleared the flight, they would have endangered the lives of many, as the visibility over the runway was poor which may have lead to erroneous judgements by pilots leading to an accident. Potential sources that can lead to accidents or may cause harm is known as HAZARD. Hazards may happen due to incidents, circumstances, substances and may lead to collateral damage

of life, property, health or anything having value. Managing Airline operations is a tough thing. There are many aspects related to a hazard free Airline operation. From the Weather, to the maintenance of the aircraft, to the security of every human at the airport or on flight, to the functioning of every single gadget; the hazard free management of the aviation industry is indeed a cumbersome process undertaken 24 hours a day.

1.2 DEFINITION OF HAZARD AND RISK :

According to Occupational health experts a Hazard is a source that can cause impending damage, harm or adverse health effect. Hazards can affect a thing, a place or human beings. The source of the hazard may be a condition, a situation, an object, an activity or behaviour. In the year 1977 at the Tenerife airport in Spain, Boeing 747 belonging to KLM airlines took off on the runway without clearance from the Airport Traffic Control and crashed into a PANAM Airlines taxiing on the runway. More than 500 people died in the accident. The hazard happened due to ineffective communication and human errors. The tragic accident led to lot of standardization in communication between pilots and Air Traffic Controls. The International Civil Aviation Organization (ICAO) in its ICAO Safety Management Manual, document 9859 defines Hazard as " a condition or object with the potential of causing injuries to personnel, damage to equipment or structures, loss of material or reduction of ability to perform a prescribed function". In its SM ICG Safety Manual that was published, Hazard is defined as "a condition that could cause or contribute to an aircraft incident or accident".

If we go through dictionaries we may find that Risk and Hazard are synonyms. However, in the Aviation sector, both the words have separate meanings. A lot of airports undergo a lot snow making runways very slippery. The slippery runway due to snowfall is a potential hazard. It is upon the pilot to take the risk for a take off in the slippery runway knowing the potential Hazard. Risk is the situation where there is an exposure to danger or hazard, and the same might lead to danger, harm or loss.

1.3 CLASSIFICATION OF HAZARDS :

According to the International Civil Aviation Organization (ICAO), Aviation Hazards can be classified under the following heads as under

- Environmental
- Technical
- Organizational
- Human

If we consider an overall perspective taking into consideration the various aspects of any Industry and its operations, Hazards can be classified under the following heads as under

- Physical
- Mechanical or Technical
- Environmental
- Chemical
- Biological

- Organizational
- Human
- Psycho Social Hazards

1.4 ENVIRONMENTAL HAZARDS :

The factors present in the existing environment, within which airline operations are undertaken and pose a threat for an incident or accident. The city of Srinagar in January 2021 was experiencing severe snowfall. The airport runway was kept free of snow and was open to flights arriving to and departing from the city. However, heavy snowfall let to deposits over lot of structures and could not be cleared easily. The wings of a private aircraft while taxiing hit debris of ice that had deposited near to the flight taxi path leading to minor damages in the aircraft. The incident led to delay of the flight by over two hours. Environmental hazards can be due to many reasons which may be either natural or created. The subcategories of environmental hazards are

- **Weather or Climatic Conditions :**

A lot of weather conditions lead to potential hazard for aircraft operations. Hurricanes, Storms, Gale, thunder storms, Lightning, Strong Winds, Tornado, Icing, Heavy Rain, and Visibility Restrictions due to fog or smoke, extreme temperatures may often be disastrous for aircrafts.

In 2011, an ATR 72–200 while landing at Shannon in Ireland got caught in cross winds leading to broken Nose landing gear, loss of directional control and broken hull. Several incidents of lightning strikes leading to disasters have been reported in the 60's and 70's, however, modern aircrafts are engineered to withstand lightning effects. Thunder storms, Gail and Wind shear can cause major accidents and are very destructive. In 1985, a Delta Airlines Flight 191 encountered a microburst approaching the DFW airport as the flight flew through a thunderstorm killing 138 people and injuring 28 others.

In 2005, KAM Air Flight 904 heading to Kabul from Herat was caught in heavy snow storm and crashed in the mountainous terrain killing all the people aboard.

In 2020, a repatriation Air India Express flight broke apart after landing in heavy rains at Kozhikode Airport, Kerala killing 18 people including 2 pilots.

- **Geographical Calamities :**

These are geographical factors that have a potential to impart a bigger scale of destruction and normally cannot be traced prior to its occurrence. Some of these geographical calamities are Tsunami, Volcano, Earthquake, Flash Floods etc.

In 1982, a British Airways flight, call sign, Speedbird 9, flew into volcanic ash from Mount Galunggung, near Jakarta in Indonesia, resulting in the failure of four of its engines.

- **Medical Events :**

Infectious diseases are one of the leading causes of death across the globe. These diseases spread airborne and there have been reported outbreaks of these diseases aboard commercial flights. Transmission of infectious diseases like COVID, SARS, MERS, Ebola, Influenza, Tuberculosis, Respiratory infections are within the ambit of airline travel. The COVID pandemic has led to closure

of cross border airlines, stringent protocols and introduction of new norms for passenger safety.

- **Natural Events :**

Natural events that pose threat as a hazard are within the nature. A small insect can even pose a major threat to an aircraft if not managed properly. Birgenair flight 301 crashed at the coast of Dominican Republic in February 1996, killing 189 passengers and crew. The accident report said that the "probable cause" of the Pitot tube blockage was "mud and/or debris from a small insect" that entered while the aircraft was on the ground. The Pilot tube sends information to the cockpit related to the movement of air outside the aircraft and determines the speed of the aircraft. A blocked Pitot tube immediately brings a flight from an auto pilot mode to the pilot mode and may affect controls. Locust Swarms can cause loss of visibility for the pilot leading to mishaps. Stray animals venturing on the runway have been major source of concern for many aircraft pilots. A 737–800 New Delhi bound Boeing of Spicejet with 169 passengers on board had hit a buffalo at Surat during takeoff damaging its engine. Bird Strikes are very common at low altitudes during takeoff and landing. Bird strikes or Bird Ingestion (birds sucked in by the engine of the aircraft) are major potential hazard for aircrafts across the globe. In 2019, URAL Airlines 178 took a bird strike after takeoff and crash landed in a cornfield five kilometres away from the airport injuring 70 people on board. Flights engaged in airborne fire fighting of forest fires run a high risk of hazard due to the fire, heat, turbulence and low flying. Several incidents of airline crash during forest fire fighting have been reported across the globe.

❑ **Check Your Progress – 1 :**

1. A source of hazard can be

   a. Condition b. Situation c. Object d. All the options

2. Indicate what not a geographical calamity from the options below is

   a. Tsunami b. Volcano c. Bird Hit d. Earthquake

3. Identify the medical calamity from the options below

   a. Flash flood b. MERS c. Tornado d. Gale

4. A bird hit with an aircraft on the runway is an example of

   a. Environmental hazard b. Biological hazard

   c. Technical hazard d. Human hazard

1.5 TECHNICAL HAZARDS :

Aircrafts operate in a complex world of technology. Safety is the considered to be the key aspect where technology is involved. Mechanical failure accounts for 20% of the airline accidents. Post 1990's airline manufacturing companies have laid special emphasis on design, manufacturing quality and engines to reduce the risk of accidents. There are a lot of technical factors apart from the human interface in managing the same that are cause of potential hazards in aircrafts. Technical Hazards may occur due to several causes and airline manufacturers are continuously working on improvisation to manage any mishaps. Airline operators too put a considerable amount of manpower and funds in management of technical issues in aircrafts. The various reasons that might lead to a technical hazard in an aircraft are

- **Engine failure of the Aircraft :**

Engines in an aircraft can fail mid air and result in severe devastation. British Airways Flight 38, in its flight from Beijing to London in 2008 crash landed just short of the Heathrow Airport with serious injuries to 47 people on board. On investigation by the Air Accidents Investigation Branch it was found that there was ice crystal formation in the fuel which prevented fuel to go to the engine leading to engine failure. United Airlines flight 232 en–route from Denver to Chicago developed engine failure mid air with its fan disk explosively disintegrating and falling from the aircraft. The same led to tearing of hydraulic systems and hoses, malfunction of instruments, disengagement of auto pilot and fuel supply controls killing 112 passengers out of 296. Though the flight was in a state of complete devastation, the experience and skill of the pilots saved the lives of lot of passengers.

- **Structural failure of the Aircraft :**

Structural failure of aircraft happens on ageing of an aircraft or improper maintenance and repair procedures. Metals after a time result in a phenomena known as "metal fatigue" where metals either corrode or develop cracks. Japan Airlines Flight 123, flying between Tokyo and Osaka, in 1985 crashed twelve minutes after takeoff in a mountain. The investigation revealed decompression that tore off the tail part of the aircraft due to fluctuating cabin pressure due to faulty repair of technicians of Boeing. The accident killed 503 passengers and 15 crew members.

- **Stalling :**

When a pilot decreases the speed of an aircraft and brings it down to a speed from where the plane cannot take a lift, it is known as stalling. Flights operating below the Stalling speed often cannot recover and the same leads to disastrous accidents. Air France Flight 447 flying from Rio de Janerio to Paris in 2009, stalled and could not recover, crashing in the Atlantic, lead to the death of 228 passengers and crew members.

- **Fire :**

Fires and Smoke have been the cause of lot air accidents and is one of the potential hazards. Electrical Short circuits in an aircraft may lead to fire and toxic resulting in loss of lives and property. A lot of structural, mechanical and procedural changes have been incorporated by Airline manufacturing and operating companies, yet the same remains a major source of concern and hazard. There have been numerous accidents in aircrafts where smoke and fire have taken a lot of lives.

1.6 ORGANIZATIONAL HAZARDS :

Aviation business is tough turf and continuity in all aspects is of prime concern. There are many case studies of different airlines that could not sustain in the market and closed down. Market leaders like Jet Airways in India could not survive the impact and closed its operations. Organizational decisions directly reflect on the management of an airline. Be it the operational, maintenance or service aspect. Hazards may arise from different sources pertaining to decision making of an organization. An aircraft that needs overhauling or replacement of parts may not be catered to because of the decision of the management to go slow upon such expenses leading to potential risk of an hazard that might be detrimental to loss of lives and property. Often Organizations cannot cope up with

the environmental changes related to the economy. A recession like the COVID 19 pandemic, that suspended major operation of all airlines, lead to retrenchment of staff from all departments. With air travel normalizing at a slow pace, airline companies too are going slow on fulfilment of positions where manpower is required, cutting back on expenses. The same may lead to a situation where there is potential risk of a hazard concerning safety issues of the aircraft. Often many organizations do not build a safety culture. Safety Culture is the way where an organization gives value and priority to safety in all aspects. Industry best practices and norms of organizations that frame policies related to aircraft safety are often compromised by airline companies, jeopardizing the safety of the passengers. Organizational decision making, perspective and culture play a very important role in adhering to standards; preventing the risk of potential hazards at every step.

1.7 HUMAN FACTORS AS HAZARDS :

Human factors are a major cause of hazards in the aviation Industry. Human errors can be disastrous and have led to many major accidents across the globe. Global committees set up for analysing accidents have concluded that around 65% to 80% of accidents and hazardous incidents took place due to human error. Psychosocial factors often play a major role in human errors and both are interrelated. In 2013, a South Korean airliner, Boeing 777, on its way to San Francisco crashed and burst into flames on a misjudged approach by the pilot. The incident led to three fatalities and over 200 people getting injured. On investigation it was found that pilot fatigue was one of the contributing factors for the accident. The major human factors that have been taken as precursors to accident or a potential hazard are

- **Lack of Communication :**

Poor communication and understanding is a major contributor to fatal situations. Often the message sent and the message interpreted is different or unclear. This often leads assumptions by both the sender and the receiver leading to heavy loss. Communication is the life line of airline operations and messages should be short and critical aspects of a message repeated for understanding.

- **Complacency :**

The state of loss of awareness and the foresight for potential dangers is known as complacency and may happen due to routine activities, stress, doing habitual tasks and many other reasons. The condition leads to reduced mental vigilance and only focus on the routine task. A lot of measures at work place can be ensured to remove complacency and induce heightened levels of alertness to prevent any potential hazard.

- **Lack of Knowledge :**

Aircraft operations are precise and complex. The lack of on the job experience and specific technical knowledge can lead to perceptive situations and bad decisions leading to disasters. Continual professional development, a right learning process, on job exposure and right training are key to knowledge that prevents assumptions and bad decisions.

- **Distraction :**

The elements that take away focus from a person's tasks are known as distractions. Distractions are the key to forgetfulness. There are some unavoidable

distractions but some can always be put aside during the job to ensure a complete focus for task completion.

- **No Team Bonding :**

The operational aspect in aviation is a team effort. A lot of stakeholders put a synchronized effort together to keep the operations error free. Team work encompasses a lot of skills and airline operations have to continually practice these skills to avoid any unfortunate circumstances.

- **Fatigue :**

Fatigue is a human problem and human beings tend to overestimate their potential to cope with fatigue. Fatigue can become a medical condition and leads to lessened ability to take decisions. Fatigue in aviation is a general problem as human beings often work against the biological clock of their body and the condition needs to be checked on a a routine basis to avoid any emergency situation.

- **Lack of Resources :**

Resources include personnel, equipments, data, tools, skills, experience and other aspects required in undertaking and completing tasks. Inadequate resources lead to inefficiency in completion of tasks leading to occurrence of accidents and hazards.

There are several other human factors like adherence to workplace standards and practices, stress, lack of positive outlook and pressure from different sources that may alter human behaviour and become potential sources of danger in a workplace.

1.8 BIOLOGICAL HAZARDS :

A biological hazard is defined as a biological agent, organism or substance that poses a threat to human health. It includes bacteria, viruses, spores and toxins that impact negatively on human health. The sources of biological hazards in an aircraft are food, the toilets, water, contaminated surfaces, and bodily substances. The COVID pandemic globally is a biological hazard and airlines across the world have been identified as carriers for spreading it globally. With a closure of operations for months across the globe, strict measures have been enforced by all airline companies to prevent its spread. The touch points where biological hazards may spread in an airline are

- Crew assisting passengers who are soiled with excreta
- Through humans that include crew, ground staff or passengers who have contracted food poisoning e.g. traveller's diarrhoea;
- Crew performing any emergency medical revival techniques on passengers with no protection
- Outbreaks of contagious disease in countries passengers are travelling from;
- Food contaminated with bacteria;
- Malfunctioning galley equipment resulting inadequately cooked or heated food;
- Soiled toilets and galleys;
- Poor maintenance of contaminated upholstery;

- Poor maintenance of ventilation and filtration systems; and
- Poor controls on water uplifts or toilet waste.

Good Personal hygiene and adoption of Standard Operational procedures is the key to ensure prevention of biological hazards. The post pandemic era has transformed the outlook towards prevention of biological hazards. Aircraft companies are now more sensitized towards ensuring a safe travel for all and adhere to global standards of prevention at source. Waste Management, Cleaning operations, Pest Control, Cabin Maintenance, Equipment maintenance, disinfection measures, food preparation and storage and critical aspects of airworthiness in relation to biological infestation are key priorities for airlines in today's operational scenario.

❑ **Check Your Progress – 2 :**

1. Identify the non–technical hazard from the options below

   a. Engine failure of aircraft b. Fire

   c. Stalling d. SARS

2. The decrease in speed of an aircraft after which the aircraft cannot take a lift is known as

   a. Engine failure b. Structural failure

   c. Stalling d. Aircraft fatigue

3. The non replacement of a faulty spare part of an aircraft during a routine check due to lack of organizational budgets is a

   a. Human hazard b. Organizational hazard

   c. Technical hazard d. Biological hazard

4. The state of loss of foresight for potential dangers by humans working in aviation is known as

   a. Complacency b. Lack of knowledge

   c. Distraction d. Lack of Team bonding

1.9 LET US SUM UP :

Hazard is a source that can cause damage, harm or adverse health effect. Hazards can affect a thing, place or human life. The source of a hazard may be a condition, a situation, an object, an activity or behaviour. Hazards according to ICAO can be classified as Environmental, Technical, Organizational and Human. Hazards can further be classified as Physical, Technical, Environmental, Chemical, Biological, Organizational, Human and Psycho social. Environmental hazards are factors that are present in the environment and pose a threat of accident or incident to airlines. Example, Weather conditions, geographical calamities, medical events, natural events etc. Technical Hazards include mechanical failures in an aircraft leading to incidents. Example, Engine failure, stalling, structural failure fire etc. Organizational hazards are those organizational decisions that affect operations and lead to incidents or accidents. Human beings are source of creating hazard due to factors like lack of communication, fatigue, complacency, lack of knowledge etc and the same are categorized as human hazards. Biological hazards include biological substances that pose threat to human health and may spread in airlines through different mediums and sources. Example, Bacteria, virus, spores, toxins, etc.

1.10 ANSWERS FOR CHECK YOUR PROGRESS :

Check Your Progress – 1 :

1. d **2.** c **3.** b **4.** a

Check Your Progress – 2 :

1. d **2.** c **3.** b **4.** a

1.11 GLOSSARY :

Hazard : A danger or a risk.

Risk : A situation involving exposure to danger.

Gale : Strong Winds.

Pitot Tube : Flow Measurement device in aircraft.

Overhaul : Take apart in order to examine and repair if necessary.

1.12 ASSIGNMENT :

1. What is the meaning of Hazard ? Explain the difference between Hazards and risk in aviation sector.
2. How many types of aviation hazards are there according to ICAO, enlist them ?
3. Explain the environmental hazards with its subcategories.
4. What are the technical hazards there in aviation sector, explain ?
5. Measures should indicate all the areas of airline operations and the role of both airline staff and passengers in preventing any outbreak.

1.13 ACTIVITIES :

1. As a student of aviation you are requested to visit an airport near you, seek appointment with the Airport Manager and meet him. In your meeting you are supposed to find out

- The list of hazards that are a challenge to the operations of flights at the airport and categorize the same under different heads.
- The measures undertaken at the airport for eradication of the existing hazards.
- The frequency of application of the measures initiated and the affectivity.

2. Indicate the global measures being undertaken by airlines globally to prevent the spread of COVID 19 pandemic and yet continue operations without the spread of the hazard.

1.14 CASE STUDY :

A pilot associated with a particular airline encountered some sudden and unexpected loss of human life in his family. The incident led to severe mental trauma and the pilot was detected with depressive behaviour. He consulted a doctor and was under medication for 2 weeks. He resumed duty after 2 weeks and was declared physically fit to resume duty. The pilot did not declare his medical condition or the treatment he undertook for depression to his organization.

a. What kind of risk can the pilot possess for the aircraft and the passengers he shall be flying ?

b. What should have been the organizational requirements for judging fitness apart from the physical criteria ?

1.15 FURTHER READING :

1. Safety Management Systems in Aviation by Alan J. Stolzer
2. www.skybrary.aero
3. www.wikipedia.org
4. www.icao.int
5. www.casa.gov.au
6. Practical Safety Management System by Gary M. Ullrich

UNIT 02

Risk Assessment

UNIT STRUCTURE

2.0 LEARNING OBJECTIVES :

- To understand Risk assessment and its aims in the aviation industry.
- To classify the different types of potential hazards in aviation industry.
- To enumerate the role of each type of hazard and study its impact.

2.1 INTRODUCTION :

The aviation industry is susceptible to many risks and probable hazards. The complex technological elements of an aircraft pose a potential source of high risk. Apart from the air worthiness and maintenances there are multiple risks associated with an aircraft and in operational spheres in the aviation industry. Risks may involve areas in aviation like passenger services, communication and navigation systems, airports, security related aspects and many more. The objective of airline, human and infrastructural safety in aviation is a continuous assessment process of identifying potential risks and implementing appropriate measures to either control the risk or minimize its impact. The unit shall acquaint you with how risk assessment is conducted in various areas in airline industry and its impact in the entire operations.

2.2 RISK ASSESSMENT :

Risk Assessment is a scientific tool to identify all the risks associated to different areas in aviation industry that has the potential to cause harm and lead to adverse situations. The proper identification and analysis of risk leads to implementation of different corrective measure that can prevent the potential impact of the risk at source. You must have seen that during boarding for an aircraft, extensive security checks are conducted for your hand baggage. Any non permissible articles found in the hand baggage are not allowed to be carried ahead in the aircraft. Airport security across the globe has a list of articles that are a potential source of risk and may be detrimental for passengers, goods and the aircraft. Risk assessment is a quality practice for operational ease in a complex operation like aviation. Any small error can have a disastrous impact. Risk assessment in any organization

- Recognizes and controls all potential sources of hazards.
- Creates awareness amongst the people working in the organization.
- Provides a base for training individuals to deal with any situation that may encompass the particular risk.
- Leads to compilation and implementation of standards and practices that leads to elimination of the risk for the future.
- Reduce the occurrence of any untoward incident in the workplace.
- Initiation of proactive measures leads to costs being saved for the organization. A reactive measure to minimize the impact of a risk may be very high often.

2.2.1 Aims and Purpose of Risk Assessment :

The primary aim of risk assessment is to evaluate any potential threats and minimize the risk by adding control measures. Assessments also raise the awareness of different types of hazards and risks. The global pandemic of COVID 19 is a threat to the world at present and aircrafts can act as a catalyst in spreading the same, if control measures are not implemented. Every country in view of the threat has devised measures according to global standards to prevent airlines from becoming a carrier of the disease. The goal of risk assessment is to find out what actually can happen from a potential risk source in a particular circumstance and the possible consequence of the risk if not controlled and measures not implemented to curb the same. A simple bottle of liquid, if allowed through security inside the cabin, may turn out to be a potential source of danger to the entire aircraft. Risk Assessment also aims to reduce anxiety from potential hazards and improves the work place environment. The purpose of risk assessments provide

- All necessary compliances with statutory laws and regulations of the land.
- Assurance regarding management of significant risks.
- Efficiency, effectiveness and efficacy in operations, projects and strategy.
- Quick and affirmative decisions giving regard to all risk considerations.
- Reduction in uncertainty in relation to any change of circumstances in which risks are present.
- Smooth operational flow with improved efficiency.

- Greater assurance and commitment from all stakeholders involved leading to increased performance.

2.2.2 Why is Risk Assessment Done ?

Risk assessment technique is adopted by organizations to reduce the quantum of failure that may affect an operation from a potential hazard. A simple crack in an airport terminal building if overlooked can be a potential source for water seepage during a heavy rain leading to property damage and in odd circumstances even water logging inside the airport. The process of assessment is a dynamic activity and often requires immediate attention in many situations. An emergency landing of an aircraft at an airport involves several hazards. The preparedness to identify the multiple risks during an emergency landing is to be fulfilled at the ground and applied to minimize its severity. Risk assessment is undertaken

- Prior to implementation of new processes or activities. In the pandemic situation crew aboard the aircraft still have to interact with passengers and attend to their needs. Though airlines undertake all precautions related to passengers, there is a high probability of risk that the crew can get affected with the virus. A new process was introduced to minimize the risk factor among crew. Airlines provided PPE kits to crew members with N95 masks and face shields. Food services on domestic flights were cancelled and mandatory health checkups before flights were introduced.
- Any changes to be brought in an existing process or activity. Security forces at the ground who conduct body scan for passengers were trained to do the process differently and not touch any part of the passenger or goods of the passenger.
- Whenever potential hazards are identified. The spread of the pandemic through aviation was identified as potential biological hazard. Immediately all countries implemented guidelines and protocols for passengers, crew and staff to ensure that the risk of spread through aviation is minimized.

2.3 RISK ASSESSMENT PROCESS :

Risk assessment techniques are a series of process steps, designed scientifically to assess the quantum of risk involved for the potential hazard, steps undertaken to minimize the impact and monitor the efficacy of the resolution technique.

2.3.1 Identification of Hazards :

A hazard is a condition or a pre–emptive condition that may lead to severe impact on human life, damage or loss to the environment. The process to identify hazards is ongoing and needs a lot of inclusive approach. Some of the ways to identify hazards include

- Implementation of Standards and Procedures at every area encompassing operations. A strict standard and protocol shall ensure high accountability on part of human or machine interventions leading to definite results. When standards are implemented deviations are easily identified and immediate checks and measures can rectify the gap that is created due to the deviation. A regular hygiene check at a food facility at an airport shall prevent any outbreak of potential food poisoning as a hazard for people at the airport. A standard deviation of the same may lead to hazards manifesting out of proportion.
- Review of Standards and Procedures is equally important aspect. Implementation of a standard that yields poor results in minimizing the impact of a potential hazard needs to be amended. Thorough scrubbing of airport public areas with high end machines without proper warning for people may lead to occurrence of accidents.
- Brain Storming is an effective medium of finding potential risks. It is a confluence of small groups that meet to generate ideas on potential solutions to hazards.
- Activities like periodic and regular maintenances repair and cleaning gives potential clues for hazards.
- Critical monitoring of processes objectively leads to easy identification of risks associated with a process and possible resolutions.
- Staff surveys and questionnaires on the nature of their job roles and potential risks encountered by them at the implementation level and very practical approach to get insight into detailed risks and implementation of potential solutions.
- External audits and hazard reporting systems are incorporated with the process of a safe environment and are incorporated as a part of safety management systems adhered by the aviation sector.

Safety Management system is a systematic approach to manage safety. The management system encompasses policy, procedures and accountability. The approach to the system is like any other management systems and especially the Quality management systems that require proper planning, organization, communication and direction. Within the framework of Safety Management System hazards are identified. The framework of Safety Management system in an organization is based on

- Safety Policy of the organization.
- The vision of the organization.

- The outlook of the organization towards safety.
- Process Development.

❑ **Check Your Progress – 1 :**

1. Risk assessment is a tool for
   a. Recognition of risk b. Control of risk
   c. Create awareness of risk d. All the options
2. Risk assessment in organizations lead to
   a. Poor operations b. Manifestation of hazards
   c. Reduction in uncertainty d. Delayed decision making
3. A hazard is a condition that may lead to
   a. Creating new system b. Loss of life and property
   c. Resolution of problems d. Poor Organizational processes
4. Which of the option is a part safety management framework ?
   a. Safety Policy
   b. The vision of the organization
   c. The outlook towards safety by organisation
   d. All the mentioned options

2.3.2 Determining Criticality of a Hazard :

Each hazard in an organization should be studied to determine the levels of risk. If in an airport terminal a moving walkway has to be installed for easy movement of passengers with their hand baggage, a potential analysis of the probable hazards need to be objectively assessed before installation. Before an installation of the moving walkway the following steps shall be undertaken

- The applicable standards and features of the moving walkway needs to be assessed.
- The industry best practices for the features of a moving walkway installed at different places need to be compared and the fitment of the best suited shall be applied.
- The research sheets, safety data sheets, manufacturing information needs to be studied and analyzed.
- The review of the organizations other installations of moving walkways need to be verified.
- The repute of the organization supplying the moving walkway needs to be reviewed.
- Involvement of an expert to judge the efficacy of the moving walkway and its suitability to the airport framework is essential.
- Information about prior injuries or accidents involving the moving walkway to be assessed and prevention of such occurrences through customization shall be put in place. A testing of the moving walkway to be undertaken.

The following steps are to be initiated for every task to determine the criticality of the hazard and how any potential risks can be eradicated at the source. There are some simple steps that organizations adhere as an early warning safety system. They are

- Internal and external communication with stakeholders makes identification and assessment of hazards easier.
- Identify severity of each hazard and rank the hazards.
- Identify present resolution and control measures and evaluate the effectiveness of each.
- Identify additional resources required to minimize or resolve the hazard.
- Record and monitor.

Hazards are ranked and categorized to measure the severity and the impact. A table as a reference from ICAO on the basis of likelihood of a hazard helps in the process.

Likelihood of Hazard	Meaning	Value
FREQUENT	Has occurred frequently and likely to occur several times	5
OCCASIONAL	Likely to occur sometimes. Has occurred infrequently.	4
REMOTE	Unlikely to Occur, but possible. Has occurred rarely	3
IMPROBABLE	Very likely to occur. Not known to have occurred.	2
EXTREMELY IMPROBABLE	Will not Occur.	1

Hazards are also categorized based on the consequence. A table to enumerate the same

VALUE	SEVERITY/CONSEQUENCE	MEANING
A	CATASTROPHIC	• Multiple deaths • Destruction of Equipment
B	HAZARDOUS	• Serious injuries • Major Equipment Damage • Large reduction in safety margins • Tasks undertaken not accurate
C	MODERATE	• Significant reduction safety margin • Injury to persons • Serious injury
D	MINOR	• Use of Emergency Procedures • Callousness of work • Operating limitations • Minor incidents
E	NEGLIGIBLE	• Few Consequences

2.3.3 Evaluation of the Risk of Hazards :

Once the critical part of a risk has been identified the next step is to find a solution to either eliminate the risk or reduce the risk. The process of evaluation

involves the practical steps to be undertaken by an organization to reduce the impact. The process is all about assessing the safety defences that the organization has to control the risk and what more the organization needs to do eliminate or minimize the same. It is a critical thinking step that proactively shall prevent the hazard from occurring. If we take the example of the moving walkway, there can be many risks that can be identified on assessment. Suppose a risk has been assessed that people above a certain age may find the moving walkway very difficult to use without assistance, evaluation of the risk will include probable solutions so that the risk identified do not turn to a hazard. Steps might include a battery operated cart to be provided for aged passengers or an escorted service depending on the organization.

Proper evaluation of risks in an organization leads to

- Working on various options to prevent or control the risk.
- Preparedness of the organization with its set of defences.
- Assessment of what measures other organizations are taking for control of the same risk (benchmarking process).
- Implementation of Industry standards and best practices.
- Identification and implementation of innovative methods of control.
- Designing of processes for risk to not occur.
- Identification of training needs for people.
- Creation of Safety manuals and prevention methods.

2.3.4 Recording of Findings and Implementation of Measures for Hazards :

This step is very important as documentation of all the risks assessed and the potential control measures that the organization has in place to control the same helps in sharing the same with people working in the organization. Once risk assessments are shared better ideas of mitigation of the risks are generated and people working in the organization become aware of the potential risks in a particular area. A risk assessment is never perfect but it should be sufficient enough to highlight the significant hazards, the people who might be affected, the precautions undertaken to minimize or eliminate the impact and involvement of people is done to generate better ideas related to minimization process. The steps to be involved in the process are

- The findings of the probable risks identified should be properly checked so that there is no false alarm in the prevalent system about risks.
- The findings should be mandatorily recorded for further dissemination of information.
- The findings can be analyzed at a preliminary level with staff and representatives to determine the level of impact and who gets impacted.
- A proper plan of action to be undertaken to chalk out different measures in containing the risk and decision to be undertaken for the operational aspects until the risk factor is mitigated.
- Creation of expert teams and committees to review and mitigate risks of hazards.
- The action plan implemented for resolution of the risk factor needs a continuous monitoring and reporting for the workability.

2.3.5 Review Assessment and Update for Hazards :

Risk Assessment is a continuous process. The steps to eliminate risks taken today might be obsolete tomorrow if there is a change in the environment or the system. Reviews keep the risk monitored and immediately create an alarm to the system, if the control measures implemented fail to work or any change has to be incorporated. The monitoring processes include time bound audits, surprise checks, trainings to check adaptation implementation of the strategies etc. Review for risk assessments need to be scheduled and a calendar prepared for different kinds of risk factors that have been mitigated. The risk assessment needs to stay up to date and reviews are proactive steps to curb risks at the initial levels. Some of the measures may include

- Inclusion of internal and external audits through different agencies and teams round the year for different level of risks.
- Create a team for audits and feedback internally for different areas of aircraft operation.
- Training of team for audits and safety related aspects and determining risk levels.
- Communication to all staff members related to importance of audits and schedules.
- Communication of results of all audits to staff members through company education program.

❑ **Check Your Progress – 2 :**

1. Practical solutions for potential hazards can be identified through
   a. Staff survey and Questionnaire b. Audits
   c. Hazard Reporting System d. All the options
2. Hazard classified with Value 5 by ICAO has likelihood of occurrence as
   a. Remote b. Improbable c. Frequent d. Occasional
3. Hazard categorized as Value C is
   a. Catastrophic b. Moderate c. Hazardous d. Negligible
4. Continuous review of identified hazards can be done through
   a. Regular audits b. Continuous monitoring
   c. Thorough Communication d. All of the options

2.6 LET US SUM UP :

Risk Assessment is a scientific tool to identify all risks associated with different areas of the aviation industry. The process recognizes controls, creates awareness and leads to development of standards and procedures for elimination of risks at all levels. Proactive risk management and assessment leads to organizations saving a lot of money and lesser impact. Risk assessments lead to efficiency, efficacy and effectiveness of operations and help the management to undertake quick and affirmative decisions. The uncertainty in lot of circumstances is reduced leading to involvement and commitment from all the stake holders. The risk assessment process in any organization is structured and happens in different stages. It starts with identification of hazards or potential risks in different areas of operations. The criticality of each risk identified is assessed,

ranked and evaluated for necessary review and action to be undertaken. Risk assessment is a team effort of an organization and involves commitment of people at all levels working in the organization.

2.7 ANSWERS FOR CHECK YOUR PROGRESS :

Check Your Progress – 1 :

1. d **2.** c **3.** b **4.** d

Check Your Progress – 2 :

1. d **2.** c **3.** b **4.** d

2.8 GLOSSARY :

Risk : A situation involving exposure to danger.

Assessment : The act of evaluating something.

Efficacy : The ability to produce a desired result.

Protocol : Set of rules or procedures.

Brainstorming : The method of generating ideas and sharing knowledge.

Improbable : Not likely to happen.

Audit : On Site verification activity

2.9 ASSIGNMENT :

1. What is the concept of risk in terms of aviation sector ? Explain the meaning of term risk also.
2. What are ways of doing risk assessment in an organisation ?
3. Explain the need of risk assessment for the organisation.
4. How risk assessment is carried out in aviation sector, explain the process ?
5. Write a short note on the implementation of measures for hazards

2.10 ACTIVITIES :

1. In an airport terminal, list the risk prevention activities undertaken by airline and security staff related to Check In and Hand Baggage.
2. You have joined as a cabin crew for Airline X. As a crew member what are the areas in your operational domain that involve high risks and how would you assess the risks for these areas. (Indicate each area in the operational sphere and categorize the risk level).

2.11 CASE STUDY :

A passenger en–route an international flight to India was offered complimentary cocktail. The passenger consumed the same for the first time. He liked the taste and ordered 3 rounds and drank. After a short duration, the passenger started losing control on him and became abusive with the air hostess, who refused to serve him more drinks. He entered into a brawl with co–passengers who tried to pacify him. After some time he fell down on the floor of the aircraft and lost all his senses. His health started deteriorating and the flight had to be force landed at an unscheduled destination. The passenger was offloaded for medical assistance and further course of action leading to delay in the journey of the flight.

a. What are the potential risks involved in serving alcohol on long haul flights ?

b. How would flight attendants assess the risk of passengers becoming unruly and abusive ?

c. What steps can be taken to prevent occurrence of such incidents inside a flight ?

2.12 FURTHER READING :

1. Aviation Risk and Safety Management– Methods and applications in aviation organizations by Christopher Drax, Andreas Wittmer and Roland Muller.
2. Safety and Risk Management of Civil Aircraft by Li Longbiao
3. Risk Management Handbook by Federal Aviation Organization
4. www.skybrary.aero
5. www.faa.gov
6. http://aviationsafetyblog.asms–pro.com

UNIT 03

Controlling Risks of Hazards

UNIT STRUCTURE

3.0 LEARNING OBJECTIVES :

- To classify controls and the ALARP model of risk controls.
- To list the ALARP approach for containing risks.
- To enumerate the hierarchy of risk control and list the steps for application of controls.

3.1 INTRODUCTION :

Safety is typically managed through a risk management cycle which includes the stages of hazard identification, risk assessment, risk mitigation and risk monitoring. "Risk mitigation or elimination of risks is achieved through introduction of risk control various types depending on the available resources and the degree of the desired control over risks". (ICAO,2013, Kaspers et al 2016). Risk is the probability that any hazard may cause harm to people, property, environment and even business. Risks at every level need to be controlled so that everyone working in the organization can feel safe and confident. In the earlier unit you have learnt about assessment of different types of risks based on different tools. In this unit you shall learn about procedures for controlling risks in aviation by use of different mechanisms or control procedures. Risk control procedures are organization's defence mechanism against probable hazards and lead to smooth operations. In a highly dynamic environment like aviation, sources of risks leading to hazards can be many. Whatsoever the source of the risk may be, it often leads to disastrous consequences for an organization. Controlling of risks that may turn potential hazards are important in all aspects for the organization.

3.2 THE ALARP MODEL OF CONTROLLING RISKS :

ALARP is an acronym used for AS LOW AS REASONABLY PRACTICABLE or the similar ALARA that is used and stands for AS LOW AS REASONABLY ACHIEVABLE. The acronyms are principles related to identification and control of 3 types of risk.

- **Unacceptable Risks :**

Any practice that involves a very high element of risk and might transform itself into a potential hazard, is an unacceptable, howsoever, beneficial the practice or the activity may be. An unacceptable risk needs to be eliminated or reduced. Eg. Passengers while disembarking from an aircraft often try to pose for a photograph of them standing near the propellers which is absolutely unacceptable.

- **Tolerable Risks :**

These are risks that are properly assessed and do not have the probability of becoming a hazard. The risks are tolerated to secure the benefits and are always reviewed from time to time so that the threat potential of the risk remains constant and do not change. Eg. In lot of small airports with no transportation facilities, the potential risk of pedestrians walking between the terminal and the aircraft can be permitted if there proper barricading and lighting systems in place.

- **Broadly Acceptable Risks :**

These are risks that have very low potential of becoming a hazard and are well controlled. Risk reduction for these types of risks, are only possible if measures are practically viable in their outlook. Eg Movement of vehicles with permit inside the tarmac of an airport through a guided path is an acceptable risk and world over the same is followed despite amount of risk in the operation.

3.2.1 The ALARP Approach :

UNACCEPTABLE REGION	Risk cannot be justified unless circumstances are extraordinary
TOLERABLE REGION	Risk is tolerable only if • Further risk reduction is impracticable • Cost of risk reduction is disproportionate to the improvement gained. • The benefit of risk is higher than associated risk.
BROADLY ACCEPTABLE REGION	The level of risk is negligible and the measures to reduce the same are not required.

In the ALARP (As Low as Reasonably Practical Approach) a number of criteria have to be considered to find out whether a risk can be categorized as tolerable or intolerable. The criteria enumerated are as

- **Legal Requirements :**

Aviation organizations work as per the regulations implemented by different countries in which they operate. To decide a risk under a particular category is largely dependent on the laws of the country in which the operations is undertaken. In some countries the entry into the country requires vaccination against certain types of diseases as a legal requirement for that country. The same may not be applicable to other countries as the potential risk of the disease for which vaccination is mandatory may not exist.

- **Expert Opinion :**

Expert opinion is considerably valuable to determine whether a risk is acceptable or unacceptable. A group of experts from various disciplines of aviation across the globe are work continuously on risk assessments and ways of reduction. A lot of aviation bodies as well as aviation operational organizations have their own team of experts who chalk out the safety benefit of different risks. Experts primarily analyse ways to eliminate or reduce the risk in reference to various costs associated in doing the same and the benefits.

- **Cost Benefit Analysis :**

Controls on risks often may involve a lot of other infrastructure that may be expensive than the impact of the risk itself. Before controls on risks are introduced for elimination or subsequent reduction of the risk component, studies are conducted on the practicability of the means used in the same. Costs become a major element in the study and cost that is involved in the implementation is studied against the safety benefit the measure provides involving the cost.

- **Industry Best Practices :**

Often a particular risk can be considered as tolerable or intolerable based on best practices followed in the industry. The results that these practices practically demonstrate without incurring any additional cost are considered to be best practices. A particular risk in an industry may be categorized as tolerable and the status of the same maintained without incurring a lot of costs and following certain strict processes and procedures, the same can be replicated in other industries too as a best practice adopted.

❑ **Check Your Progress – 1 :**

1. ALARP stands for

   a. As low as reasonably practicable

   b. As Light as Reason and Practice

   c. As low as Reason and Practice

   d. None of the above

2. ALARP model categorizes risks under the heads

   a. Unacceptable, Intolerable, Non Acceptable

   b. Unacceptable, Tolerable, Broadly Acceptable

   c. Acceptable, Intolerable, Non Acceptable

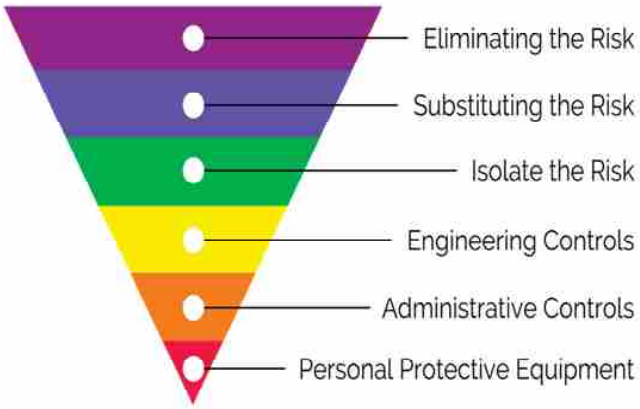
   d. Acceptable, Tolerable, Broadly Acceptable

3. In a risk categorized as Tolerable
   a. Further risk reduction is practicable
   b. Further risk reduction is mandatory
   c. Further risk reduction is impracticable
   d. Further risk reduction is time saving
4. Criteria involved in implementation of ALARP are
   a. Cost Benefit Analysis b. Legal Requirement
   c. Expert Opinion d. All the options

3.3 THE HIERARCHY OF RISK CONTROL :

Across the globe no organization or industry is free from risks and these organizations work towards reducing risks to levels as low as reasonably possible (ALARP). The ALARP region if plotted generally lies between unacceptably high and negligible risk levels. The ALARP level normally achieved by organizations when the time, trouble and the cost of further reduction of risks become unreasonably disproportionate to additional risk reduction. Operationally to manage risk at ALARP levels, organizations work on various mechanisms of risk management through improving procedures, collecting continuous feedbacks, improving technological inputs, managing change and upgrading processes continuously.

You have studied about intolerable and tolerable risks and how ALARP principles are implemented to reduce the impact. The hierarchy of control is a pyramid of steps that is considered in sequence when evaluating the ways to remove or reduce a discovered risk. Each step in the pyramid is considered but preference should be given to control measures higher up the hierarchal structure than those at the bottom. The most effective risk control will often also come from implementing a number of levels from the hierarchy simultaneously. The approach is structural that ranks the severity of the risks and plans different actions corresponding to the same to control the risk.



Hierarchy of Risk Control Structure :

The Hierarchy of Risk control structure works on a descending level of effectiveness in risk control. The Levels 1 to 3 as mentioned below are preventive actions and reduce risk by design and substitution measures. These measures provide a more long term solution in risk management and mitigation. The levels 4 to 6 in the hierarchy of control structure depend on the performance of people working in the organizations and mitigation of risks depends on their performance. To enumerate the different levels

- **Eliminating the Risk (Level One) :**

Eliminating the risk is the highest level in the hierarchy. Removing a risk completely is always the preferred option when available as it means there is zero chance of a future incident occurring. If hazards are eliminated from the design and the redesign process, risks that derive from these hazards are also eliminated. While it may not be possible to remove the risk completely in most cases, it should always be the first control measure explored. An example of risk elimination could be providing extending poles operated from the ground to access a high window latch rather than requiring climbing a ladder, which presents a risk of falling.

- **Substituting the Risk (Level Two) :**

The next level down in the hierarchy is risk substitution. Risk substitution is the process of removing a risk by replacing it with another risk that is either less likely to occur or less severe in its potential damages. Substitution is less preferred to eliminating the risk completely as it still leaves a risk present, albeit in a reduced form. An example of risk substitution could be to replace noisy equipment with a quieter option or it could be replacing a highly toxic chemical with a less dangerous version. It's important to conduct a new risk assessment after the substitution has been completed to identify any new risks created by the substitute process.

- **Isolate the Risk (Level Three) :**

The third level in the hierarchy is risk isolation. Risk isolation is performed by placing some form of barrier between the employee and the risk factor in order to provide protection. The key difference between this level and risk elimination (level one) is that the risk is still present, with the employee only shielded from it by the barrier. If the barrier were to fail or require bypass the risk would return to being uncontrolled. Risk isolation could be enacted by placing dangerous machinery in a separate room from the operating and installing remote control systems.

- **Engineering Controls (Level Four) :**

Engineering risk control is the process of designing and installing additional safety features to workplace equipment. These controls act as warning systems and depends a lot on administrative controls, training , quality of maintenance and people's reactions. Safety features could be installing more stringent ventilation systems in noxious environments or installing guardrails on a raised walk–way to prevent risk of accident and incidents.

- **Administrative Controls (Level Five) :**

Level five of the hierarchy is administrative controls. These are measures the management and chain–of–command can implement to reduce the likelihood of a risk occurring. Measures could include providing dedicated training targeted at the risk or arranging work schedules to limit exposure times in hazardous environments.

- **Personal Protective Equipment (Level Six) :**

The final level in the hierarchy of risk control is the use of personal protective equipment (PPE). It's likely that this level will be utilised regardless of what other levels are also being used to control a risk, however, it remains at the bottom of the hierarchy as it doesn't remove or reduce the risk itself. Instead, this level is designed around assuming an incident will occur and protecting the

employee from harm when it does. Personal protective equipment is items such as hard–hats, noise–reducing ear protection, or cut–resistant gloves.

3.4 DETERMINING CONTROLS FOR IMPLEMENTATION :

It is very difficult for any organization to decide sometimes on what controls would work the best in different situations. Decision making of what type of controls is to be implemented depends on a number of factors. To enumerate the factors include

- Operational demands to perform the task. The decision of the level of control to be implemented for risks depends on operations and the needs of the operations. Often operations might implement a higher level of control in place of a lower one depending on the situation and the need.
- Regulatory authority compliance is one of the decision making factors in implementing the level of control for a particular risk. What may seem to be a lower level risk in a particular country may be treated as a higher level risk by authorities of another country.
- Management of any organization plays a vital role in implementation of a particular control measure keeping the cost factor as one of the important benchmarks for decision making. The amount of money required at a particular level for risk mitigation shall yield the value spent.
- The framework of risk management as prepared by the organization involves people, processes, technology and other aspects that provide a reliable decision making support for implementing the right type of controls.
- Decision making for the level of control depends on practicality (i.e. the extent to which mitigation can be implemented and how appropriate it is in terms of available technology, financial and administrative resources, legislation and regulations, political will, etc.), acceptability (i.e., the extent to which the alternative is consistent with stakeholder paradigms), enforceability (i.e., the extent to which compliance with new rules, regulations or operating procedures can be monitored), durability (i.e., the extent to which the mitigation will be sustainable and effective), residual safety risks (i.e., the degree of safety risk that remains subsequent to the implementation of the initial mitigation and which may necessitate additional risk controls) and unintended consequences (i.e., the introduction of new hazards and related safety risks associated with the implementation of any mitigation alternative) (ICAO 2013).

3.5 STEPS FOR APPLICATION OF CONTROLS :

The definition of effectiveness is "the degree to which something is successful in producing the desired outcome" (OED, 2017). The effectiveness of a risk control provides information on how many times the risk control is addressed in tackling a particular hazard or risk and how many of these times the risk control performs according to the desired outcome of the specific risk control. The steps involved in application of risk control are

Step 1 : Identifying the risk control measures prevalent in an organization and describing all the sets as precisely as possible for measuring the effectiveness of the control.

Step 2 : Determine to identify the failure of the risk control. There may be different reasons for failure of risk control.

Step 3 : Determine whether it is possible to identify a situation to test the risk control measure.

For instance, a hand–held fire extinguisher carried in the cabin of an aircraft is a control against small fires in the cabin. A test of the risk control is an attempt to use the extinguisher to put out a fire in the cabin.

Step 4 : Select time period for testing the risk control. The same can be done according to the control measure so that in a real life scenario the control is effective.

Step 5 : Collect Data for effectiveness judgement and analysis.

Step 6 : Calculate Actual Effectiveness of the Control measure

❑ **Check Your Progress – 2 :**

1. Level 1 of risk control structure determines
   a. Elimination of risk
   b. Engineering controls
   c. Isolation of risk
   d. Personal Protective Equipment
2. Engineering controls are
   a. Adding new equipment
   b. Installing additional safety to workplace equipment
   c. Repairing old equipment
   d. All the options
3. Level 2 of Risk control structure determines
   a. Administrative controls
   b. Isolation of risk
   c. Substitution of risk
   d. Elimination of risk
4. The risk control measure that does not remove or reduce the risk itself is
   a. Elimination of risk
   b. Engineering controls
   c. Isolation of risk
   d. Personal protective equipment

3.6 LET US SUM UP :

Risks at every level in the organization need to be controlled to prevent any disastrous consequences. The ALARP (As low as reasonably achievable) model are principles related to identification and control of majorly 3 types of risks. The categories in ALARP are Unacceptable risks(risks with very high probability of transforming to hazards), Tolerable risks(risks that do not have the probability of transforming into hazards), Broadly Acceptable risks (risks with low potential of becoming a hazard but are well controlled). The ALARP approach works on definite measures of control to be undertaken for each category of risk. The measures implemented for controls follow certain criteria and practices. Controlling of risks follow a hierarchy involving different levels. Implementation of a definite level in the hierarchy depends on a lot of factors within the organization that includes operational demands, regulatory compliances and a definite framework of risk management decision making.

3.7 ANSWERS FOR CHECK YOUR PROGRESS :

Check Your Progress – 1 :

1. b **2.** b **3.** c **4.** d

Check Your Progress – 2 :

1. a **2.** b **3.** c **4.** d

3.8 GLOSSARY :

Control : To order, limit or rule something.

Tolerable : Fairly good.

Substitution : The act of using a particular thing in place of another.

Personal Protective Equipment : Equipments worn to minimize exposure to hazards.

Elimination : Complete removal.

Isolate : Examining something apart from others.

3.9 ASSIGNMENT :

1. Discuss the ALARP model of controlling the risks with its types.
2. What are the criteria for to find out tolerable or intolerable risk ?
3. Write a short note on Hierarchy of risk control.
4. What are the steps to apply control in an organisation ?
5. What are the factors of implementing types of control ?

3.10 ACTIVITIES :

1. You have been assigned to design a part of the operational area inside the terminal building for setting up of a check in counter for your airline operations. In event of a fire what are the control measures that you should incorporate in your design plan to mitigate any potential risks.
2. For different passengers travelling during the COVID 19 pandemic, there are different situations and risk levels that may arise in aviation operations. List the hierarchy of control applied for different risk levels involving passengers and staff.

3.11 CASE STUDY :

At an airport terminal the authorities purchased a machine for scrubbing and polishing the flooring of the terminal from abroad and imported the same at a cost of six lacs. The machine was used on the premises for 7 days for the purpose it was purchased. The floor became appeared more shiny and clean than before. After the 7th day the floor started getting slippery. The first accident happened on the 8th day when a lady passenger slipped and fell with her luggage. Within the next few days there were at least 30 cases of people slipping and some even falling down. The use of the machine was stopped as it led to a high risk.

a. In relation to the machine being used for cleaning what risk elements should have been assessed before the purchase ?

b. Is the control measure applied justifiable in relation to the cost of the machine ?

c. What better control measure can be applied in the above scenario ?

3.12 FURTHER READING :

1. Aviation Risk and Safety Management – Methods and applications in Aviation Industry – Springer.

2. www.skybrary.aero

3. Aviation Risk and Safety Management – Methods and Applications in Aviation Organizations by Christopher Drax, Andreas Wittmer and Roland Muller.

4. www.wikipedia.org

BLOCK SUMMARY

The units in the block provide an insight defining risks and hazards that are an integral part of aviation operations. Hazards are classified under different heads and identification of each category of hazard and segregating them is essential to make operations smooth and efficient. Each hazard possesses a different type of threat and risk and requires correct resources for identification and determination of its criticality. Evaluation and categorization of hazards according to global standards is essential and the unit makes you aware of the various categories. Recording of findings for different categories of hazards is necessary for effective review and monitoring. The last unit in the block highlights the various types of controls that can be applied on potential hazards for mitigation of risks. The ALARP principle is a technical tool used in the aviation industry and you are acquainted to the same. The different hierarchies used in controls determine the type of control required in relation to a particular hazard and evaluate its effectiveness.

BLOCK ASSIGNMENT

Section – I : Short Question Answer

1. Define Hazard ? Classify hazards under different heads and enumerate on the same ?
2. What is risk assessment ? Why is risk assessment required in organizations ?
3. Enumerate the purpose of risk assessment in relation to the aviation industry ?
4. Write a short note on organisational hazard.
5. What are the different hazards due to human factors ?
6. How biological hazards may spread due to airline sector ?
7. Explain the hierarchy of risk control in detail ?

Section – II : Long Question Answer

1. Describe the stages of risk assessment process and their importance in aviation ?
2. What is ALARP approach in risk control ? How does this approach benefit in the aviation industry ?
3. "Risk Assessment is a scientific tool to identify all the risks associated to different areas in aviation industry." Discuss the statement.
4. Write a detailed note on review assessment and updates for hazards.

❖ **Enrolment No. :** ☐

1. How many hours did you need for studying the units ?

Unit No.	1	2	3
No. of Hrs.			

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

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AVIATION HAZARDS

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ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self- instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual- skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is

particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self- instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)

PREFACE

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included many tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect. All the best for your studies from our team!

AVIATION HAZARDS

Contents

Dr. Babasaheb Ambedkar Open University Ahmedabad

BBAATR-203

Aviation Hazards

BLOCK 2 : SAFETY MANAGEMENT

SAFETY MANAGEMENT

Block Introduction :

In the previous block you have studied about the ways of identifying, assessing and mitigating different types of risks that may become potential hazards and jeopardize safety. In this block you shall acquaint yourself to the application of an entire set of principles of the management process in a defined framework, related to safety in aviation known as Safety Management System. Safety Management System is understood as an application of a set of principles, process, framework and measures to prevent adverse conditions, incidents, accidents or injuries, caused by the use of a product or a service. The block shall enumerate on different concepts related to management of safety, discuss best practices followed and implemented by global organizations, analyze on the human and organizational contribution towards managing a safety culture and imparting the concepts of building a Safety culture at the workplace.

Block Objectives :

- To understand the concept of safety management and list the essential elements and key ingredients required in building a safety culture in aviation.
- To discuss the benefits and best practices followed by safe aviation organizations across the globe.
- To understand the conditions for human and organizational concept of safety and list the controllable factors for measuring human performance and safety.
- To understand the concept, purpose, principles and goals of Safety from perspective of ICAO.
- To enumerate different aspects included in the ICAO global safety plan.
- To understand the role and function of global bodies and agencies in managing and implementing aviation safety globally.
- To enumerate on Safety culture and its importance in aviation operations.

Block Structure :

UNIT 01

Fundamentals of Safety Management System

UNIT STRUCTURE

1.0 LEARNING OBJECTIVES :

- To understand the concept of safety management and its role in aviation.
- To list the essential elements and key ingredients required in building a safety culture and enumerating the benefits of the same.
- To list practices followed by safe organizations across the globe.
- To enumerate the benefits of Safety Culture.

1.1 INTRODUCTION :

Safety is key concern for businesses across the globe. A precise and complex operation like aviation has to put safety as one its prime priority in its business operations. The entire team of professionals engaged in the aviation business work round the clock to keep passengers, crew, aircrafts and goods safe from any threat or hazard. You must have seen airhostesses telling all the passengers to fasten their seat belts during takeoff or landing. The process is undertaken with due diligence to ensure that passengers do not get hurt or are not thrown away from their seats in event of any emergency. The process is a global standard for safety and is followed by every airline of the world to prevent

adverse incidents. You have studied about risks and assessment of risks undertaken minutely at every level of aviation operations in the previous block. Mitigating these risks in day to day operations in a consistent way through controllable solutions is a management process. The application of entire set of principles of the management process in a defined framework, related to Safety is known as Safety Management System.

1.2 SAFETY MANAGEMENT SYSTEM :

Safety Management System is understood as an application of a set of principles, process, framework and measures to prevent adverse conditions, incidents, accidents or injuries, caused by the use of a product or a service. An airhostess while serving hot tea to a passenger seated next to the window on row A accidentally drops it on the passenger seated on the aisle in row C during service. The above may be a small incident but it involves a lot of scope for assessment on safety issues related to service. It provides an insight into how the task can be undertaken in a different way so that the potential risk of dropping any food or beverage on another passenger can be eliminated. The small safety incident provides an assessment of the risk factors involved during service, leading to probable solutions and creation of procedures and standards for mitigating the same and creation of a definite framework for adherence. The control processes implemented shall be further monitored to ensure scope for improvement.

Safety Management helps in designing the operational flow and makes the system easier to function without chances of potential risks. It takes into account the system deficiencies and identifies predictable resolution measures before errors or potential risks become hazards. Safety management as a concept involves everyone working in an organization and is driven by the top management of the organization with definite distribution of responsibilities and accountabilities. The concept lies in creation of a safety culture within the organization.

1.2.1 Safety Culture :

The uniformity in following the standard laid down practices in an organization related to safety is known as Safety culture. It is a set of norms, beliefs and attitude of people working in organization, towards the concern for safety. The coherent effort towards safety reduces the exposure of people to conditions considered as dangerous or hazardous. The characteristic of any culture building starts from the top management and safety as an utmost priority of business too is initiated by the decision makers in an organization. The modelling of Safety culture according to ICAO guidelines include

- The senior management's involvement and emphasis on safety is of strategic importance for controlling risks within an organization.
- Activities in an organization involve hazards and the cumulative perspectives of decision makers and operational personnel lead to a realistic projection of short term and long term impacts.
- A positive environment of undertaking feedback regarding safety issues from lower ranks is incorporated to build the climate for easy identification of safety concerns and resolutions.
- Mechanisms are designed by decision makers to disseminate information and awareness related to safety measures at all levels of the organization.

- Promotion of realistic and workable rules related to safety and hazards are endorsed and supported throughout the organization.
- Regular training of personnel across the organization.

1.2.2 Safe Organizations :

Safe organizations across the globe

- Consider safety as an organizational objective.
- Consider it as a factor in contribution to achievement of organizational goals.
- Have framework of risk management in place and has a balance between risk management and operations.
- Follow a transparent safety culture within the organization.
- Follow standardized and consistent decision making processes related to safety without any compromises.
- Rely on internal responsibility of implementing safety.
- Work on proactive measures rather than being dependant on audits or other reactive elements to achieve the organizational objectives of safety.
- Ensure long term measures are implemented to mitigate safety risks and short term measures to control active failures.

❑ Check Your Progress – 1 :

1. Safety Management system takes into consideration

   a. System deficiencies b. Predictable resolution

   c. Involvement of everyone d. All the options

2. Modelling of Safety culture according to ICAO involves

   a. No requirement for training

   b. No involvement of management

   c. Positive environment for undertaking feedback

   d. Poor communication channel

3. Safety in aviation is

   a. Personal Objective b. Organizational objective

   c. Manager's objective d. Owner's objective

4. When people working in organizations know about humans, systems, machines and environmental factors thoroughly, the organization is following a

   a. Informed Culture b. Just Culture

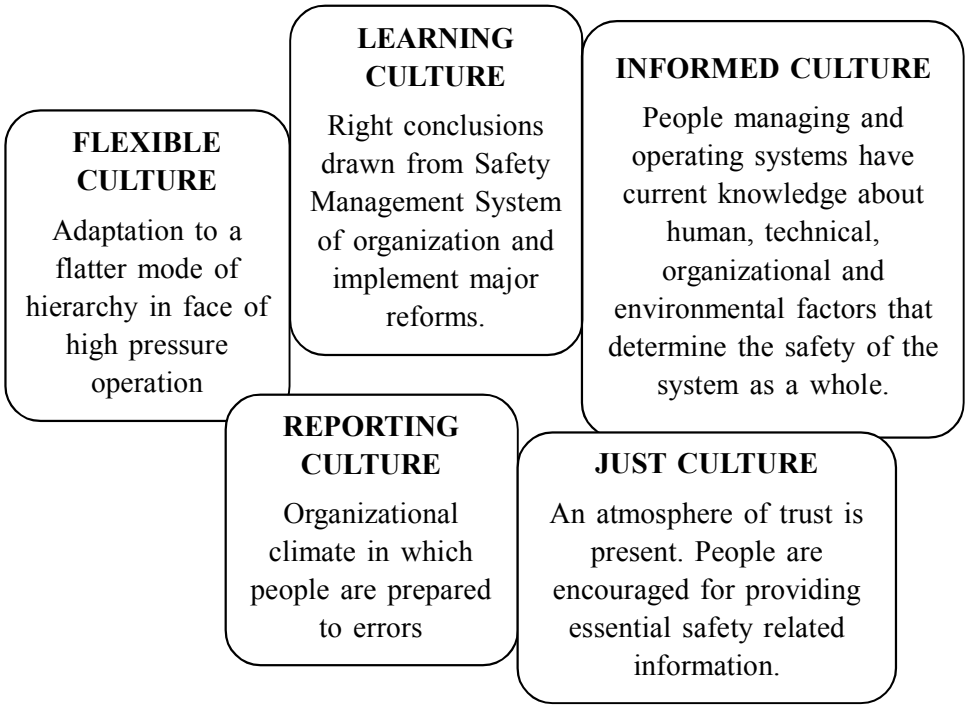
   c. Reporting Culture d. Flexible Culture

1.3 KEY INGREDIENTS OF SAFETY CULTURE :

The 5 Key ingredients of Safety Culture are

- **Informed Culture :** The people managing the system in an organization have knowledge about human, technical, organizational and environmental factors that determine the safety of the system as a whole.

- **Learning Culture :** The willingness of an organization to learn from its competence and experience the aspects related to safety and implement major reforms.
- **Flexible Culture :** Safety concerns change in operational perspective as they operate in a dynamic environment. The organization's adaptability to change with the environment determines its willingness and commitment to safety.
- **Reporting Culture :** The development of an organizational climate where people willingly report errors and challenges related to safety aspects and the organization works towards solutions for better implementation.
- **Just Culture :** People encouraged and rewarded for bringing essential safety related information.



1.3.1 Benefits of a Safety Culture :

The benefits of implementing a safety culture in an organization is manifold and to enumerate they are

- Safety Culture in an organization generates trust amongst all the stake holders of the organization. It leads to a positive attitude, customer satisfaction and more business.
- Safety culture leads to better control on the performance of the resources and probable losses that the organization may incur due to the same.
- The implementation of the culture initiates better audit systems in the organization. The organization becomes more open and incorporates a positive outlook to external feedback.
- Thorough audits and implementation of changes increases the index of performance in the organization leading to a positive impact on the return of investment and a continuous and much better approach to implementation of a robust Safety Management System.

1.4 ICAO GLOBAL PRACTICES ON SAFETY MANAGEMENT :

Globally the apex body guiding the entire aviation operations around the globe sets standards in aviation safety management. The airline operators work within the framework of the ICAO global practices to implement the industry best practices on safety management. Safety is a state where incidents that may cause harm are reduced. The incidents occurring are maintained at a rate that is practicable and continuous process is implemented in its reduction. Management includes the principles and directives formulated through planning, organizing, directing and controlling of incidents that may cause harm and ensure a safe environment. The 4 major components that ICAO indicates for its framework for safety management are

- Safety Policy and Objectives
- Safety Risk Management
- Safety Assurance
- Safety Promotion

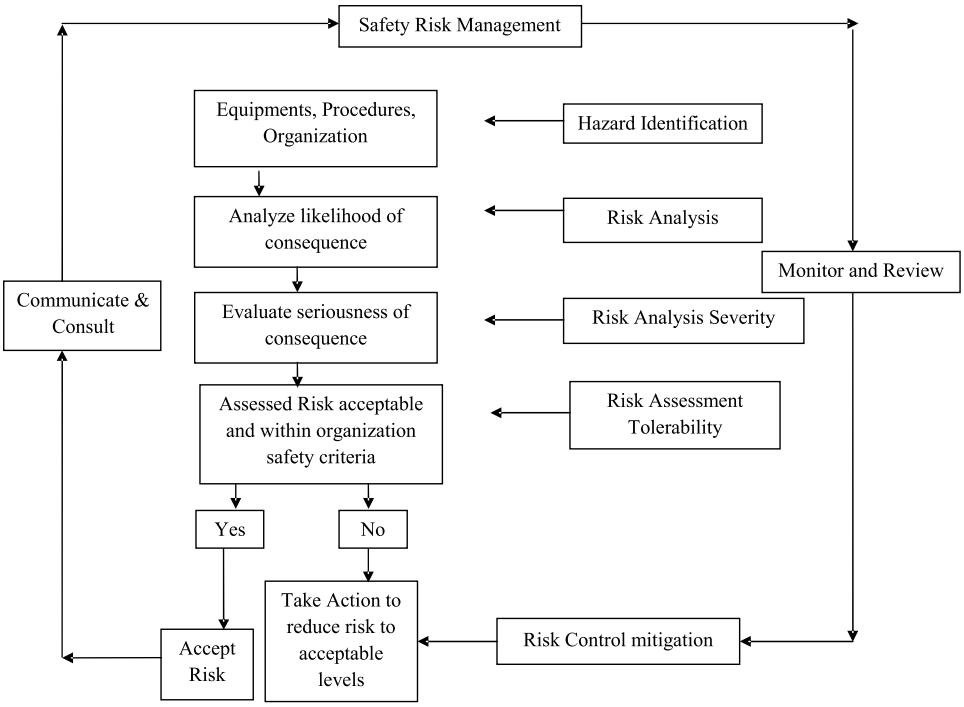
1.4.1 Safety Policy and Objectives :

The management of organizations across the globe work towards formulating the policy and objectives and their outlook towards safety within the operation. It encompasses

- Commitment of management to safety in organization as a priority.
- Responsibility and accountability of senior management to provide resources necessary for safety management.
- Management support for building a safety culture.
- Strategizing of SMART objectives to imbibe safety aspects into operations.
- Formulating a safety team to establish safety strategy and goals.
- To disseminate policy and objectives across the organization.
- Assigning roles and responsibilities concerned with safety for implementation.

1.4.2 Safety Risk Management :

Risk Management is an important component of the safety management system and involves the approaches to identification of hazards, assessing risks and reducing the potential of the risks to cause any harm. A graphic flow chart easily explains the concept of safety risk management which is an integral part of the safety management system for any organization.



1.4.3 Safety Assurance :

Safety Assurance is a systematic process for recording the safety performance of an organization. It includes activities lie safety investigation, managing change, monitoring, analysis and improvement. According to Commission regulation of the European Union, all planned and systematic actions necessary to afford adequate confidence that a product, a service, an organisation or a functional system achieves acceptable or tolerable safety is known as Safety Assurance. The ICAO provisions for safety assurance components include

- **Safety Surveys :** They are adhered in a routine manner and the key objective lies in recommendation of improvements wherever needed. Surveys also act as a tool of assurance for people working in different areas related to safety of activities being carried out in conformance to applicable procedures of the safety management system.
- **Safety Monitoring :** Monitoring ensures that all processes and procedures are in place to detect any changes in systems or operations. The monitoring activity helps in indicating amendments of any standard pertaining to the activities being undertaken within the framework of the safety management system.
- **Safety Records :** Safety records are important element of the Safety Management System operations and are the basis for providing safety assurance to all associated with, responsible for or dependent upon the services provided, and to the safety regulatory authority. Safety records include all documentation produced and maintained throughout the operation of the Safety Management System processes, including the risk assessment and mitigation documentation.
- **Management of Change :** The management of change should ensure that required safety performance is achieved by reducing or eliminating the safety risks resulting from the changes in the organisation, the provision of services or in the operational environment.

- **Continuous Improvement of the Safety Management System :** The aviation service provider organisation shall develop and maintain a formal process to identify the causes of sub–standard performance of the Safety Management System, determine the implications of sub–standard performance in operations, and eliminate such causes.

1.4.4 Safety Promotion :

Safety Promotion is important for the entire Safety Management System implemented by any organization. The promotion of safety within the framework of the system happens through basically 2 elements Safety Training and Safety communication. The aspects lead to the creation of a strong foundation for a Safety Management System. It creates awareness about the safety aspects that the organization has set as key objectives in its operational execution and builds a safety culture. With proper training new skills and knowledge are built for safety and better adherence of the processes laid down by the organization are followed. Overall safety promotion leads to best practices being followed by everyone in the organization.

Safety Management system has to be driven down in an organization from the top level management. Organizations undertake different approaches to find a workable system within the organizational framework. Safety Management Systems are blend of Reactive style of approach and a Proactive style of approach. The reactive style is a traditional approach and helps in dealing with unusual and sudden events that are beyond the control of risk assessment techniques. The approach works towards immediate compliance with minimum safety requirements to eliminate any risk. The proactive approach is based on risk management strategy. It is a modern approach where hazards are identified before they can lead to incidents or accidents. The system works in a structured way putting safety policies in place with hazard identification, risk assessment and reporting systems in place. There is a safety monitoring system that is implemented and safety training and dissemination of the learning throughout the organization

❑ Check Your Progress – 2 :

1. Organizations where people willingly report errors follow
   a. Flexible culture b. Just culture
   c. Informed culture d. Reporting culture
2. Safety culture in an organization generates
   a. No Customer Satisfaction b. No Control
   c. Trust amongst all d. No control on performance
3. Documents and guideline on thermal screening of passengers prior to entering an airport is a part of
   a. Safety Risk Management b. Safety Assurance
   c. Safety Policy d. Safety Survey
4. Entering data for safety in system is known as
   a. Safety Records b. Safety Monitoring
   c. Management of Change d. Safety Promotion

1.5 LET US SUM UP :

Safety Management System is an application of a set of principles, process, framework and measures that are implemented in organizations to prevent adverse conditions, incidents or accidents. Safety management system designs operational flow and makes the function of a system easier. Safety management system involves everyone working in an organization with distribution of responsibilities and accountabilities. The entire concept of safety management system is driven by the top management and leads to formation of a culture that takes into account safety as a prime aspect. Safe organizations globally work on a coherent proactive strategy implementing long term measures to mitigate risks and failures. Culture of organizations following safety has certain key ingredients that differentiate one organization from the other. ICAO, the apex body formulating global norms in the aviation sector, indicates major components for its framework in safety management. It includes safety policy and objectives, safety risk management, safety assurance and safety promotion.

1.6 ANSWERS FOR CHECK YOUR PROGRESS :

Check Your Progress – 1 :

1. d **2.** c **3.** b **4.** a

Check Your Progress – 2 :

1. d **2.** c **3.** b **4.** a

1.7 GLOSSARY :

Safety : Condition of being protected from a condition of danger or risk.

Management : Process of controlling things.

System : The set of things working together as a whole.

Culture : Characteristics followed within an organization.

Environment : Ecosystem in which an organization functions.

Practice : Actual application or use of an idea, belief or method.

1.8 ASSIGNMENT :

1. What do you mean by Safety Culture and Safety Organisation ?
2. Explain in brief about the benefits of safety culture.
3. Discuss the risk management component of safety management system.
4. Write a short note on Safety Assurance.

1.9 ACTIVITIES :

1. You are an operations manager looking after all the activities of particular airline at an airport.

a. How would you incorporate a culture of safety within your team ?

b. How would you ensure that the team is aware of safety specifications ?

c. How would you handle a team member who brings issues related to others continually ?

2. You have been assigned duty at the Check in counter of a particular airline. Your task includes greeting guests, checking their identity and tickets, issuing boarding passes and baggage tags and directing them for further processes.

a. As a safe organization list the safety concerns you shall adhere in the entire process of operations ?

b. How will you manage conditions that are unsafe and may lead to potential hazards ?

1.10 CASE STUDY :

Mr. Peter was the operations head for the house keeping department at the airport. He was very concerned with complaints of his department. In fact he used to over react if complaints regarding his department came from other departments. He had let go employees from the job on small issues reported by others. The staffs in his department were not concerned about any other aspect within the airport premises apart from the tasks allocated to them. There was no inclusiveness, team work or trust within the staff often leading to any safety issues not reported from areas they were present.

a. What should be done to imbibe safety culture building within the department ?

b. What should be the outlook of managers in handling staff in the department ?

1.11 FURTHER READING :

1. Safety Management Systems in Aviation by Alan J. Stolzer

2. www.casa.gov.au

3. www.skybrary.aero

4. Practical Safety Management System by Gary M. Ullrich

5. www.faa.gov

UNIT 02 *Human and Organizational Concept of Safety*

UNIT STRUCTURE

2.0 LEARNING OBJECTIVES :

- To list the conditions for human and organizational concept of safety.
- To enumerate resource indicators for managing human and organizational factors of safety in organizations.
- To list and understand the controllable factors for measuring human performance and safety.

2.1 INTRODUCTION :

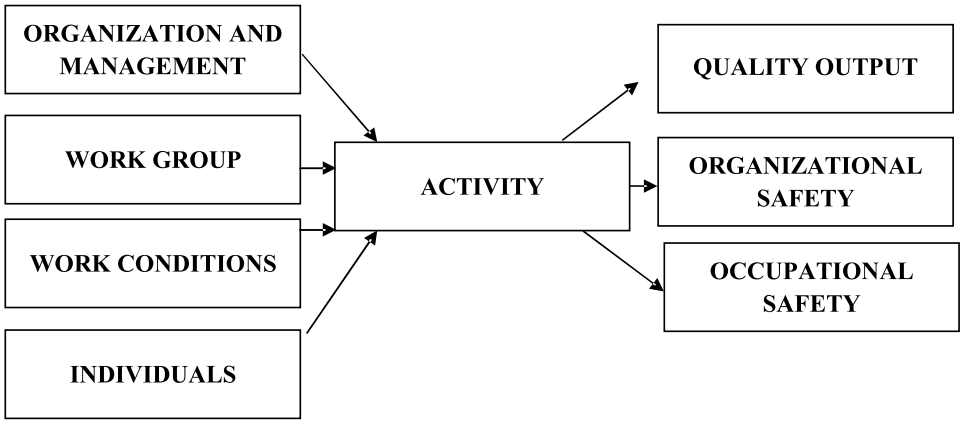
Safety as you have studied in the previous units is a state where potential hazards that may cause physical, material or psychological damage are controlled and monitored continuously by adopting safe practices and management systems. Human and Organizational Safety is a holistic approach in which human beings working in any organization individually and collectively identifies and implements safe work condition practices that brings a positive change in the environment leading to safety as a culture imbibed in the entire operations of the organization.

2.2 CONDITIONS FOR HUMAN AND ORGANIZATIONAL SAFETY :

Organizations in their endeavour to attain an optimum level of safety require individuals working at different levels within to create and maintain the following conditions **:**

- a climate of social cohesion and building of culture of priority and respect for human beings.

- the prevention and control of injuries and other consequences or harm caused by accidents.
- the respect of the values and the physical, material and psychological integrity of individuals; and
- the provision of effective preventive, control and rehabilitation measures to ensure the presence of the three previous conditions.



Output Model for Human and Organizational Factors of Safety

The Human and Organizational safety approach leads to the creation of a design framework amongst work groups, management and individuals within the organization that correlates and lays down the following objectives for creating work conditions oriented to safety. The design framework emphasizes on

- Understanding and creating betterment of human activities within an organization.
- Analyzing the conditions under which human beings perform the activity and incorporating change.
- Listing the occupational situations and various measures of safety undertaken by an organization in the ambit of a particular activity.
- Identifying improvement areas concerned with safety within the occupational situations.
- Mitigating risks at every step and ensuring a climate for safe work.

❑ **Check Your Progress – 1 :**

1. Human safety requires

   a. Social cohesion b. Prevention of injuries

   c. Respect of Values d. All the Options

2. A system of safety works through 2 approaches

   a. Managed and Unmanaged Safety

   b. Rulebook and Unmanaged Safety

   c. Rule Based and Managed Safety

   d. None of the Options

3. Rule Based Safety relies on

   a. Unforeseeable Areas b. Foreseeable Areas

   c. Hidden Areas d. Complaint Areas

4. The objective of Human reliability is to achieve

a. Desired Performance b. Controlled Output

c. Unmanaged Performance d. Challenges

2.3 ADOPTING HUMAN AND ORGANIZATIONAL FACTORS OF SAFETY :

Organizations across the globe have adopted process based stringent safety management systems. These safe operating procedures implemented in these organizations have led to reduction in incidents related to process based issues. The formal guidelines and processes do not often consider the human efforts and the environment in which the actual work or the activity is being executed. Operating procedures often ignore the reality of a situation of performing tasks by human beings. Though Safety Management Systems are implemented by organizations they do not show the desired outcomes because of the mismatch between the written guidelines and the actual occupational guidelines. In real life situations, conditions may arise that are beyond the configurations of procedures that are written and are often unforeseen. A system of safety will only work in these situations through an amalgamation of 2 approaches

- The Rule based Safety
- The Managed Safety

The rule based safety relies on foreseeable areas where safety may be compromised and applies measures through formal procedures, rules and automated safety mechanisms, protective measures, equipment, right training etc. An employee while carrying a disabled passenger on a wheel chair follows wrong procedures. The employee can be corrected through proper training on the correct rules and procedures of the job.

The managed safety is the capacity to anticipate and respond to incidents unforeseen by the organization. It relies on human expertise, the initiatives undertaken at that situation, coordination between groups and management in controlling the situation. A passenger on a wheel chair suddenly encounters a blackout and is about to fall. The employee quickly stops the wheel chair and comforts the passenger, offers water and calls for medical assistance. The managed safety procedures are rarely written in rulebooks and depend on the response of the employee. Organizational Safety is always a combination of Rule Based Safety and Managed Safety.

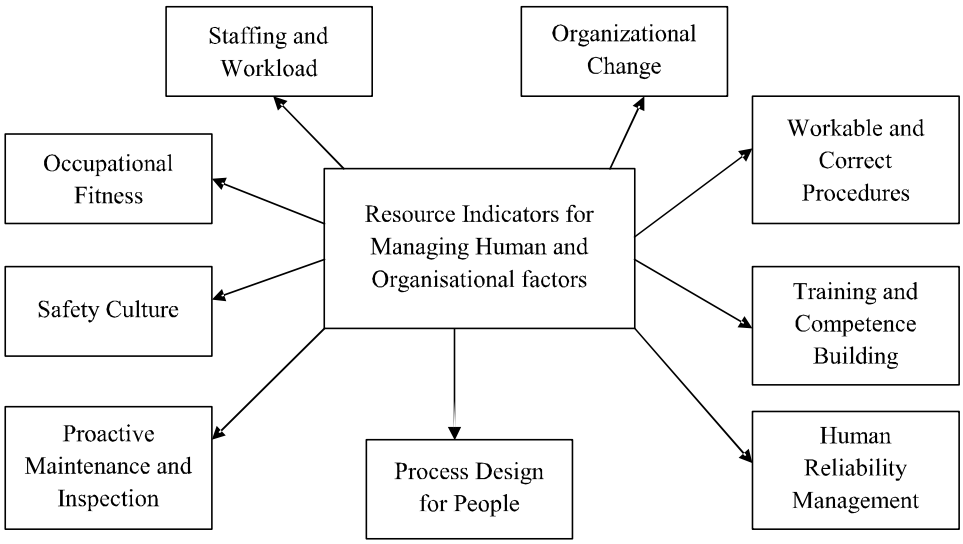
2.4 RESOURCE INDICATORS FOR MANAGING HUMAN AND ORGANIZATIONAL FACTORS IN AN ORGANIZATION :

Human and organisational factors affect how effectively and safely workers are able to do their jobs. When managed well, human and organisational factors set workers up for success. When they are poorly managed, or have not been considered, safety and productivity are compromised.

Human factors are defined as critical indicators for safety. Reliability indicates successful human performance within a given timeframe and environmental conditions. The objective of human reliability is to achieve a desired performance through reduction of error. Human reliability if managed properly leads to greater performance outcome through reduction of error and the desired goal is achieved. The objective of tasks in human factors within an

organization is achieved through easing out any challenging job related factors, work environment, time constraint or any other human issues.

Organizational factors are bigger resource indicators that play a major role in management of Safety. Organizational factors include correct processes , policies, procedures and a systematic framework that guide humans working within with role clarity, direction, environment and supervision. Continuous improvement processes, right guidance and training, leads to continuous evolution of change towards safety and builds a positive environment of safety within the organization.



2.5 CONTROLLABLE FACTORS FOR INCREASING HUMAN PERFORMANCE AND SAFETY :

With complex work environments in aviation that is highly technical, incidents and accidents are common. Processes in the aviation industry are introduced at every step to prevent occurrences of any incidents, however, often the human factor of errors are a major source of accidents happening the aviation industry. Gordon Dupont in 1998, while working for Transport Canada stressed upon his theories of DIRTY DOZEN, a set of twelve factors that provide a basis for useful introduction to human performance and safety in aviation. The Dirty Dozen list of Human factors focuses on organizations to reduce human error and design measures to counter the aspects that contribute towards possibility of errors. The factors enumerated are

- **Lack of Communication :**

Communication is one of the key elements in the aviation industry and is required at every step for ensuring smooth operations. It is one of the most critical elements and lack of proper communication often becomes the single most contributors for incidents and hazards. The entire communication cycle encompasses the sender or the transmitter of messages, the receiver and the entire method of transmission of messages. In the entire process transmitted messages may be unclear or inaccessible; receiver may make assumptions about meaning of instructions transmitted; transmitter of the messages may assume that the message is received and understood without undertaking a proper feedback. The complex environment in which aviation operates generates continuous communication flowing across the system and majorly technical in nature. It has been estimated that verbal communication is only 30% received and understood. To ensure an effective communication in the entire framework

- written messages should be encouraged
- the use of logs, checklists and worksheets to be introduced at critical places to avoid any lapse of communication leading to untoward incidents
- the use of verbal messages if any needs to be short and to be used for most critical times and the same repeated
- Assumptions should not be entertained at any stage of the process. Asking questions for clarifications should be encouraged.
- **Complacency :**

Complacency is the feeling of self satisfaction and arises in human beings undertaking routine tasks. Complacency leads to loss of awareness of potential dangers and often relaxation of vigilance leads to important indicators of danger missing from the task as the human being and the organization involved find the task as routine, easy and safe. Complacency also happens in organizations where there is a high work pressure or activity on a daily basis and the same leads to reduced performance of the individual. Recovery from bad health or any disaster also often leads to lower mental awareness.

To avoid complacency at human and organizational level, organizations must continuously help to activate the stimulus and introduce methodologies like high inspection routines, adherence to checklists, finding gaps in work, writing down of tasks, introducing of methods of double checking or cross checking or mutual cross checking within the team.

- **Lack of Knowledge :**

Lack of knowledge for humans working at a particular position, especially in aviation, leads to misjudging situations and unsafe decision making. The same leads to incidents that may be detrimental for the organization and often highly fatal. Avoiding improper knowledge needs to be avoided in the organizational context. The same can be done through

- Thorough technical knowledge check during fitment of a person to a particular position by the concerned departments of the organization.
- Cross checking of knowledge and required skills for a particular job through simulative environments wherever required.
- Continuous Training and learning process for up–gradation of knowledge, processes and skills for a particular job role.
- Knowledge sharing platforms for refreshers and professional development.
- Reference to manuals, processes, checklists to avoid doubts and assumptions in work or execution of tasks.
- Having a mentor for guidance on the job for better execution of tasks.

- **Distraction at Work :**

Distraction is a major source of human beings making error in tasks. Anything that diverts one's attention away from the core task can be said to be a distraction. There are some distractions that are unavoidable and are contributed by the environment like emergency assistance or sudden work or a request for assistance etc. A lot of distractions like social conversations, home conversations, non immediate work. Distractions lead to forgetfulness, lack of focus on tasks

and often the person has to redo the tasks. To avoid distractions at work one should

- Complete tasks before distracting.
- Maintain checklists for completion of work if distraction is more.
- In event of distractions work should always be rechecked before progressing further.
- A good workspace design and creation of do not disturb zones for highly technical reduces distraction.

- **Lack of Team Work :**

Aviation operations being complex require a lot of team work and team support for performance of tasks. A single person cannot give a safe outcome of tasks and support is absolutely necessary. Non contribution of team members leads often to unsafe outcomes. To have a right team in place

- Right Skill sets required to be a part of a team like communication, followership, trust building, motivation, and praise to be checked during the interview process and imbibed during training.
- Organization should have clear and defined goals with clarity in roles and responsibilities of each team member.
- There should be a standardized communication procedure and clear expectation of behaviour.
- The boundaries and limitations of team members to be defined.
- Activities for team building and team culture promotion should be in place.
- There should be opportunity for clarifications and team member grievance redressal procedures.

- **Fatigue :**

Fatigue is a psychological reaction that happens due to overwork or from prolonged mental stress. Chronic fatigue in persons is a medical condition. Fatigue leads to reduced decision making ability, concentration, remembrance and leads to high distraction. Fatigue affects the mood of a human being and often makes them irrational and angry. A lot of high pressure job roles that incorporate shift movements and rotations leading to reduced sleep often cause fatigue. Human beings underestimate their levels of fatigue and overestimate their ability to cope with the same. Signs of fatigue can be reduced through self management and regularization of sleep

- **Lack of Resources :**

Resources in any organization are varied aspects that aid in execution of a task smoothly. Resources can be men, time, data, tools, support, and a lot many things without which there is an inability to complete a lot of tasks. Often resources of poor quality lead to tasks being completed not as per standards and takes more time. Acquisition and maintenance of right resources and their availability at the right time is very essential for smooth operations. Organizations shall emphasize on storing resources at the right place so that they can be located easily and used at the right time.

- **Pressure of Work :**

Human beings in organizations often are under severe stress and pressure of work that leads to an unsafe environment leading to serious incidents. Pressure of work often is created by the environment and sometimes by the self. It leads to inability in completion of tasks and coping with different situations. Often human beings working in organizations lack the assertive skill of saying No and take on more work leading to improper delivery. Communicating concerns with colleagues are essential skills in critical work atmosphere.

- **Lack of Assertiveness :**

Assertiveness is a behavioural style which is very important in a job role. The lack of assertiveness leads to human beings unable to express concerns leading to ineffective communication. A non assertive person often complies with decisions that may be wrong or may prove dangerous to the organization. Human beings working in the organization in order to inculcate an assertive behaviour should

  - Communicate honestly and appropriately without aggression.
  - Give respect to the needs and opinion of others and take positive feedback with a rational mindset.
  - Never compromise with standards pertaining within the organization and follow them completely.

- **Stress :**

Aviation being one of the most dynamic areas of work require split second decision making often leading to stress to individuals working in different job roles. Some positions in the industry are very critical and involve high stress that may involve both mental as well as physical elements. Stress can also be accumulated that may come from factors inherent to personal life and sometimes can also be a medical condition. Stress at work leads human beings to

  - Overreaction towards work or colleagues at work that becomes detrimental for execution of any particular task.
  - Not cope with work pressure leading to errors, mental breakdowns and poor performance.
  - Lack of simulation at work leading to complacency.

It is very important for persons working in high stress areas in the aviation industry to recognize early signs of stress. Simple breathing and relaxation techniques used in the workplace can considerably reduce stress. Even lifestyle changes and interaction with peer group also is very essential.

- **Lack of Awareness :**

Humans who work in isolation in an organization undertaking their own responsibilities only have a narrow vision in work and are unaware of a lot of aspects about the organization. The behaviour often leads to a poor formation of team and professional outlook which is not acceptable as a part of a bigger team within an organization.

❑ **Check Your Progress – 2 :**

1. Indicate the resource indicators for Human and Organizational performance factors

   a. Process Design b. Controlled Output

   c. Unmanaged Performance d. Challenges

2. The list of 12 human factors focussed on organizations to improve safety is

   a. Tango b. Charlie c. Dirty Dozen d. Dozen

3. Human factor that leads to a feeling of self satisfaction and is bad for safety is

   a. Communication b. Complacency

   c. Knowledge d. Distraction

4. Psychological reaction happening due to overwork and affecting performance in human is

   a. Fatigue b. Stress

   c. Lack of Knowledge d. Complacency

2.6 LET US SUM UP :

Organizational Safety is a holistic approach in which human beings working in any organization individually and collectively identifies and implements safe work condition practices that brings a positive change in the environment leading to safety as a culture imbibed in the entire operations of the organization. Organizations to attain optimum level of safety, require individuals working at different levels in an organization to build a culture of cohesion, prevention, control measures and rehabilitation procedures. Risks need to be mitigated at every step and improvement areas need to be worked out. Continuous improvement process is required for managing all the resource indicators involved in safety for human and organizational factors. The theory of Gordon Dupont highlights 12 factors of human and organizational error that act as a major source of safety related incidents in the aviation industry.

2.7 ANSWERS FOR CHECK YOUR PROGRESS :

Check Your Progress – 1 :

1. d **2.** c **3.** b **4.** a

Check Your Progress – 2 :

1. d **2.** c **3.** c **4.** a

2.8 GLOSSARY :

Organization : Organized group of people with a particular purpose.

Indicator : A thing that indicates level of something.

Resource : Action of strategy adopted in circumstances.

Holistic : Things related to an idea completely.

Integrity : The state of being whole.

Cohesion : Action or fact of forming a united whole.

2.9 ASSIGNMENT :

1. What are the conditions for human safety an organisation need to follow for the individuals working ?
2. Differentiate between term rule based safety and managed based safety.
3. What are the resource indicators for managing human and organisational factors ?
4. How to increase controllable factors for human performance and safety in an organisation ?

2.10 ACTIVITIES :

1. Pilots on long haul flights have erratic schedules, different time zones and other factors that often work against the biological clock of the body. There are potential probabilities of human error occurring due to certain aspects related to the job.

List the legal requirements followed by pilots of long haul flights to prevent human errors leading to incidents.

List some of the practical processes that pilots undertake during long haul flights to overcome fatigue.

2. The job at the Air Traffic Control at any busy airport involves a lot of stress and mental fatigue. The job is monotonous and often human factors contribute towards detrimental situations.

As aviation student Analyse the types of human factors that can be detrimental and list the steps undertaken by people working in the Air Traffic control to avoid these factors.

2.11 CASE STUDY :

An aircraft was cleared for towing by the pilot. The ground towing vehicle was being manoeuvred by a new recruit who had just cleared his towing test and obtained necessary licence for the job. It was a early winter foggy morning at the airport and the visibility was quite low. The towing vehicle operator during the operational process misjudged the path and the tail wing of the flight hit a static movable stairway kept at the side. There was damage to the tail wing and the flight was stalled and all the passengers had to be evacuated for a thorough maintenance check of the flight. The entire flight was delayed for 2 hours before its take off.

a. Did the incident happen due to human error ?

b. What steps should airline companies undertake in adverse weather conditions for towing ?

c. What are the aspects that was not followed leading to an incident and how can such incidents be averted ?

2.12 FURTHER READING :

1. www.icsi–eu.org
2. www.foncsi.org>publications
3. Safety Management Systems in Aviation by Alan J. Stolzer
4. Aviation Safety – A balanced Industry approach– Ferguson
5. www.skybrary.aero

UNIT 03

ICAO Safety Standards

UNIT STRUCTURE

3.0 LEARNING OBJECTIVES :

- To understand the concept of Safety from perspective of ICAO.
- To list the purpose and the principles of Global Aviation Safety Plan as designed by ICAO.
- To identify the role of ICAO in global aviation safety and list the goals for managing the same.
- To enumerate different aspects included in the ICAO global safety plan.

3.1 INTRODUCTION :

Safety is of prime importance in aviation. ICAO as a global body understands the need for safety and evolves strategies to ensure a safe ecosystem within the aviation industry for a smooth and sustainable operation. The body works continually with all its member countries to develop a synchronized strategy to continually reduce fatalities and the risk of fatalities. A safe aviation system of a country contributes not only to the progress of the country in terms of development but also acts as a contributor to economic development through a coordinated approach of managing safety through implementation of regional and national level aviation safety plans.

3.2 ICAO GLOBAL AVIATION SAFETY PLAN (GASP) :

Global Aviation Safety Plan (GASP) is a safety framework designed and implemented by ICAO across member countries to reduce incidents and accidents arising due to safety. The GASP is incorporated into a country's design framework of aviation safety and provides best practice solutions to the framework of safety. It sets the goals for member countries to review their safety oversight capabilities and progress through implementation of a State Safety Program. The GASP program was introduced by ICAO in 1997 and is used as a guide for technical work program of ICAO. In May 2005, GASP broadened for reference of all stakeholders to incorporate a proactive approach in aviation safety and reduce risk of accidents in commercial aviation. In 2013, global aviation safety road map was designed by ICAO to support the implementation of GASP among member countries. In 2016, ICAO introduced the State Safety Programs (SSP) as part of GASP. GASP presents strategy that supports prioritization and continuous improvement in airline safety. The roadmap for GASP serves as action plan to assist aviation community in achieving GASP goals through a structured and common frame of reference.

3.3 PURPOSE OF GLOBAL AVIATION SAFETY PLAN (GASP) :

The purpose of a Global safety aviation plan is manifold and presents a structured approach to safety as one of the key prerogatives for aviation. To enumerate, the purpose are

- Work towards continually reduce any type of incidents or accidents globally that cause fatalities.
- Implement a continuous planning process to provide a framework for making GASP an integral part of aviation across member nations and other countries.
- Synchronized development and implementation of national and regional aviation safety plans as a part of global protocol.
- Design methodology to guide all its member countries in identification of hazards in operations, emerging issues and management of all types of safety risks.
- Prioritize global action in area of aviation safety for uniformity and seamless synchronization.

3.4 PRINCIPLES OF GLOBAL AVIATION SAFETY PLAN (GASP) :

The principles that form the design base for global safety aviation plan are a collective set of values embedded in a system and presented as a plan to enhance global civil aviation safety through a positive safety culture. Some of the principles highlighted are as

- A healthy culture building across aviation organizations to incorporate safety as a part of its value system.
- Recognizing and promoting aviation sector's responsibility for safety of all the stake holders involved.
- Encouraging collaboration, teamwork and shared learning across organizations involved in aviation for management of safety.

- Promoting a culture of sharing and exchanging of safety information and best practices across member nations and agencies involved in aviation.
- Address all operational safety issues through a guided protocol of a risk based approach.
- Proactively manage all emerging issues and plug gaps that are concerns in safety for aviation operations.
- Protection of all data pertaining to safety and safety related information.
- Incorporating data driven decision making system for different areas of aviation operation for safety related issues.

3.5 THE ROLE OF ICAO IN GLOBAL AVIATION SAFETY PLAN (GASP) :

ICAO plays a very important role in driving aviation safety and implementing best practices amongst member organizations. ICAO works hand in glove with different governments and Regional Aviation Safety Groups (RASG) to implement the principles and objectives of its safety plan. With countries having different norms, rules and infrastructure, ICAO plays a vital role of coordination and incorporation of global safety plan through customization of best practices. To enumerate some of the aspects that forms a part of the role of ICAO

- Promotion of global aviation safety plan through strategic collaborations and partnerships with different governments across the globe.
- Coordinating activities with Regional Aviation Safety groups to ensure that the bodies are aligned to GASP.
- Ensuring that government of different countries and organizations involved in aviation operations participate in Regional aviation safety groups (RASG) for designing of framework required for safety.
- Working towards active involvement of all regional mechanisms in safety planning and coordination with authorities of respective countries.
- Implementation of Global Aviation Safety Oversight System (GASOS) for strengthening of safety oversight capabilities, accident investigation and State Safety programs.
- Providing data and tools to support the monitoring of GASP implementation by all the member countries.
- Exchange of safety related information and best practices to authorities of different member countries involved in regulations and safety pertaining to aviation.
- Provide access to resources and technical assistance to all member nations implementing the GASP framework through regular trainings and workshops.

❑ **Check Your Progress – 1 :**

1. GASP stands for

   a. Global Airlines Safety Plan b. Global Aviation Safety Progress

   c. Global Airline Safety Progress d. Global Aviation Safety Plan

2. The State Safety Program (SSP) was introduced as part of GASP in

   a. 2014 b. 2015 c. 2016 d. 2017

3. The principle of GASP include
   a. Working separately
   b. Encouraging Collaboration of teams
   c. No data sharing
   d. Reactively managing issues
4. RASG stands for
   a. Regional Aviation Safety Group
   b. Regional Airline Safety Group
   c. Regional Airline Safety Gathering
   d. Regional Aviation Safety Gathering

3.6 GOALS IN GLOBAL AVIATION SAFETY PLAN (GASP) :

The plan of a country incorporates measures for hazard identification and mitigation. The ICAO in its Global Aviation Safety Plan 2021–2022 has laid down the following goals for an effective State Safety Plan formulation and its implementation across member nations.

Goal 1 : Continuous reduction in operational safety risks.

Goal 2 : Countries to strengthen their safety oversight capabilities.

Goal 3 : Implementation of State Safety Plan effectively within a country.

Goal 4 : Collaboration at regional level by countries internally to enhance safety.

Goal 5 : Expansion in the use of industry programmes.

Goal 6 : Focuses on need to ensure appropriate infrastructure for safe operations.

Achieving Global aviation safety plan goals and standards is a prerogative of each member nation. Each goal has some definite targets to be achieved under GASP. The targets to be achieved under each goal are

Goal	Target
1	Decrease in rate of untoward incidents and accidents globally.
2	Countries individually strengthen their safety oversight capabilities by implementing safety enhancement initiatives.
3	Countries to design framework for state safety plan with clear objectives and deadline for achieving the objectives. ICAO has set a deadline for all its member nations to roll out a comprehensive State Safety Plan by 2025.
4	Countries that lack necessary framework for designing and implementing GASP need to collaborate and seek assistance from other member countries and design a State Safety plan for implementation. Assistance may range from Training capabilities to sharing of resources, information, data and other necessary resources.

5	Participation of different service providers and bodies for expansion and promotion of GASP across the globe. Bodies like IATA, EUROCONTROL and others that are part of aviation regulatory systems are encouraged in the same.
6	The goal focuses on all member nations to implement air navigation and airport core infrastructure by 2022.

ICAO lists down different indicators for achievement of targets against each goal. The safety performance of the GASP is measured by a series of metrics as defined by the GASP indicators. Elements used to measure safety performance related to the GASP include, but are not limited to

- Number of fatalities working as the main indicator.
- Accident Rate
- Fatal Accident Rate
- Safety Oversight Index
- State Safety Plan performance quotients
- Performance quotient related to Safety Management.

Since ICAO coordinates with authorities of different countries to implement the global safety plan, there are obligations that each member country associated with ICAO need to fulfil. The role of the authorities of member countries in implementation of GASP include

- Addressing safety concern as a priority for aviation operation within the country.
- Acquire necessary expertise from different sources and pool of resources to set safety goals and culture.
- Design framework for a national safety plan taking into account regional challenges and concerns with reference to the ICAO GASP.
- Working on implementation of Safety Enhancement initiatives on a continuous basis within the country.
- Participation in different activities in coordination with ICAO and create a regional aviation safety group for continuous effective monitoring of safety.
- Sharing safety information with regional aviation safety group and ICAO for resolution of issues and allocation of various resources.

3.7 STANDARDS AND RECOMMENDED PRACTICES (SARPS) :

To manage safety in the aviation sector the council of ICAO adopted technical specifications according Article 37 of convention of International civil aviation to manage and maintain uniformity.

- Regulations across the aviation sector
- Standards and procedures in organizations related to aircrafts, personnel, services and any matter that facilitate and improve air navigation.

SARPS define standards as a specification for physical characteristics, configuration, material performance, personnel, procedure for Safety, Regularity, and Efficiency of International air navigation adhered by member countries under ICAO. SARPS was published by ICAO as annexes to the Chicago convention

and has no legal binding to the convention as they are not international treaties. Countries may modify the implementation of various SARPS according to the regional ecosystem of operation and country's own safety policies in consultation with ICAO.

3.8 UNIVERSAL SAFETY OVERSIGHT AUDIT PROGRAM (USOAP) :

The Universal Safety Oversight Audit Program was established in 1999 by ICAO to promote global aviation safety through regular audits of ICAO member states. The same was undertaken to maintain the safety oversight systems of the member states. The implementation of conducting a regular, mandatory, systematic and harmonized safety audit by ICAO led to increased accountability of member states to implement global safety program and SARPS in a more structured way, following all the policies and procedures as laid down. The audit program gives an increased accessibility to member countries into the gaps that need to be corrected through a transparent analysis. USOAP uniformly monitors implementation of SARPS by all the member countries and maintains the core elements of safety provisions as indicated in the SARPS during the audit process. All the aspects pertaining to audits are visible to the member countries and available for review. The access to information and audit findings helps all the member countries towards improvement in a continuous manner. The audit conducted happens as a comprehensive system in phases. They are

- Pre Audit phase that includes an activity questionnaire and a compliance checklist. The same is sent to all the member countries for a review and identification of gaps for the SARPS implemented. The ICAO audit team helps countries to customize audits according to the systems implemented by member countries in relation to the SARPS procedure.
- On Site phase incorporates the physical audit of the facility by a team. The actual audit process for safety oversight is based on pre–determined indicators of SARPS implemented for safety.
- The Post audit phase leads to preparation of the audit report by the team on gaps in SARPS implementation and formulation of corrective action plans for member nations. The post audit also helps the ICAO in working out new strategies for easy implementation and the necessary support system required for the same.

3.9 ICAO INITIATIVES IN GLOBAL SAFETY FOR AVIATION :

The continuous enhancement of safety has always been the cornerstone of the sustainable development of civil aviation. This fact itself is no accident : the visionaries who conceived the 1944 Convention on International Civil Aviation, which is the foundation of international air connectivity and ICAO itself, fully understood the imperative of placing safety as the first priority of flight. That is why they gave ICAO's member States the means to cooperate to ensure safety as a way to foster the development of the then–nascent industry. Some of the under mentioned aspects present the highlights about different areas from various technical domains that had an impact on the enhancement of aviation safety in the last 75 years.

- Equipping aircrafts with Emergency Locator Transmitters (ELT). ELTs transmit signals when an aircraft is involved in an accident by transmitting signals that help the rescue team to track the site of the accident.

- Inclusion of 16G type of seats in aircrafts to reduce the impact of head injury and severe chest injury during an accident.
- Material used in cabin delay the onset of flash fires inside the cabin of an aircraft by 40 to 60 seconds through use of fire retardant material.
- Installation of lavatory smoke detectors and automatic fire extinguisher in the waste paper bin inside an aircraft.
- Installation of floor proximity emergency escape path markings to speed up evacuation rate in case of smoke conditions inside the cabin of an aircraft.
- Slides used during evacuation in aircrafts are made of heat resistant material.
- Exit designs of aircrafts modified for faster evacuation.
- Uniform distribution of emergency exits in an aircraft with a cut off distance of 60 feet.
- Replacement of Halon used as gas for fire extinguishers as the same depleted ozone layers.
- Introduction of Runway Safety Programme initiatives.
- Introduction of clean aircraft concept for winter operations where formation of ice is a major challenge.

The above mentioned initiatives are some of the highlights for an exhaustive list of inclusions that ICAO has been continuously incorporating for aviation safety globally.

❑ **Check Your Progress – 2 :**

1. Continuous reduction in operational safety risk is part of ICAO Safety goal number

   a. 3 b. 4 c. 2 d. 1

2. Participation of different service providers and bodies is a measure for ICAO safety goal number

   a. 3 b. 4 c. 5 d. 6

3. The acronym SARPS stands for

   a. Standards and Relative Performance

   b. Standards and Recommended Practices

   c. Standard Allocated Recommended Practice

   d. None of the Options

4. The acronym USOAP stands for

   a. Universal Safety Oversight Audit Program

   b. Universal Safety Onsite Audit Program

   c. Universal Safety Oversight Audit Performance

   d. None of the Options

3.10 LET US SUM UP :

Safety is of prime importance in aviation. ICAO as a global body understands the need for safety and evolves strategies to ensure a safe ecosystem

within the aviation industry for a smooth and sustainable operation. Global Aviation Safety Plan (GASP) is a safety framework designed and implemented by ICAO across member countries to reduce incidents and accidents arising due to safety. The GASP is incorporated into a country's design framework of aviation safety and provides best practice solutions to the framework of safety. It sets the goals for member countries to review their safety oversight capabilities and progress through implementation of a State Safety Program. The purpose of GASP is to continually reduce incidents and accidents that cause fatalities and providing a framework for development and implementation of GASP by member nations. The principles of GASP include a healthy culture building and collaborative teamwork to proactively manage all safety related issues. Goals are set by the ICAO with targets and measures. Standards are designed with recommended practices to be implemented by member countries. Continuous audit mechanism help member countries to plug gaps related to recommended standard practices and prioritize the need for safety.

3.11 ANSWERS FOR CHECK YOUR PROGRESS :

Check Your Progress – 1 :

1. a **2.** c **3.** b **4.** a

Check Your Progress – 2 :

1. d **2.** c **3.** b **4.** a

3.12 GLOSSARY :

Framework : Basic structure underlying a system or concept.

Proactive : Creating or controlling a situation before its happening.

Protocol : Set of rules and guidelines

Principle : The foundation for system of belief or reasoning.

Oversight : Action of overseeing an activity.

Comprehensive : Dealing with all or nearly all elements or aspect of something.

Ecosystem : The physical environment.

3.13 ASSIGNMENT :

1. When and how Global Aviation Safety Plan was implemented by ICAO ?
2. What was the need of Global Aviation Safety Plan ?
3. Describe the role of ICAO in designing and implementing GASP.
4. How is the Universal Safety Oversight Audit Program works in safety audit field ?

3.14 ACTIVITIES :

1. Lights at an airport are visual aids for efficient navigation of all aircrafts. The revolution in lighting technology has paved the path for increased safety at airports.
2. As a student of aviation study and list the different lightings at airports indicating relevant significance of each for safety in airport operations.

3. List the Standard and Recommended Practices as designed by ICAO for combating fatigue management of human beings working at critical positions in the aviation industry.

3.15 CASE STUDY :

A passenger travelling for holiday after landing at his destination found that his Check in baggage did not arrive. He waited till all the baggage arrived at the baggage belt. Confused and baffled he approached the airline counter at the destination. The airline authorities at the airport were clueless. An argument broke out between the passenger and the airline staff. The man was a tourist and had to again travel ahead for his final destination and was getting delayed for the same. After a lot of interaction and probing over phone, the airline staff was able to track the baggage of the passenger. The baggage was detained at the departure city as it contained portable charging equipment which is banned to be carried in a Check In baggage as a safety measure. The airline authorities had tried calling the passenger at the departure city but the passenger did not answer his phone. It was a complex situation for the passenger and after a lot of persuasion and written communication, the airline agreed to send the baggage of the passenger without the portable charging device the next day. The passenger had to cancel his onward journey and stayed back at the city of arrival to collect his baggage.

1. What went wrong from the airline side and how the problem with the passenger could have dealt in a better way ?
2. What went wrong from the side of the passenger and what should a passenger mandatorily do before boarding a flight ?

3.16 FURTHER READING :

1. www.icao.int
2. www.skybrary.aero

UNIT 04

Safety Standard Organizations

UNIT STRUCTURE

4.0 LEARNING OBJECTIVES :

- To understand International Standard for Business Aircraft Operations (IS BAO) as a safety organization in aviation.
- To list the prime functions of IS BAO and understand IS BAO program for safety.
- To understand the role and function of Federal Aviation Administration (FAA) as a body for implementing aviation safety globally.
- To enumerate the functions and responsibilities of European Union Aviation Safety Agency.

4.1 INTRODUCTION :

Safety as you have studied in the earlier units is a key concern for a complex operation like aviation. In this unit you shall study about some organizations that lay the benchmark for safety and standards in the aviation industry. The benchmarks as laid down by these organizations are considered as best practices for the industry and are followed globally. In this unit you shall be acquainted to some of the organizations of the aviation industry and shall enumerate their role in managing safety globally.

4.2 INTERNATIONAL STANDARD FOR BUSINESS AIRCRAFT OPERATIONS (IS BAO) :

The International Standard for Business Aircraft Operations (IS BAO) has been developed by International Business Council (IBAC) in 2002. IS BAO is the industry code for the best practices in aviation operations and implements standardized and global best practices for operational excellence. The International Business Council (IBAC) is a non profit International trade association with its head office in Montreal, Canada. IBAC works in close coordination with ICAO as an observer and also as a part of different aviation operations. The best practice codes as laid down by IS BAO are based on ICAO Standard and Recommended Practices (SARPs). The European Committee for Standardization also recognizes IS BAO as an industry standard for business aircraft operation.

4.2.1 Prime Functions of IS BAO :

As a global body IS BAO facilitates the aviation industry and also global commerce as a whole that is associated through the aviation industry. The best practices designed by IS BAO are globally recognized and the major functions of IS BAO can be listed as

- The organization includes Safety Management System requirements, organization and personnel, standard operating procedures, training programs, flight operations, operations in international airspace, aircraft equipment requirements, aircraft maintenance requirements, company operations manual, emergency response plan, environmental management, occupational health and safety, transportation of dangerous goods, and security.
- Undertakes global projects on different aspects of aviation that contribute to the best Practices for the industry. The organization also undertakes educational projects on behalf of the aviation industry to conduct time research and utility deliverables as a standard for the industry.
- IS–BAO facilitates airline operators to enhance safety and adopt industry best practices through review of their existing safety–related policies, processes and procedures. Following this critical review, the IS–BAO programme then provides the appropriate tools and guidance materials necessary to assist the operator in :
  a. Establishing or enhancing a framework for effective safety and operational processes.
  b. Facilitating the implementation of best practices.
  c. Developing a Safety Management System appropriate to their specific operational profile.
  d. Continuous review and improvement through employee generated continuous improvement reports and through an established schedule of internal and external audits.
- The organization provides auditor accreditation programs to individuals or bodies to conduct IS BAO audits of different aviation bodies and assess organizational conformances to respective programs. The auditor accreditation programs are based on individual's knowledge of ICAO and National aviation authority regulations, understanding of Safety Management Systems, quality systems and background of business aviation. The National

aviation authority regulations are aviation regulations pertaining to a particular country.

- Inducts affiliates as subject matter experts and undertakes safety programs on various issues of aviation through the affiliates globally.

4.2.2 The IS BAO Program :

There are three levels to the IS–BAO process, with progressive stages signifying a greater level of maturity within the business. A company will begin at Stage 1 and has the goal of eventually maturing to Stage 3.

- Stage 1 of IS–BAO indicates that an appropriate Safety Management System (SMS) has been established.
- Stage 2 may be achieved several years later and ensures that safety risks are being effectively managed.
- Stage 3, the most advanced level, is awarded only when safety management has become a fully engrained part of the company's culture, and a positive culture of safety management has been sustained over time.

The IS BAO program ensures the following

- Assessment of the Operator undertaking the program as per standards of IS BAO and determining the level of the program to be undertaken.
- Designing of a framework within the organization for an effective process design.
- Implementation of Safety Management System according to the guidelines of ICAO.
- The formulation and incorporation of global standards and Safety Management System infrastructure.
- Application of industry best practices through continuous review and comparison of various policies, practices and procedures.
- Confirmation for fulfilment and implementation of Safety Management Standards by organizations.
- The activities undertaken in implementation of Safety Management standards are integrated into operator's business.
- Building of an environment of Positive Safety Culture that is stable and sustainable for the organization.

The IS BAO programme is recognised by both Federal Aviation Administration (FAA) and Civil Aviation Authority (CAA) and meets standards of Safety Management System as laid down by the ICAO. The European Committee for Standardization (CEN) recognizes IS BAO as a standard for business aircraft operations. The IS BAO is similar to ISO 9000 standard and is a benchmark for safety and efficiency in business aircraft operation.

❑ Check Your Progress – 1 :

1. The acronym IS BAO stands for

   a. International Space for Business Aircraft Operations

   b. Indian Standard for Business Aircraft Operations

   c. Indian Space for Business Aircraft Operations

   d. International Standard for Business Aircraft Operations

2. The acronym IBAC stands for
   a. International Business Confederation
   b. International Buyer Confederation
   c. International Business Council
   d. None of Options
3. There are _____ levels to IS BAO process progressively
   a. 2 b. 3 c. 4 d. 5
4. The acronym CEN stands for
   a. European Committee for Standardization
   b. Core European Nations
   c. European Core Entity
   d. None of the Options

4.3 FEDERAL AVIATION ADMINISTRATION (FAA) :

The Federal Aviation Administration (FAA) is an agency of the United States Department of Transport. The FAA is responsible for regulation of civil aviation in the United States. The Civil Aeronautics Act signed in 1938 by President Franklin Roosevelt ensured that aviation safety came under the purview of the Federal government. The formation of the Civil Aeronautics Authority (CAA) was undertaken with a three member Air Safety board in place that conducted accident investigations and recommended ways of preventing air accidents. In 1958, the Federal Aviation Act was signed and an independent Federal Aviation Agency to provide for the safe and efficient use of national airspace was created for civil aviation safety. With time the responsibilities of the agency increased and major changes related to several aspects of aviation were introduced.

The primary responsibilities of the Federal Aviation Agency (FAA) are

- Regulation of civil aviation within the country as per global standards and creating benchmarks in every aspect related to aviation that act as standards for other nations to follow.
- Development of new aviation technology and a system for better air traffic control and navigation.
- Undertaking research and development in the field of civil aeronautics and air space system.
- Develop and implement global programs on challenges encountered by the aviation industry, technological enhancements and their implementation in the field of aviation, noise reduction for aircrafts and other environmental effects as contributed by aircrafts.
- Regulation of United States commercial space transportation and space programs.
- Participation in investigation of all aviation incidents, accidents and disasters related to aircrafts in coordination with different agencies of the United States government.
- Acting as one of the prime agencies globally for certification of aircrafts related to airworthiness.

4.3.1 The Key Activities of Federal Aviation Agency Includes :

- Safety Regulation that encompass and enforce standards and regulations according to Industry and global best practices related to manufacturing, operations and maintenance of aircrafts.
- Certification of airports according to global standards of safety and airmen who are directly related to the operations of aircrafts.
- Ensuring air space and air traffic management by safe use of airspace and management of airport towers; route management and route traffic control centres; management of flight service stations.
- Building global capabilities in air navigation facilities through development of visual and electronic facilities; maintaining, operating and assuring quality of visual and electronic aids.
- Maintaining and sustaining other systems involved in aviation safety.
- Certification of more than seventy percent of all large jet aircraft with large engines. Most countries around the world have their own civil aviation authorities to devise and implement regulations within their respective territories, but the FAA provides indirect or direct assistance to 129 countries to help improve their air traffic control systems.
- Partnering with bodies like the National Aeronautics and Space Administration (NASA) on issues of technology development, including innovations to improve aging aircraft, prevent accidents caused by weather, and improve air traffic control operations.
- Works towards control of environmental issues concerning aircraft engines, noise pollution and particle emissions, which pollute the areas surrounding airports. The FAA has the power to regulate the concentrations of these substances found in engine exhaust emissions and is also able to modify the limits when target goals are not reached.

4.4 EUROPEAN UNION AVIATION SAFETY AGENCY (EASA) :

The Single European Sky (SES) in a European commission initiative that works towards continuous improvement and reforms in the European air traffic management system through series of actions. The initiative aims at working on aspects of capacity building, safety, efficiency and environmental impact catering to the needs of the European airspace. Air traffic management in European Union is currently undertaken by member countries cooperating through EUROCONTROL, an intergovernmental organization that includes most of the European countries.

The European Union Aviation Safety Agency (EASA) is an agency of the European Union with the responsibility of overseeing civil aviation safety. EASA is based out of Cologne in Germany and was formed in 2002. The body became fully functional from 2008. The mission of EASA includes

- Highest Safety Protection for European Union citizens.
- Highest common level safety for environmental protection.
- Single regulatory and certification process among member countries.

4.4.1 Responsibilities of EASA :

EASA is allocated with various takes responsibility of the agency includes

- Analysis and research of all safety parameters for aviation operation under Single European Sky.
- Advising the European commission on drafting European Union legislations for Aviation safety.
- Authorizing foreign operators to fly over European skies.
- Standardization of safety norms for all aviation operators and agencies for aspects related to aviation.
- Investigation and monitoring of issues pertaining to operations and safety.
- Coordination with Safety agencies across globe for collection of data and analysis.
- Working with European Union member states National aviation authorities for standardization of safety policy implementation and also oversee a considerable amount of functions of National aviation authority.
- Working on drafting of common rules for National Aviation Authorities.
- Promoting International harmonizing agreements and technical collaborations with countries and aviation agencies across the globe.
- Providing oversight and support to member states through shared competence in field of airline operations and air traffic management.
- Certify and approve products and organizations in fields where EASA has relevant competence and airworthiness. Organizations include those involved in design, manufacture and maintenance of aeronautical products.
- Certification of organizations providing Air Traffic Management and Air Navigation System management services across Europe and operators from outside Europe operating within Europe.
- Publication of journals related to Annual Safety Review indicating performance and measures implemented for safety.

❑ **Check Your Progress – 2 :**

1. The acronym FAA stands for

   a. Federal Association of Aviation

   b. Federal Aviation Aggregate

   c. Federal Aggregate Administration

   d. Federal Aviation Administration

2. FAA provides direct or indirect assistance to _____ countries.

   a. 127 b. 128 c. 129 d. 130

3. The acronym EASA stands for

   a. European Aviation Safety Agency

   b. European Union Aviation Safety Agency

   c. European Safety Agency

   d. None of the options

4. The headquarters of EASA is located at

a. Cologne, Germany b. Frankfurt, Germany

c. Madrid, Spain d. Lisbon, Portugal

4.5 LET US SUM UP :

The unit highlights some of the global aviation organizations that have created benchmark in areas pertaining to aviation safety. The International Standard for Business Aircraft Operations (IS BAO) is an industry code for best practices in aviation operations. The functions include designing Standard Operating Procedures, conducting training programs, designing Emergency Response Plans, maintenance standards, security, research, safety related policies, processes and procedures. The organization also conducts audits and auditor accreditation programs and affiliates subject matter experts who undertake safety programs. The Federal Aviation Administration (FAA) is an agency of the United States department of transport. The primary responsibilities include regulation of civil aviation within the country, creating benchmarks, designing new technology for safety related aspects, Research and Development, investigation of air accidents and many other responsibilities. The European Union Aviation Safety Agency(EASA) oversees safety of civil aviation in the European Union and encompasses many responsibilities for highest safety protection of European citizens.

4.6 ANSWERS FOR CHECK YOUR PROGRESS :

Check Your Progress – 1 :

1. d **2.** c **3.** b **4.** a

Check Your Progress – 2 :

1. d **2.** c **3.** c **4.** a

4.7 GLOSSARY :

Benchmark : Standard or measure against which others can be measured.

Occupational Health : An area of work in public health to promote and maintain highest degree of physical, mental and social well being.

Regulate : Control by means of rules and regulation.

Certification : Formal Attestation.

Goals : An aim or a desired result.

4.8 ASSIGNMENT :

1. What is International Standard for Business Aircraft Operation (IS BAO) and its prime functions ?
2. What does the IS BAO program ensures ?
3. Write a short note on Federal Aviation Administration.
4. What is the role and responsibilities of European Union Aviation Safety Agency ?

4.9 ACTIVITIES :

1. List SOPs for Safety as listed and followed for Passenger Management by different safety agencies at different airports across countries.
2. Make a comparative of any 5 countries and indicate the best practices adopted.
3. List the role of Airports Authority of India (AAI) and functions of the Aviation Safety Department under AAI.

4.10 CASE STUDY :

A small fire broke out in the electrical panel in one of the toilets of an airport terminal. One of the housekeeping staff who was present there immediately ran for the fire extinguisher kept there. He dismantled the extinguisher from the wall but did not know how to use the same. He ran out and called security personnel. As they entered the toilet there was lot of smoke that had filled the area. The security personnel broke open the cylinder but to his dismay there was insufficient pressure in the cylinder to combat the fire. The personnel alerted the authorities and soon measures were initiated by Emergency teams and the fire doused.

1. What went wrong from safety perspective in the whole incident ?
2. What type of basic trainings should be imparted to aviation staff related to safety ?

4.11 FURTHER READING :

1. www.nba.org
2. www.isbaoaudits.com
3. www.faa.gov
4. www.ibac.org
5. www.easa.europa.eu
6. www.wikipedia.org
7. www.easa.com

UNIT 05

Safety Culture and Promotion

UNIT STRUCTURE

5.0 LEARNING OBJECTIVES :

- To enumerate on Safety culture and its importance in aviation operations.
- To list the ICAO standards for Safety culture management.
- To understand the importance of the concept of Safety policy, objectives, assurance, promotion and risk management as a part of safety culture.

5.1 INTRODUCTION :

Safety is the key concern for businesses across the globe. A precise and complex operation like aviation has to put safety as one of its prime perspective to be in the business. You must have seen air hostesses instructing all the passengers aboard an aircraft to fasten their seatbelts during takeoff or before landing. The process is undertaken and followed strictly to ensure that passengers do not get hurt or are not thrown away from their seats in event of any emergency. The fastening of seatbelts is a global standard for safety and is adhered by every airline of the world to prevent any adverse incidents. In the earlier block you have studied about risks and assessment of risks undertaken at every level of aviation operations. Mitigating these risks in day to day operations in a consistent way by introducing controllable solutions, is a management process and the application entire set of principles of this management process related to safety is known as Safety Management System.

Safety Management is understood as an application of measures, processes, principles within a framework to prevent adverse conditions and incidents (accidents, injuries etc) caused by the use of a product or a service. If we analyze an incident of an airhostess while serving hot tea to a row "A" passenger seated next to the window in an aircraft, accidentally spills it over on the passenger seated on row "C" in the aisle. The incident may be a small one but it involves a huge scope of assessment on safety issues and how the task may be undertaken in a way so that the potential risk of spillage on another passenger is eliminated. These incidents lead to development of procedures and standards that ensures safety during service and create a framework of adherence. Any further improvement in measure undertaken shall be a continuous process. Safety management helps in designing the operational flow and makes it easy to operate. It takes into account the system deficiencies and identifies predictable resolution measures before errors or potential risks become hazards. Safety management as a concept involves everyone working in an organization and is driven by the top management with definite accountabilities and responsibilities within the organization and the framework. The whole concept lies in building of a safety culture within the organization.

5.2 SAFETY CULTURE :

The uniformity in following a standard laid down practice in an organization related to safety is known as Safety culture. It is a set of norms, beliefs, attitude of the people working in the organization towards concern for safety that reduces the exposure of people to conditions considered as dangerous or hazardous. The characteristics of any culture building starts from the top management with safety as an utmost priority of business too, are initiated by decision makers. The modelling of safety culture according to ICAO guidelines include

- The involvement of the senior management and their emphasis on safety within the organization as a strategic importance for controlling risks.
- Activities in an organization may involve hazards; but the cumulative perspectives of decision makers and operational personnel lead to a realistic projection of short term and long term impacts.
- A positive environment of undertaking feedback regarding safety issues from lower ranks is incorporated to build the climate for easy identification of safety concerns and resolutions.
- Mechanisms devised by decision makers to disseminate information and awareness related to safety measures at all levels of the organization.
- Promotion of realistic and workable rules related to safety and hazards and the rules being endorsed and supported throughout the organization.
- Ensuring regular trainings of all personnel employed in the organization.

Safe Organizations Across the Globe

- Considers safety as an organizational objective and as a factor in contribution to achievement of organizational goals.
- Ensures establishment of a framework for risk management and contributes to a balance between risk management and production.
- Follow standard decision making practices consistently without compromises and adheres to an open safety culture.

- Relies inherently on internal responsibility of implementing safety.
- Works on proactive measures rather than being dependant on audits and reactive measures to achieve objectives related to safety.
- Ensures that long term measures are implemented within the organization to mitigate safety risks and short term measures for mitigating active failures.

❑ **Check Your Progress – 1 :**

1. Safety Culture incorporates a set of _____ in organizations
   a. Norms b. Beliefs c. Practices d. All the options
2. Culture building in an organization starts from the
   a. Bottom line b. Middle Management
   c. Top Management d. None of the options
3. For implementation of Safety culture the following aspect is essential
   a. No flow of communication b. Realistic and Workable rules
   c. Involvement of only Staff d. No training
4. Long term safety measures are implemented in organizations to
   a. Mitigate safety risks b. Inform Management
   c. Share responsibility d. Make decision making tough

5.3 KEY INGREDIENTS OF SAFETY CULTURE :

Safety Culture building in any organization is an enduring phenomenon that incorporates different vivid perspectives and a cohesive effort to amalgamate over a period of time. It is a concerted effort over time. Cox and Cox (1996) have mentioned that "safety culture can be linked to the personality of a human being." The various elements that build the foundation and framework of safety culture in any organization are interrelated and one cannot function perfectly without another. These elements determine how much an organization works towards safety as its prime concern in building a culture. Different organizations

Informed Culture : Organizations following this type of culture work on a system where every person working in the organization is well informed and concerned with safety in their respective operational areas. The potential risks and hazards and the ways to mitigate the same in every operational area are imbibed to the personnel through necessary knowledge, skills and experiences. Each employee working in the organization is responsible for identifying and reporting threats for safety and seeks changes necessary to overcome the same. People managing organizations that follow informed culture are themselves experts in their domain related to human, technical, organizational or environmental factors that determine the safety of the entire system. Informed culture organizations lay a lot of emphasis on reporting incidents and aspects related to smallest of the issues concerned with safety.

Learning Culture : Learning in any organization is an ongoing process and it is the willingness of the organization to learn from incidents and aspects related to safety. A learning organization promotes proactive safety assessments as well inferences from any reactive source also. Any aspect that might become a threat or a potential hazard within the organization is noted and the same analyzed to draw a right conclusion from the safety information system put in

place. Reforms are introduced as and when required and are fed into the system of learning.

Reporting Culture : Organizations that willingly report errors create a climate of safe working environment. These organizations find a quicker solution to challenges that affect safety aspects and work towards solutions for better implementation. Many organizations handle reporting as a way for blame and implements punitive action for errors, hazards or risks against employees who report. A reasonable and just culture within the organization would lead to a routine response to error and hence shall lead to enhanced safety measures.

Just Culture : It is a culture within the organization where employees are encouraged to bring essential safety related information. Just culture is developed through an atmosphere of trust within the organization. To implement a just culture there should be clear cut set of principles laid down within the organization that distinguishes between acceptable and unacceptable actions. In a just culture atmosphere people are more open to share safety related information without the fear of any punitive action.

Flexible Culture : With operations and operational aspects are in a dynamic phase, the culture of safety also changes within the organization. A culture of safety is flexible depending on the urgency of the decision to be undertaken related to safety and hazards and the amount of expertise of people involved in the process. In event of operations gearing up and moving towards a higher scale with threats of imminent hazards increasing, the culture of safety management also changes its tempo accordingly to stay abreast with the change.

Organizations that give priority to a culture of safety impart multifarious benefits. To enumerate

- Individuals at all levels of the organization are aware of hazards and concerns of safety. The seriousness of any risk is perceived in the same way by employees working in all levels of the organization. The concern for safety becomes a priority.
- Appropriate behaviour and decision making is undertaken in regard to safety issues by employees.
- The attitude towards safety especially of the management leads to a positive work environment within the organization.
- The compliance to procedures, rules and regulations leads to involvement being felt by everyone within the organization in defining, prioritising and controlling risk.
- There is an increased control on the performance of resources that detect potential risks and help in imparting safety.
- Organizations that adopt safety as a culture and implements the same generates a positive attitude and trust leading to increased business and higher level of customer satisfaction.
- A safety culture leads to better practices and performances. There are better system of audits and better control over resources. An organization that adopts safety as a culture looks positively into external feedback raising the index of performance aand a better implementation of a Safety Management System.

- Focus on Safety as an organizational attribute leads to higher return on investments through better control on performance of resources and better control over losses.

5.4 ICAO STANDARDS FOR SAFETY CULTURE MANAGEMENT :

Globally ICAO acts as the regulating body for setting standards on safety in aviation management. All airline operators across the globe work within the purview of the ICAO global practices and implement Safety Management Systems within organizations. According to ICAO standards Safety is considered to be a state where incidents that may cause harm are reduced. The incident control is maintained at a rate that is practicable and a continuous process is involved in its reduction. The application of principles and directives that include, Planning, Organizing, Directing and Controlling of such incidents to ensure a safe environment is known as Management of Safety within an organization. Safety Management System according to ICAO is a priority for operations in which all business activities are managed systematically to ensure all risks are minimized and safety concerns are given the utmost priority. The ICAO Safety Management System requires 4 major components. To enumerate they are

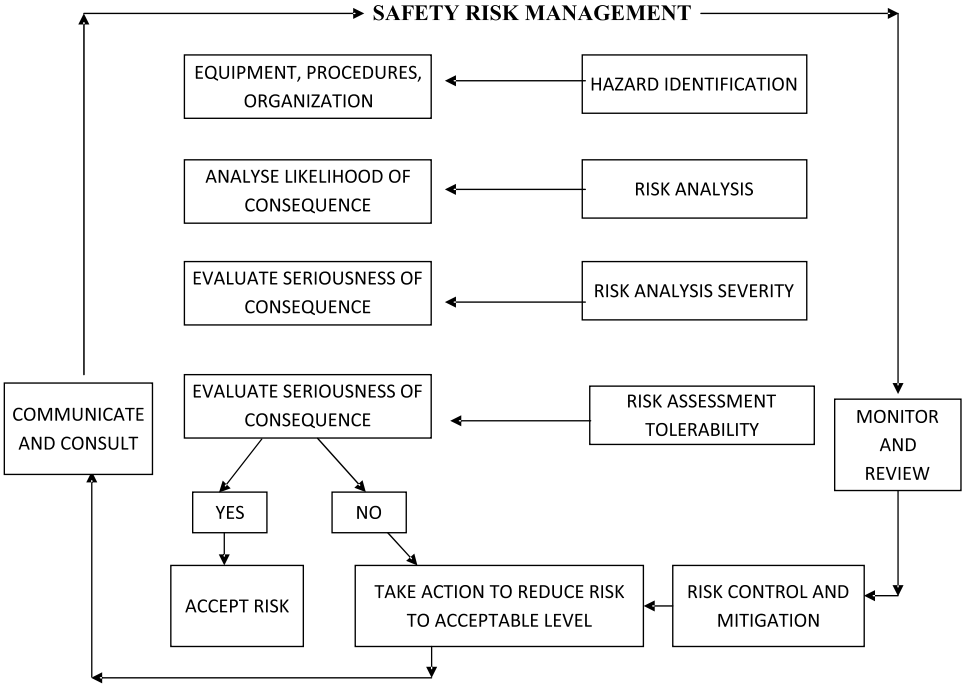
5.4.1 Safety Policy and Objectives :

Safety Policies and Objectives in an organization work as the basic building blocks towards a safe working culture. From an organizational perspective policy and objectives encompass the following and the same can be elucidated as

- The commitment of management of an organization towards safety and imbibing the same as a priority.
- It is the responsibility and the accountability of the senior management of any organization working towards safety management to plan, organize and provide necessary resources required for safety management.
- A management support and decision making system for building a safety culture within the organization.
- Strategize SMART objective layout to imbibe safety aspects within the operations.
- Incorporating a Safety team to establish safety strategy and goals to disseminate the same within the organization.
- Assignment of specific roles and responsibilities to people working in the organization for implementation of Safety Culture.

5.4.2 Safety Risk Management :

Risk Management is an important component of Safety Management System and involves multifarious approaches of identifying hazards, assessing risks and reducing the potential of risks to cause harm. The framework of Safety Risk Management when drawn represents



5.4.3 Safety Assurance :

Safety assurance is a systematic process for recording performance of organizational safety. It includes multifarious activities that lead to continuous improvement. According to ICAO document 9859, safety assurance includes

- Safety performance monitoring according to laid down safety policy and objectives of an organization.
- Validation of effectiveness of safety risk management through continuous monitoring and measurement of outcomes of activities.
- Achievement of required safety performance by reducing or eliminating safety risks continuously in the organization through identifying and managing changes that may affect established processes, procedures, products and services.
- Identifying causes for non performance of safety management system and continually working on improvement processes to eliminate such causes and set new standards.
- Maintenance of safety documentation, records, conducting routine surveys, continuous monitoring and initiating scope for improvements.

5.4.4 Safety Promotion :

The promotion of safety within the organization at all levels is important for implementation of safety management system. The 2 major elements that are important in promotion of safety are communication through different channels within the organization and training of people in relation to safety management system. A structured safety promotion

- Leads to awareness related to safety within the organization.
- Creates a positive safety culture through inculcation of new skills and knowledge.
- Leads to implementation of better processes and risk awareness.
- Leads to a lot of best practices.

5.5 SAFETY CULTURE ENHANCEMENT PROCESS :

Building a safety culture within an organization may incorporate both a reactive and a proactive approach. A reactive approach in Safety management system is a traditional approach that helps in dealing with unusual sudden events beyond the control of risk assessment. The focus of a reactive approach is on compliance with minimum safety requirements. A proactive approach is a modern approach that is based on risk management strategy. The approach identifies hazards before they can lead to incidents or accidents. The approach puts safety policy, risk assessment, safety monitoring, safety training and effective reporting systems in place in building the culture. Safety culture is not only about implementation but continuous enhancement. Enhancement is a process of elevation of safety standards from a particular level to another level through different stages.

Stage 1 : The first stage of Safety culture enhancement process starts with understanding of safety culture and its importance within an organizational framework. Once organizations are ready for upgrading its existing culture the components and characteristics are defined and the drivers of safety culture is identified. Drivers include people or conditions that can help bring in a change and maintain.

Stage 2 : The Second stage involves determining of the elements of safety that needs to be measured by any organization. The measurement is undertaken through various tools in different organizations and the best methods and tools are selected by each organization according to its requirement and effectiveness. The aspects related to the factors of who shall measure effectiveness, how it shall be measured, and the frequency to be involved and when it shall be done are also determined during this stage.

Stage 3 : In the third stage the measurement results obtained for safety for a particular process within the organization is further evaluated and interpreted. Interpretation of results can be pre–conditioned through a machine decision making system or involve human interface of decision making.

Stage 4 : The next stage emphasizes on the outcome of the measurements and the standard deviations from planned objectives that are obtained. Gaps are identified and addressed through an effective action plan that is drawn within the organization.

Stage 5 : The final stage includes checking of workability of the action plan within a due course of time. For changes related to the workability of the plan the process is repeated. If the plan is workable the safety measures and culture gets enhanced moving towards a new level. The entire process of enhancement is closed loop following a closed loop design continuously evolving through processes and setting new benchmarks in safety culture whenever required.

According to Ron Westrum, Safety culture in an organization is a collective efficacy that effectively happens through a free flowing communication with clear lines of accountability and authority. Often enhancement processes of safety fail due to disengagement of employees when they see no real benefits of participating. The achievement of an effective safety culture is considered to be a vital element of achieving and maintaining satisfactory levels of safety performance. Action plans in a Safety Culture must be realistic and employees working in the

organization must be able to see links between the action plan and the weaknesses in the safety culture. Timely feedback and follow up is critical

❑ **Check Your Progress – 2 :**

1. Organizations where everyone working is informed of safety norms follow

   a. Learning Culture b. Flexible Culture

   c. Just Culture d. Informed Culture

2. An atmosphere of trust is most essential component in organizations following a

   a. Learning Culture b. Flexible Culture

   c. Just Culture d. Informed Culture

3. Objectives designed for aviation safety should be

   a. ROBUST b. SMART c. STRAT d. MART

4. The 2 major elements to promote safety are

   a. Training and Communication b. Marketing and Advertisement

   c. Management and Staff d. None of the Options

5.6 LET US SUM UP :

Aviation gives priority to safety in all aspects of its operation. Mitigating risks on a day to day basis in operations is a management process and the application of controllable solutions lead to building an organization where safety is embedded as a part of culture. The uniformity in following a standard laid down practice in an organization related to safety is known as Safety culture. It is a set of norms, beliefs, attitude of the people working in the organization towards concern for safety that reduces the exposure of people to conditions considered as dangerous or hazardous. The modelling of safety culture includes involvement of management, a positive attitude, mechanisms for disseminating information and continuous training of all personnel. Organizations are internally responsible to implement safety and working on proactive long term and short term measures. An organization can imbibe different types of culture and can either follow a learning, reporting, just or flexible culture in its approach. ICAO Safety Management system requires 4 major components as part of culture building and they are safety policy and objectives, safety risk management, safety assurance and safety promotion.

5.7 ANSWERS FOR CHECK YOUR PROGRESS :

Check Your Progress – 1 :

1. d **2.** c **3.** b **4.** a

Check Your Progress – 2 :

1. d **2.** c **3.** b **4.** a

5.8 GLOSSARY :

Endorse : Declare one's public approval or support.

Mitigate : Lessen the impact of something.

Culture : Social behaviour prevalent in an organization.

Punitive : Intended as punishment.

Efficacy : Ability to produce desired result.

5.9 ASSIGNMENT :

1. What type of safety culture shall you try to imbibe within the organization and why ?
2. What are Safety Culture and its guidelines included by ICAO ?
3. "Safety Policies and Objectives in an organization work as the basic building blocks towards a safe working culture." Discuss the statement.
4. What is included in Safety Assurance according to the ICAO document 9859 ?
5. Describe the stages of safety culture enhancement process.

5.10 ACTIVITIES :

1. Make a list of 3 domestic airlines and 3 International airlines operating from New Delhi.
2. List down the safety activities undertaken by these airlines as a part of Safety in terms of passenger services right from arrival of the passenger at the airline counter to arrival of the passenger at the designated city.
3. You have been appointed as a manager of an airline company and have been assigned duty at an airline terminal that caters to a lot of destinations. You have a team of around 65 people from different job roles reporting directly to you in your organization at the terminal working round the clock in different shifts.

5.11 CASE STUDY :

A passenger while eating a packaged sandwich served in flight found a piece of small stone inside the filling which he had chewed and got a tooth of his hurt. The passenger called the flight attendant and showed the same to her. Initially the flight attendant spoke in a denial mode and was not ready to accept the same. A verbal duel led to flight attendant offering to replace the sandwich. The passenger intended for more action rather than a replacement. The flight attendant gave the passenger a feedback form to be filled and that was the best she could do in flight. The passenger filled the same and on arrival at the terminal he raised the same issue with the staff of the airline at the terminal. The staff tried to shirk off undertaking any responsibility and provided an email id of customer care for escalation of the issue. The passenger wrote an email only to receive a standard reply that the organization is conducting an investigation and shall come back to the customer shortly. With several follow ups that the passenger undertook, the airline company only replied with standard answers of assurance of getting back to the customer.

1. How was the safety of the customer jeopardized in the above situation ?
2. Was the incident a safety issue or a non safety issue on part of the airline ?
3. What was wrong with the culture within the airline company ?
4. How can a culture of concern be built in such organizations ?

5.12 FURTHER READING :

1. www.skybrary.aero
2. www.faasafety.gov
3. www.icao.int
4. www.caa.co.uk
5. www.casa.gov.au

BLOCK SUMMARY

The units in the block highlights aspects of safety being a prime concern of the aviation business and how safety holistically is managed globally across aviation organizations through implementation of manifold practices, procedures, standards, principles and measures. The same is done by governments of different countries, global aviation bodies and different agencies working independently or on behalf of governments. The management of safety within a framework is known as Safety Management System. You as a student of aviation must be aware of potential areas in aviation where safety can be compromised due to potential risks. An effective Safety Management System is the key to identify, assess and mitigate the risks and provide a safe operation in all spheres of aviation. The block highlights some of the principles, goals and practices implemented by global organizations of the world delivering benchmarks in safety management like IS BAO, EASA and FAA. An insight into the implementation of ICAO standards for global aviation safety is also included in the block. Safety is a part of every aviation organization and its people. A culture building on safety is essential to prioritize safety within the organization and the block also includes how organizations working in aviation imbibe safety as part of its culture.

BLOCK ASSIGNMENT

Section – I : Short Question Answer

1. What is Safety Culture ? Enumerate on the key ingredients of Safety Culture ?
2. Enumerate the role of ICAO in implementing global Safety for aviation ?
3. Explain the term Safety Promotion with an example from aviation sector.
4. What are the principles designed for global safety in aviation sector ?
5. Describe the goals set up for the member nations by GASP.
6. Explain the key activities included by Federal Aviation Agency.
7. Describe the framework of Safety Rick Management with the help of diagram.

Section – II : Long Question Answer

1. Explain the role of some of the global agencies for creating a benchmark for the aviation industry through its policies, procedures and principles ?
2. What is Safety Management ? What are essential elements required to build a safe organization ?
3. How shall you ensure that safety becomes an integral aspect of your organization and is followed by all the staff members ?
4. Explain the ICAO approach to Safety Management with reference to aviation organizations ?

❖ **Enrolment No. :** ____

1. How many hours did you need for studying the units ?

Unit No.	1	2	3	4	5
No. of Hrs.					

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

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AVIATION HAZARDS

DR. BABASAHEB AMBEDKAR OPEN UNIVERSITY
AHMEDABAD

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The content is developed by taking reference of online and print publications that are mentioned in Bibliography. The content developed represents the breadth of research excellence in this multidisciplinary academic field. Some of the information, illustrations and examples are taken “as is” and as available in the references mentioned in Bibliography for academic purpose and better understanding by learner.’6

ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self- instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual- skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is

particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self- instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)

PREFACE

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included many tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect. All the best for your studies from our team!

AVIATION HAZARDS

Contents

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Aviation Hazards

BLOCK 3 : SAFETY OPERATIONS – I

SAFETY OPERATIONS – I

Block Introduction :

Airport operations have been a major component of the global aviation industry for many decades. Airports are often situated near large population centres and may offer limited customer parking, making them inconvenient for travellers. They also serve as hubs for one or more airlines or other types of passenger transportation.

In the future, new technologies could be implemented that would allow passengers to have their own private jet and land it at an airport in their city to avoid most of the hassles associated with airport operations and find themselves closer to their destination.

In the modern age, one of the most important aspects of airport operations is safety. Security and safety are two inseparable words that go hand in hand. With increased terrorist attacks and a sudden change in the political climate, airport security has been enhanced.

A cabin crew member's duty is to ensure passenger safety through a number of actions, such as providing information about emergency exit locations and using their training to help evacuate passengers in case of an emergency. In addition, they may be required to assist passengers with disabilities or medical conditions when needed.

Block Objectives :

After learning this block, you will be able to understand :

- To know the regulatory considerations for an airline and role of agencies.
- To enumerate safety procedures related to airline operations on different aspects.
- To list the Cabin safety and health and safety guidelines
- To enumerate IATA cabin operations safety task force (COSTF) and operation safety audit (IOSA)
- To list basics of the Safety management system in cabin operation (SMS) and safety risk management.

Block Structure :

Unit 1 : Passenger Safety

Unit 2 : Cabin Safety

Unit 3 : Baggage Safety

Unit 4 : Airport Operation Safety

UNIT 01

Passenger Safety

UNIT STRUCTURE

1.0 LEARNING OBJECTIVES :

- To learner will understand about the safety regulation consideration for airline
- To have an overview of passenger safety as per ICAO provisions
- To understand the requirement of languages in safety
- To have consideration for operations with cabin crew

1.1 INTRODUCTION :

The safety rules for international commercial air transport on an aeroplane; process and procedures that need to be followed by an operator, cabin crew members and the passengers along with the tools and the locations with its utilisation which can save the life of the passenger at various situation and make the journey a memorable one.

The combination of speed and height makes the aircraft very dangerous at the time of the accident, which is a question for survival at that moment. Survival in an aircraft accident depends on a lot of factors. Such as following the standard procedures for maintenance of aircraft, board safety checks, inflight

equipments, etc. To enhance passenger chance of survival is followed by integrating the structure and its access to exist.

1.2 THE SAFETY REGULATORY CONSIDERATIONS FOR AN AIRLINE :

The International Air Transport Association is an international airline industry trade group representing nearly 240–member airlines. The IATA strives to make air transportation safe and efficient by setting minimum safety standards, providing guidance to member airlines, and cooperating with governments in their regulations of air travel.

1.2.1 Federal Aviation Authority of the US :

The Federal Aviation Authority of the U.S. is responsible for regulating all aspects of aviation in the United States. They are responsible for air traffic control, aircraft certification, and operation of the national airspace system, among other things.

1.2.2 National Transportation Safety Board :

The National Transportation Safety Board (NTSB) is an independent federal agency, which has the responsibility to determine the probable cause of transportation accidents. The NTSB investigates accidents involving automobiles, trains, motorcycles, buses, pipelines, bridges and boats.

1.2.3 European Union Aviation Safety Agency :

The European Union Aviation Safety Agency is a regulatory body that establishes common safety and security rules for all member states, thereby ensuring a level playing field for all airlines in the EU. The agency also has the power to inspect airlines and issue safety certificates.

1.3 PASSENGER SAFETY OVERVIEW OF ICAO PROVISIONS :

ICAO stands for international commercial air transport on aeroplanes. As for the ICAO the operator should be concerned about the safety of the passenger. The operator should provide the equipment and shall be responsible for making the equipment familiar with the location and its utilisation. Few of the equipment's are as follows :

- Seat belt
- Emergency exit
- Life jacket if carries of life jacket is provided
- Oxygen dispensing equipment if it required to use by the passenger
- Other emergency equipment provided for individual use including passenger emergency briefing cards

Regulatory Consideration :

If you want to increase the safety of the passenger, the operator should provide the necessary safety information to the passenger and how they need to act in times of emergency. The process of using the equipment should provide for normal operation as well as in the event of emergency.

It is the responsibility of the cabin crew members to use different medium to make the passenger understand regarding the safety process which can increase their survival at the time of travelling. The cabin crew can use the verbal,

nonverbal or visual communication on safety briefing to provide the necessary information to passengers. Passenger safety briefing includes the following.

1.3.1 Safety Regulation before Departure :

Pre–Departure Briefing :

A pre–departure briefing is a document that has all the critical information necessary for the traveller to have a safe trip. A typical pre–departure briefing can include anything from airport procedures and safety tips to specific risks for travellers of certain medical conditions.

It is important to create a pre–departure briefing before one goes on any travel because it has all the critical information necessary and it can be used as an emergency resource if anything goes wrong on their trips.

Operation of Unstaffed Exit :

Other required announcements like rules and regulations and the utilisation of stowage of portable electronic devices.

Unstaffed Exit Row Briefing :

The passenger should understand his or her role in the event of an emergency. So that the passenger who is seated at on stop exit rows should know his or her responsibility to operate the exit.

- The passenger should verbally accept the responsibilities.
- The passenger should open the exit only after getting the signal or command form cabin crew.
- How to open the exit including specific aspects of the operations such as
- Check for the nature of accident like fire, water etc.
- What need to be done with the exit hatch if removal and the place of placards and the passenger safety briefing cards.

Briefings for Special Category of Passengers :

It is important to understand the special needs of every passenger. That's why airlines provide a variety of briefings for different categories of passengers. They come in a variety of types, from those for travellers with disabilities, those for people living with allergies, those that are suitable for parents travelling with children, and so on.

This section will focus on the briefing for travellers with disabilities.

There are many benefits to receiving these special briefings that are tailored to their needs. Not only do they receive information about what is available at their destination airport, but they also get to know the layout of the airport and how to get around it in case they need assistance. These are the passengers those are different than the normal passengers for them the operator should provide the additional information or briefing which can suit their specific needs.

The state instructs the operator to provide individual safety briefing to the special category of passengers and their companion.

These passengers may include the following

- Person travelling with infants
- Unaccompanied children
- Persons with disabilities

- Persons with mobility impairment
- Person on stretchers

Cabin crew should cross verify that these special categories of passenger have understood the following

- Seat belt and other equipment's
- How to use the seat belt and other equipment's along with its features.
- The use of child restraint system if applicable.
- Restrain means the secure or control animals if it is permitted in the cabin

Emergency Exit :

The emergency exits

- Should provide the information on the location of the nearest exit.
- Should provide the information on the location of the nearest alternative exist if there.
- Should brief on emergency lighting like escaping path lighting, exit sign etc

Oxygen :

Often it is critical and oxygen is required by passengers to be inhaled through a pressurized mask. The airline

- Should explain how to get a mask.
- How to activate the flow of oxygen and use it.
- Also explain to the passenger first to use your own mask before you are assisting to other passengers for their mask.
- Life jacket or individual flotation devices
- Should give a demonstration of the location.
- How to remove life jackets from stowage and packaging.
- The method of inflation and when to inflate life jackets along with signalling equipment if provided.

Unaccompanied Child, Unaccompanied Minor :

An unaccompanied child is a person under the age of 18 who arrives at a port of entry without a parent or guardian. Unaccompanied minors are different from unaccompanied children. They are defined as individuals under the age of 13 who may not be accompanied by a parent or guardian.

Safety Demonstration in an Aeroplane :

A safety demonstration is an overview of the safety procedures that should be taken in an emergency.

The demonstration should include **:**

- Removing your seat belt and oxygen mask
- Bracing for impact if the plane crashes –Upon detection of an emergency event, employees must act swiftly and act promptly in accordance with their departmental evacuation plan. If the nearest exit is to be found on the other side of an emergency exit door, all employees should comply with the steps for accessing this type of door. These include : (or the door opposite) –Searching for a safe landing spot –Applying first aid to people who need it –Administering CPR or mouth–to–mouth resuscitation.

1.3.2 Safety Regulation During the Air Travel :

After take–off Briefing in Aeroplane :

The passenger should be briefed on what they can expect when the plane is taking off. They should be given important information about the safety procedures in case of an emergency. The passenger should know to keep their seat belts on and not to move around the cabin.

The briefing will make passengers feel more comfortable before take–off and also after take–off. It will also make them aware of safety measures in case of emergencies, which will make them feel more secure during take–off. The passenger should know smoking restrictions and policy for stowage.

Briefing in the Event of Turbulence :

Turbulence is a great challenge for any airline company. The safety rules and regulations for turbulence vary from one country to another. But, one thing is common : If the aircraft is struck by turbulence and the passengers become aware of the event, they should follow these guidelines **:**

- They should sit down and put on their seat belt;
- They should make sure that their seat backs and tray tables are in their upright positions;
- use of lavatories is prohibited.
- They should tell other passengers to do the same.

Pre–landing Briefing :

The operators should inform to the cabin crew members to conduct the briefing before each landing. Generally, this briefing done by an announcement made over the PA system. The cabin crew should inform the following.

- The utilisation of seat belts for restraint systems.
- The correct position of stowage, tray tables, seat backs, footrest and windows blinds etc.
- Smoking restrictions.
- Policy and procedures for flight that is longer than four hours and the location of the emergency exits.

1.3.3 Safety Regulation After the Landing :

After landing Briefing :

After landing on the cabin crew member should conduct a briefing for the passenger. This briefing is also announced by using the PA system. Cabin crew members may brief the passenger on the following thing.

- Until and unless the sign of fasten seat belt is not turned off you should remain seated with the seat belt fastened.
- After the sign stop then only you can take your baggage.
- Smoking restriction policy.
- The policy and process for safety moment of the passenger on airport.

Transit Stop Briefing :

As the name suggests if you are travelling from one place to another place in between the aircraft landed on the ground is called transit stop. If this scenario arises the cabin crew members should inform the following by using PA system.

- The rules and regulations regarding smoking.
- The policy and procedures on the use and stowage.

Refuelling Briefing :

The cabin crew members should conduct the briefing at the time the aircraft is being refuelled. The following information should be given using PA system and we should avoid the following **:**

- Using of Lavatory
- Walking around the cabin
- Unfastening the seat belt
- Smoking restriction
- Policy on the use of stowage (storage)

Abnormal and Emergency Situation :

The cabin crew member should inform the passenger at the time of emergency situation and also guide them how they need to react for their survival. This may include the following.

- Fire or smoke
- Cabin pressurization problems and decompression
- Anticipated and on anticipated emergency landing or ditching
- Evacuation may be on land or water
- Quick leave action

1.4 LANGUAGE REQUIREMENT FOR COMMUNICATION :

For better communication between the cabin crew members and the passenger there should be some language which is used to brief to the passenger. The operator may consider to assign language qualified cabin crew members or interpreter onboard of the aircraft on a specific routes.

The following languages can be used by the operator.

- The use of English
- Official language of the state of departure
- Official language of the state of destination

1.5 CONSIDERATION FOR OPERATION WITHOUT CABIN CREW :

If the flight is not taking any cabin crew members in this scenario the flight crew members are responsible for providing all the necessary information to the passenger as well as they should provide all the standard briefing materials to the passenger. The operator may select any alternative mediums such as electronic means, pre–recorded announcement to make the passenger understood regarding the safety process during the journey.

❑ **Check Your Progress :**

1. IATA stands for
   a. Indian Air Transport Association
   b. International Air Transport Association
   c. International Air Traffic Association
   d. International Air Travel Association
2. NTSB stands for
   a. Nation Transportation Safety Board
   b. National Transportation Safe Board
   c. National Transportation Schedule Board
   d. National Transportation Safety Board
3. Unaccompanied Minor age
   a. under the age of 13 b. under the age of 18
   c. under the age of 20 d. under the age of 21
4. Minimum number of languages used by the operator
   a. 6 b. 5 c. 3 d. 8
5. Public Address system should be used by crew for safety during
   a. Refuelling b. Fastening of Seat belt
   c. Smoking restriction d. All the options
6. Information regarding seat back being upright is part of
   a. Mid Air procedure b. Post Landing briefing
   c. Pre Landing briefing d. No briefing is done
7. During turbulence use of lavatory is
   a. Permitted b. Prohibited
   c. Depends on situation d. None of the options
8. Minimum number of languages used by the operator
   a. Mandatory by crew b. Done for emergency exits
   c. Not mandatory d. Done only on International flights

1.6 LET US SUM UP :

Safety information, understanding and proper action on the airplane must be given to airline passengers to create the acceptable behaviour in the event of emergency. During the journey safety is the joint responsibility between passengers and cabin crew. The more passengers are knowledgeable, informed, the better safety will be in case of emergency.

1.7 ANSWERS FOR CHECK YOUR PROGRESS :

Check Your Progress :

1. a **2.** a **3.** a **4.** c
5. d **6.** c **7.** b **8.** a

1.8 GLOSSARY :

IATA : International Air Transport Association

NTSB : National Transportation Safety Board

EU : European Union

ICAO : International commercial air transport on aeroplanes

PAS : Passenger Announcement system

1.9 ASSIGNMENT :

1. What are the passenger safety regulatory considerations for an airline ?
2. Explain the passenger safety according to ICAO provisions.
3. How to improve the survival percentage at the time of emergency in an aeroplane ?
4. What are the safety regulations in airline during the air travel ?
5. How language is important for safe flight operation ?

1.10 ACTIVITIES :

1. As a passenger, find out the safety process followed by the different operator in international flights.

1.11 CASE STUDY :

Case Study – 1 :

Mr Kartik Oberoi is the Managing Director of a well–established aviation Company named Airfly situated downtown. The company has spread its wings across the globe for aviation work with 13000 staff. Recently an aeroplane met with an accident in which everyone died. It creates a terrifying impact on passengers. Due to that event drastically passengers reduced for the flight. Mr Kartik Oberoi is in a situation where he must decide some of the innovative ideas for convincing the passenger to use their flights.

What are the factors he needs to consider for promoting the business ?

Case Study – 2 :

Mr Kartik Oberoi is the Managing Director of a well–established aviation Company named Airfly situated downtown. The company has spread its wings across the globe for aviation work with 13000 staff. Due to the Covid passengers reduced for the flight. Mr Kartik Oberoi is in a situation where he must decide some of the innovative ideas for convincing the passenger to use their flights.

What are the factors he needs to consider for promoting the business ?

1.12 FURTHER READING :

1. Airport Operations, 3 edition by Norman J. Ashford, H. P. Martin Stanton, Clifton A. Moore, Pierre Coutu&John R. Beasley
2. Aviation Risk and Safety Management Methods and Applications in Aviation Organizations.
3. Manual on Information and Instructions for Passenger Safety by ICAO.
4. Cabin operations safety best practices guide by IATA

UNIT 02

Cabin Safety

UNIT STRUCTURE

2.0 LEARNING OBJECTIVES :

- To understand the cabin safety initiatives in airlines
- To have knowledge about safety management measures in cabin
- To have insight on safety reporting and its aspects
- To know about the characteristics of effective reports

2.1 INTRODUCTION :

Cabin safety is a primary key which is having a major impact on operational safety. If you see the history the role of cabin crew was only seen after the accident only. But now a day it is not limited to post evacuation procedures only but also taking the responsibilities for the smooth operations and taking care about the passenger during the journey.

The activities done by the cabin crew members during the operation of an aircraft are coming under the cabin safety. The contribution of cabin crew members are not only limited to taking care about the passenger but also make them feel safe during the journey as well as it plays a major role for effective operation at any situation.

As you are aware, cabin crew members play a very important role during emergency situations. It may be a fire, depressurization and turbulence or situations to handle the passengers. To increase the efficiency of cabin crew members the IATA has been working continuously with operators, manufacturers and other industry partners.

Cabin safety is a very important component for an operator safety management program which includes the following.

- Cabin design and operation
- Equipment
- Procedures
- Crew training
- Human performance
- Passenger management

2.2 CABIN SAFETY INITIATIVES :

IATA is always looking for the contributions and continuous reductions in the number of incident and accident as well as the cost associated with the safety operation of commercial aircraft. This can be achieved through the following.

- Developing and promoting the best practice for global utilisation.
- Understand the new trend worldwide and initiate the corrective actions.
- Involved with aircraft manufacture for technical installation, equipment and its design.
- Organising the conference and the workshop to bring them one flat form.

There are various other initiative taken by IATA for the safety, they are :

Cabin Safety Extranet Site :

The IATA provides website for all the airline operators to access the safety related resources. This website also allows the members to discuss the various issues and problems to create a benchmark for safety standard.

Cabin Operation Safety Conference :

This is provided by IATA for the regulators, crew training specialists, operators, solution providers, manufacturers, suppliers and cabin safety specialists. This also provides the great network and opportunity to solve safety related issues.

Cabin Safety Guidelines :

IATA provides all the guidelines related to cabin safety, best practices and the documents required for the concerned industry.

2.2.1 Cabin Safety Data and Analysis :

IATA analyses the data from global aviation data management (GADM). IATA member airlines may request access to the GADM site by registering at

http://extranet2.iata.org. Analysis and Data Exchange System (STEADESTM) which provides access to data on established key performance indicators in comparison to worldwide benchmarks. This allows members to compare their performance to their peers and identify where improvements can be made.

2.2.2 IATA Cabin Operations Safety Task Force (COSTF) :

IATA includes all members of airlines along with cabin operations safety task (COSTF) to establish proper operational environment.

It is said that the member of cabin operation safety are industry experts in cabin safety areas of interest and it includes flight investigators, policymakers, cabin crew trainers and safety auditors.

COSTF provide support to IATA in cabin safety in the following areas.

- Cabin safety and operations
- Cabin safety training
- Accident or incident investigation
- Human factors
- Quality assurance

The following aspects are taken care by COSTF by maintaining the IATA operations standards audit (IOSA) and IATA standards manual through continuous up gradation and modification of cabin operations annually. The audits are also responsible for giving the answer related to cabin operations as required.

- Helping the IATA to develop the programs like conferences, seminars, exhibition and training programs for cabin operation and safety.
- Helping the accident classification task force (ACTF) by reviewing the accident classification for the cabin safety sections of the IATA safety report.
- Developing the process and procedures to decrease injuries or the cost of operations related to commercial aviation safety.
- Creating the platform for the issues on current and anticipated cabin operation safety so that it can be discussed and guided properly.
- Guided to the representative who involve in cabin operation activities by the IATA.

2.2.3 IATA Operation Safety Audit (IOSA) :

This is a program which has been accepted internationally for evaluating the system which is designed to access the operational management and control systems of an operator. It is mandatory for all IATA members to register in IOSA. It is not compulsory for non–IATA members to register with IOSA.

In each year operational safety audit standard manual is revised in all the sections which include section 5 and the cabin operations.

Section 5 includes the following

- Management and control.
- Training and qualification.
- Line operations.
- Cabin system and equipment.

The benefits of IOSA for operators and regulators are.

- A quality audit program under the flagship of IATA.
- Continuously updating the standards and the best practices.
- Reduction in operating cost and audit resources requirements.
- Audits through approved organisations which has trained and qualified auditors.
- Approved training organisation with auditor training courses.
- Properly structured audit methodology with the approved checklists.

2.2.4 Health and Safety Guidelines :

Health related issues for the passenger or crew are very important because it affects the aircraft operations, passenger transport and cargo transport. They cover matters like time limitations, transmission of communicable diseases, and desensitization.

Generally, the Guidelines have been developed by IATA's Medical Advisory Group, addressing general medical issues and aviation–specific issues. It has been reviewed by the World Health Organization (WHO) and meant to help operators address emergency public health issues, particularly in the case of suspected communicable diseases.

2.3 SAFETY MANAGEMENT :

As for the aviation industry safety is the state in which the possibility of harm to persons or property damage is reduced to and maintained at or below unacceptable level through a continuous process of hazard identification and safety risk management.

For the aviation industry safety is the number one priority. The continuous development in safety brings down the fatal accident numbers. The operator should take the responsibilities for the safety and security of their passengers and crew members. Cabin crew member should work dedicatedly for safety and security also understand their role at the time of an emergency. If cabin crew members see any suspicious or concern they should report to the operator.

At the time the operator making safety policy should add the culture and the responsibility of all relevant departments and ensure coordination between them.

2.3.1 Safety Management System in Cabin Operation (SMS) :

The role of the International Civil Aviation Organisation (ICAO) is to define a safety management system (SMS) as a systematic approach to managing safety including the necessary organisation structures accountability policies and procedures.

2.3.2 Safety Risk Management :

There is no such thing as 100% safety. It is not possible to eliminate all the risk, but you can reduce the damage by controlling it.

Safety risk management is all about identifying analysing and elimination of hazards. To reduce the risk allocation of resources are required which is taken from data. Risk mitigation can be measured and balance against time cost and the difficulty of taking measures to reduce or eliminate the risk.

Following points include in control strategy

Avoidance : an operational activity is cancelled due to the risk is more than the benefits.

Reduction : The frequency of an operation or activity is reduced to bring down the risk to an acceptable risk.

Segregation of exposures : Separated the affected parts of an aviation to reduce the risk.

2.3.3 Risk Assessments in Cabin Operations :

Generally, assessment is done at the time of new product or service which helps to give some input that is required to change, for better cabin safety or service procedures.

These are the following things can be done as an assessment.

- Help to find out new and improved process.
- Introduce new product or service that was not previously in the safety regulation.
- Help to use the resources properly.
- Prevent cost of injury or incapacitation.
- Improve engagement with workforce.

Generally, assessment can be done by experts in the area of cabin operation to ensure that appropriate hazards and risks are identified. To get involved in risk assessment the person should have taken the training in identification of hazards and their associated risk.

Hazard : An event with the potential of causing injuries to personnel, damage to equipment or structure, loss of material for the reduction ability to perform a prescribed function.

Consequence or Risk : The result of the hazard.

Safety Performance Indicators : Safety performance indicator helps to understand how effectively the SMS is functioning.

2.3.3.1 Safety Performance Indicators (SPI) :

Safety Performance Indicators are short term measurable objectives reflecting the safety performance of a Safety Management System.

2.3.3.2 Safety Performance Targets (SPT) :

Safety Performance Targets are long term measurable objectives reflecting the safety performance of a Safety Management System.

❑ **Check Your Progress – 1 :**

1. GADM stands for
   a. Global aviation day management
   b. Global aviation data management
   c. Global air data management
2. WHO stands for
   a. World Health Organization
   b. World Health Operator
   c. World Heal Organization
3. ACTF stands for
   a. Accident Classification Task Force
   b. Analytical and Classifying Task Force
   c. Accident Carefulness Trend Force
4. IOSA stands for
   a. IATA Operational Standard Audit
   b. IATA Operational Safety Audit
   c. IATA Operational Safety Access

2.4 SMS TRAINING :

Safety Management System training is generally provided by the operator for both management personnel and non–management personnel. The idea of providing this training is to understand the responsibilities individually and also of understanding the process involvement in the Safety Management System.

In the SMS training programs, the following points need to be taken into concern

- Event investigation and analysis techniques
- Risk assessment and mitigation
- Hazard identification
- Communication techniques
- Safety reporting and culture

- Audit principles and methodology
- SMS implications analysis and improving it continuously
- Prepare for any kind of emergency.

2.5 SAFETY REPORTING :

It says proper reporting always help the people to improve the safety process due to that they come up with the idea called open reporting culture. This culture says improving the safety should in priority and it should not blame anyone else. Cabin crew should always report any flight related safety concern to the pilot in command and follow the operator's guidelines on reporting incidents.

Few examples of safety report include

Cabin Safety Report (CSR) : This report is generally related to any incident or mishap during the period of cabin crew member's duty.

Air Safety Report (ASR) : ASR is informing about any incident or problem which is directly impacting the operation of the flight, typically submitted by a flight crew member.

Confidential Human Factor Report : This report related to the people involved in the operations and identifying their performance in a special situation. These should be submitted independently from safety reports.

2.5.1 Characteristics of Effective Reports :

The effective reports create a major role in terms of improving in process as well as to understand the event more in details. Generally, at a crucial time the members are writing the reports which are very hard to write in details. We should come up with the ideas how can these people can write the reports effectively and try to send the message all in details so that it can analyse easily and understand the situations. To make it effectively we can take the help of Pre–filled format.

The investigation report may include the following.

- Title of the report
- Details of the event
- Persons involved
- Description of the event
- Action taken

Further there are other aspects of effective report, such as :

Process Flow of the Report : To develop any safety standards, you should communicate properly. Generally it is very hard to take the decision on the ground to enhance the safety due to that lot of reporting is required so that the reporter can understand the situations and giving you the ideas how you need to handle at a particular situation of time again at the same time they are expecting you to give your input to validate whatever the processor ideas they have given or reporter has given is applicable or it can be implemented or not.

Submission of Reports : All the report should be submitted within 24 hours of the event so that the action can be taken as soon as possible. Generally, it is depending upon the size of the operator reported as may be submitted electronically or in paper format.

Evaluation and Classification of Report : After the report is submitted the investigator should analyse the report to understand the problem and coming up with the ideas for solution of this specific problem.

2.5.2 Closure Reports :

This report only prepared once all assigned action have been completed and mitigation measures in place are effective. Even after the closure, if it is required to review at a specific time period that also can be done.

The Value of Effective Cabin Safety Reports :

The huge database of cabin safety reports can be used by the operator to identify the safety performance indicators. As well as it helps to identify and classify the safety and the risk before the introduction of new products or service or related to procedures.

❑ Check Your Progress – 2 :

1. Reports generated related to a mishap during cabin crew member's duty is
   a. Air Safety Report b. Cabin Safety Report
   c. Cabin Surety Report d. Human Factor Report
2. Report impacting the operations of flight submitted by flight crew
   a. Air Safety Report b. Cabin Safety Report
   c. Cabin Surety Report d. Human Factor Report
3. Reports should be ideally submitted within
   a. 36 hours b. 48 hours
   c. 24 hours d. None of the options

2.6 LET US SUM UP :

The cabin safety totally depends on the cabin crew members. Better understanding and convincing power of cabin crew member can handle any situation very effectively.

The International Air Transport Association (IATA) has explained that commercial aviation has a great arrangement of development in modern technology during the few centuries. This progress would not be possible unless the involvement of IATA or other regulatory aviation body. Therefore, the equipment and the people involve has to pay very close attention to the incident and accident prevention and ensure that everyone follow the safety process which has been laid down by the operator or regulator.

2.7 ANSWERS FOR CHECK YOUR PROGRESS :

Check Your Progress – 1 :

1. b **2.** a **3.** a **4.** b

Check Your Progress – 2 :

1. a **2.** a **3.** c

2.8 GLOSSARY :

IATA : International Air Transport Association

NTSB : National Transportation Safety Board

EU : European Union

ICAO : International commercial air transport on aeroplanes

PAS : Passenger Announcement system

WHO : World Health Organization

GADM : Global aviation data management

2.9 ASSIGNMENT :

1. What are the main components for an operator of cabin safety ?
2. Write a short not on the initiative for cabin safety.
3. Enumerate the role of Safety Management System (SMS) in cabin operation.
4. What is safety reporting ? Explain the characteristics of effective reporting.

2.10 ACTIVITIES :

1. Due to the bad weather and turbulence in an aeroplane, the passengers are afraid. Being a senior member, what are the steps you need to take to handle this situation ?

2.11 CASE STUDY :

On Saturday March 20, 2021, Boeing 850, operated by Company Zapak, took off from India, Delhi International Airport for UK International as the company's scheduled Flight.

Around 12:45 India Standard Time (GMT+5.30hr, unless otherwise stated, all times are shown in GMT on a 24–hour clock), the aircraft was hit by turbulence when it was flying at an altitude of about 33,300 ft about 180 km. Six passengers got serious injuries, while 36 other passengers and five flight attendants (FA) got minor injuries.

At that time 350 people were there, it includes the pilot in command and 12 other crewmembers and 450 passengers. The aircraft interior was partially damaged.

What is the role of the cabin crew member in this above situation for ensuring passenger safety and cabin safety ?

2.12 FURTHER READING :

1. Airport Operations, 3 editions by Norman J. Ashford, H. P. Martin Stanton, Clifton A. Moore, Pierre Coutu & John R. Beasley.
2. Aviation Risk and Safety Management Methods and Applications in Aviation Organizations.
3. Manual on Information and Instructions for Passenger Safety by ICAO.
4. Cabin operations safety best practices guide by IATA.

UNIT 03

Baggage Safety

UNIT STRUCTURE

3.0 LEARNING OBJECTIVES :

- To understand about the history and trends in baggage handling
- To have knowledge about baggage handling procedure
- To develop insight about bag drops
- To know about baggage storage

3.1 INTRODUCTION :

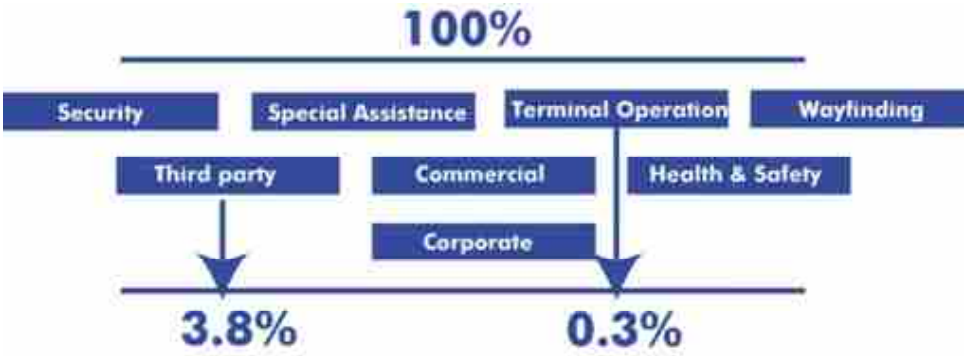
Baggage Handling is one of the essential aspects at airports and its relevance is important from process, system and organisational perspective. Effective baggage safety and handling leads to customers towards satisfaction and make their journey a memorable one.

3.2 HISTORY AND TRENDS :

The effective handling of baggage makes the operation smooth at airports. It creates lots of problem if the travellers are not getting their baggage at the time of arrival or at the time of departure at an airport. Failure of baggage handling may lead to cancellation of flights for the passenger.

If you see the history, it highlights that baggage which is kept near the passenger has got a long list of complaints. An analysis in the period of 2009 and 2012 it says 3.8 % of complaints are related to third parties like airlines and their handlers. Only 0.3% are related to terminal operations.

Let's understand the same with the following illustration.



To improve the baggage safety and handling worldwide, a lot of operators started using automated systems which involved a lot of investment.

Generally, the baggage handling is taken care by an airline or its appointed handlers. The information is most of the time unclear to passengers. Therefore, if any passenger or traveller has issues with baggage, they assume that it as a fault of the airport risking its reputation. For effective handling of the baggage the airports and the airlines should be combined.

With the changes of the time the complexity of baggage handling has changed. Now days you are able to see simple to very sophisticated baggage handling procedures provided by different airlines to the customers.

A unit load device (ULD) is a new way to load the luggage in flight and mail on wide body aircraft and specific narrow body aircraft. An efficient planning and preloading of cargo make the process faster to load in aircraft.

Just because of cost of air transportation has declined it has opened a wide variety of passenger types. This also opened a wide range of items that passenger wants to carry therefore companies have laid emphasis and additional concern on out of gauge (oversize) processes. The demand of aviation industry increases along with new routes which increased the market. In few cases a faster, cheaper and more secure way of moving high value items also increased due to increase of flights.

Most jurisdictions come up with the idea of screening the passenger and their baggage at the time of arrival or departure. As for the modern facility concerned it does not require to separate the passenger and baggage's. Generally large airports have the facility to scan large quantity of baggage altogether. As for inline system it provides approximately 1200 bags per hour. For machines an order of magnitude greater than what can be achieved by metal detecting arch and with baggage screening equipment becomes mandatory.

Few economic airlines have come up with the idea to reduce the quantity and size of hold baggage and charge extra for any other luggage. Most of the full–service carriers also charge for extra bags for extra weight. The limitations of the baggage are imposed by airlines also because of health and safety concern of passenger.

To provide faster and safer in processing it is required to change technology, legislation, competition markets and it also have the impact of certain events like IPL cricket which effects on the types and volume of baggage and processing needs.

3.3 BAGGAGE HANDLING PROCESS :

Most of the commercial airports should have check–in, reclaim and flight build facilities also called makeup. Hub airports are different as multiple terminals require inter terminal transfer process for connecting passengers and their bags arriving at one terminal with departure flights in different terminal.

In most of the cases the baggage enters the system through bag drop, gets screened at the terminal of departure. If options are there, they may be stored and delivered to a flight build output. From there itself the baggage is sent to the departing aircraft and loaded over there.

Once the bags are rejected at the terminal they are handed over to the reclaim section for collection by the passengers. In few situations the rejected bags may be screened for illicit items.

The submitted bags at a terminal will be considered as input into the bagger system and routed to the terminal of departure. Once the process is complete then it will go as locally checked in baggage.

3.4 BAG DROPS :

As the name suggest you can drop your bag or put your bag in a particular location. Off airport check–in can be given in different way it may include airline offices, check–in counters, at downtown train stations and services supporting check–in and bag drop at hotels. The idea of providing the bag drop facility is to make the passenger free and help him to visit the particular city or country without carrying their baggage with them.

Car park and kerb side check–in are also popular ways to check in for a flight and without having to take them to the airport building. Generally, they operate as follows.

- Pull up to a booth in a car park or the kerb near to the departure terminal. A check of the passenger photo ID card along with the confirmation number, flight number, destination or e ticket number is done by an agent.
- The baggage is handed over to the agent and the receipt for the same is collected. Once the baggage and boarding pass is received a passenger can directly approach to the security.

The passenger must provide the proof to the check in agent with assigned seat number. If the passenger has baggage's that need to check in, the agent will print and attach the barcode tags to each bag and issue baggage received to the passenger. The agent then submits the bags into the baggage system.

Just because a lot of check in functions can be done online like seat allocation and boarding card printings, the same may create problem in terms of bypassing few processes required for security check by passengers.

Typically, there are three phases and each phase is being encountered by passengers as they make their way through the departure concourse.

- The first phase is kiosk service. It may provide check–in, seat allocation and boarding card printing. Additionally it may provide the support for baggage tag printing and attachment. The kiosks are popular as they are less space consuming and can be placed anywhere. A kiosk is cheaper than a conventional desk and saves a lot of manpower. Drastically it decreases the transaction time and a passenger benefits from not being standing in

queues as it is for a conventional check–in. To operate the kiosk effectively there is need of very few staff who can host and support a group of kiosks. Due to the introduction of kiosk service the operational cost for airlines and handlers are reduced for giving the same level of service.

- The second phase is a bag drop where the passenger can submit hold baggage. Sometimes these bag drops are physically same like conventional check–in desk. In this the machines are only designed to accept the baggage only.

The phenomena of self service bag drops are of growing interest where the passenger can self–deposit the baggage without the need of any member or staff. Qantas is an early adopter of this approach for domestic traffic. In this process the bag tags are printed and attached at check–in kiosk for regular passenger so that the passenger can easily reach to the bag drop. Only a few things need to be done by the traveller that is put the bag onto the receiving conveyor. The average process time per bag is 20 to 30 seconds only. This is less time consuming as compared to conventional check–in. It can be coupled with multiple bag drops which mean fewer queues for the passenger to deposit bags.

- The third phase is full service desk. Here all the functions of phase one and phase two are performed along with few additional functions such as taking payment for excess baggage for rebooking.

There are chances that the passenger may reach the departure gate with baggage that cannot be allowed by the airline inside the cabin. In such a scenario a staff member of the airline has to again take the baggage and load into the aircraft hold area. Because the same is a time–consuming process, it may slow up aircraft boarding if done at the last moment. To speed up the process the airline company should minimise the number of last–minute gate bags. Few things need to be taken care of like

- The agent should check all the baggage at the time of check in for size to capture all non–cabin compatibility items.
- Should limit the size of the baggage at passenger screening and also take necessary actions against the item which cannot be carried in the cabin.
- The agent may spot the unsuitable baggage from the passenger those are waiting so that the item can be tagged and loaded before boarding begins.

3.5 HOLD BAGGAGE SCREENING :

Once you have submitted the bags in the baggage system it will be screened using inline x–ray machines to ensure that you are not carrying any dangerous or prohibited items. The inline x–ray machines are also known as explosive detection systems (EDS). If the bags of the passenger or traveller fail level 1 clearance it goes for level 2 screening. It means at the time of screening in level 1 if it raises alarm the bags again need to be sent to level 2 for the screening.

In level 2 screening the transportation security administrator (TSA) personally check the bag images captured during the level 1 scan. In most of the cases the issue is resolved visually from the captured image. Once a baggage fails a level 2 screening and the issue is still unresolved, it undergoes a level 3 screening.

Level 3 screening is done manually which involves opening of the bag physically and the initiation of the use of explosive trace detection technology.

Any bag which does not pass level 3 screening will be disposed by the local law enforcement officers.

3.6 BAG STORAGE :

In real scenario there is no need of providing bag storage because all airliners have a capping on the carriage of a specified quantity of free baggage. It is according to this capping bags are loaded in the aircraft. However there might be a situation where arrival of two aircraft at a same time or unloading of two aircraft at a same time. This is all exceptional and ground staff a prepared for such situations.

❑ **Check Your Progress :**

1. ULD stands for
   a. Universal load device
   b. Unit load device
   c. unit leak device
2. The average process time per bag is _____ to _____ in kiosk.
   a. 20 to 30 seconds b. 30 to 40 seconds c. 50 to 60 seconds
3. EDS stands for _____.
   a. Explosive defuse systems
   b. Explosive detection systems
   c. Explosive detection source
4. TSA stands for _____.
   a. Transportation security administrator
   b. Transport security administrator
   c. Travel security administrator
5. Manual Screening of Baggage happens in
   a. Level 1 b. Level 3 c. Level 2
6. Baggage Drop facilities in modern times can be
   a. Only at airport
   b. Only at Metro stations
   c. At multiple points for ease to passenger
7. Baggage enters an airline system through
   a. Bag Drop b. Bag Chute c. Bag Belt
8. Oversized baggage are
   a. Not taken by airline b. Considered c. Charged Extra

3.7 LET US SUM UP :

Innovative approach in baggage safety and its handing makes a remarkable impression to the passenger or traveller. Especially during the time of travel, the baggage or luggage is an area of concern for the passenger as well as the airline and needs extra concern so that it can be handed over to the passenger at the end of the journey. It is also related to passenger safety. To provide better and a safer journey proper screening is required at the time of arrival and departure.

3.8 ANSWERS FOR CHECK YOUR PROGRESS :

Check Your Progress :

1. a	**2.** a	**3.** b	**4.** a
5. b	**6.** c	**7.** a	**8.** c

3.9 GLOSSARY :

EDS : Explosive detection systems

TSA : Transportation security administrator

ULD : Universal load device

3.10 ASSIGNMENT :

1. Briefly discuss the history and recent trends in baggage safety in aviation sector.
2. What is bag drop ? Describe the three phases of bag drop.
3. Explain the baggage handling process at the airports.
4. How is the hold baggage screening process completed ?

3.11 ACTIVITIES :

As a passenger, find out the baggage safety process followed by the different operators of aircrafts in India.

3.12 CASE STUDY :

Case Study – 1 :

Mr Kartik Oberoi is a well–established business man of India. He has been to a lot of countries around the world but this time he is visiting first time to United Kingdom. As a first timer to United Kingdom he purchased a lot of things from there. The specific flight he is travelling is providing maximum weight limit of 50 pounds per checked bag as well as a size restriction. The most common maximum size bag allowed is 62 linear (total) inches. A common size bag for checking through is : 27" x 21" x 14". But he found that he is having excess baggage.

1. What are the factors he needs to consider taking the baggage ?

Case Study – 2 :

Just imagine this is the Current baggage Process

- The service provider registers luggage in the name of passenger, finds the whole travel itinerary, and prints one or more tags to attach to each suitcase.
- The tag is a label which holds the information related to the flight along with the destination, and any other foreseen stopover, together with a 10–digit barcode, unique for each suitcase.
- The sorting process help to segregate on the base of final destination and its itinerary, and our baggage can be automatically sent to almost all final destinations.
- At the end, the suitcases are unloaded from the airplane. With the help of tags the right delivery path is assigned to them.

1. Find out the problem, impact and suggest solution for the above case.

3.13 FURTHER READING :

1. Airport Operations, 3 editions by Norman J. Ashford, H. P. Martin Stanton, Clifton A. Moore, Pierre Coutu&John R. Beasley
2. Aviation Risk and Safety Management Methods and Applications in Aviation Organizations.
3. Manual on Information and Instructions for Passenger Safety by ICAO.
4. Cabin operations safety best practices guide by IATA

UNIT 04 *Airport Operation Safety*

UNIT STRUCTURE

4.0 LEARNING OBJECTIVES :

- To understand about the safety measures at airports
- To know about airport operational safety
- To learn about the importance of safety at airport
- To have knowledge about local rules and procedure at airports
- To develop knowledge of safety during inclement weather and other hazards
- To learn the challenges in aviation safety

4.1 INTRODUCTION :

In this unit you will learn how to effectively handle the airport operation and the importance of safety in operations. You will understand various steps that are to be taken in different situations. Safety operation in an airport is a never–ending process due to new technology, weather condition, new behaviour and other varied aspects. Each time incident report should be generated and analysed for better safety of the staff, passenger, employee, airport and aircraft.

Let's understand the main causes of airport accidents as well as the precautions that should be taken to avoid them.

One of the most common causes of airport accidents is failure to obey the rules. Airlines have detailed instructions on how they want their employees and passengers to behave in order to ensure that nothing goes wrong before, during, or after a flight. Failure to follow these rules can lead to a serious accident, which can result in significant economic losses and death.

Another cause of airport accident is human error. A human error can be failing to follow instructions or misinterpreting an instruction from a supervisor. Human errors are very common because humans are not perfect and make mistakes all the time.

A third cause of airport accidents is mechanical failure. This type of malfunction is typically more serious.

4.2 SAFETY MEASURES AT AIRPORTS :

One of the most important safety measures is an unbroken chain of security. Security checkpoints are set up at every point in the airport, and there are also multiple layers of security.

Machine gun turrets are placed outside the terminal building and on the roofs of some terminals.

Luggage is screened by bomb–detection devices.

The unloading area includes a secure area for loading cargo that might be dangerous if carried into the passenger terminal, while incoming aircraft are inspected before they're cleared to approach the terminal gates.

There's also an x–ray machine at each entry point to screen baggage, and all passengers must pass through metal detectors before entering an airport gate. The secure area is accessible only through a single gate that is controlled from a security post inside.

4.3 SAFETY MEASURES IN AIRPORT OPERATIONS :

Airports are traditionally considered a critical infrastructure, and the airport operations division is an essential part of airport security. The airport operations division includes a variety of employees that work in a group to ensure safety at the airport.

The Airport Operations division ensures safety within the airport by monitoring access points, conducting inspections, analysing alarms and responding to emergencies. They also take care of airfield maintenance and repairs, which can be very expensive if not properly maintained.

Safety Issues that Airports Face

Airport safety is often being discussed in the media. It is important that everyone who works for an airport stay up–to–date with all changes and protocols so that they can best serve the passengers. The following are some of the major safety issues that airports face.

First, there are terrorist attacks where people have infiltrated airports or planes with weapons or explosive materials. Second, there are natural disasters which cause problems to the airport infrastructure by destroying them, damaging them or disrupting their operations. Third, there are also technical failures which can be caused by human error or malfunctioning machinery including computer systems and communications equipment.

Safe Evacuation Plan from Airports

A safe evacuation plan from airports is an important component of the airport's design during any emergency.

The most important part of the safe evacuation plan is to conduct pre–emergency planning, which includes identifying potential safety hazards and estimating evacuation times.

The next most crucial part of developing a safe evacuation plan for airports is to develop an efficient escape route that doesn't cause too much congestion. The exit should also be clearly marked by signs, and there should be sufficient exits to ensure that no one gets trapped in the exit corridors.#

Protecting Human Lives during Emergency

To protect human lives the following aspects should be adhered by people during an emergency situation

- Be aware of surroundings
- Stay inside the airport if possible
- Use the emergency exits if there are no other options
- If an emergency exit cannot be found, best option is to get to a seat and put the head down.

Common Airport Inspections

Many airports have different security agencies for continuous monitoring and security. In USA, Transportation Security Administration (TSA) is responsible for airport inspections. One way for TSA officers to screen travellers is by using the Rapiscan machine, which is also known as a body scanner. The Rapiscan machine can detect if there are any metal or non–metal objects on the person's body. The Rapiscan machine has been around since 2001 and it was mainly used at airports in America before it was discovered that this type of scanning could be harmful to human health.

Another way that security officers can inspect traveller's luggage is by using an X–ray machine, which will help them see if there are any prohibited items in the bag.

Field Lighting at Airport

Field lighting is a type of exterior airport lighting. It can be installed on the ground or on top of the terminal building. This type of airport lighting is made up of lamps and fixtures that are mounted outside the building, as opposed to inside.

The benefits of field lighting include **:**

- Reduce aircraft approach times by as much as 30%
- Keeps passengers and staff more visible to incoming flights
- Helps to identify people and vehicles on the airport property
- Field lights are situated at a safe distance from the ground so as to avoid pedestrian traffic such as people walking on the runway.
- They provide illumination for all types of aircrafts landing or taking off, so as to ensure safety during the flight.
- The field lights give an even distribution of light across the runway and this makes it easier for pilots to land their plane without any mishaps.

Spot a Suspicious Person in the Airport

Firstly, the person's actions are inconsistent with who they pretend to be. Secondly, their body language is out of place and thirdly, the person's behaviour is off.

A suspicious person in an airport can vary from a terrorist to a drug smuggler or a human trafficker. The best way to spot them is by paying attention to their behaviour and not judging them by their looks. This is the major task of the security personnel at airport. But, a responsible traveller if find any suspicious person must quickly inform the airport security.

4.4 IMPORTANCE OF SAFETY AT AIRPORTS :

Airport safety is one of the most important things that passengers care about.

The importance of safety in airports is not just related to the passengers. The employees who work here are also equally important to be safe. They have to follow strict guidelines on how they are supposed to dress, what they are allowed to carry, and so on.

Apart from these guidelines for travellers and workers, there are also some other safety measures that airports take care of. These include the use of scanners, metal detectors etc. That helps prevent any dangerous materials from being carried onto flights by passengers or taken into airports by employees.

4.5 LOCAL RULES AND PROCEDURES IN AIRPORT :

Local security and airport authorities enforce these rules. Passengers should also be aware of the following policies **:**

- Passengers are prohibited from bringing any knives, weapons, firearms, or explosives on board the aircraft.
- Passengers should refrain from shouting or using profanity in the airport and on board the aircraft.
- Passengers who need assistance because of a disability for example for boarding or deplaning should contact a member of an airline's staff before they reach the gate.
- Passengers cannot smoke in any area where there is a "No Smoking" sign.
- Passengers may not bring any type of glass containers onto an airplane as they could shatter and injure those seated near them.

4.6 RULES AND PROCEDURES AFFECTING TRAVELLERS :

Rules and procedures are guidelines for travellers to use in order to make their journey an easier one. These rules and procedures include a number of different things that the traveller should be aware of before booking a flight, checking into a hotel, or going through customs.

The rules and procedures also have different requirements based on the traveller's destination country. Travellers going to more strict countries may have to provide more information when checking in, such as having their documents ready ahead of time or being subjected to a pat down before boarding. These rules and procedures can be seen as two sided – they help the traveller by giving them something they need to know beforehand but can also potentially cause delays if these guidelines are not followed properly.

4.7 SAFETY DURING INCLEMENT WEATHER :

Every day, there are some flights that are delayed or cancelled. This is due to many reasons, but one of the main ones is inclement weather. Climate change has made inclement weather more intense and more frequent. This has resulted in more flights being delayed or cancelled because of it.

The first thing that airlines need to do when they notice inclement weather on a route is to make an assessment on the urgency of the situation. If they find out that it is a severe storm, they will take necessary action to address it as quickly as possible by changing their flight plan or cancelling the flight altogether.

This is something that all airlines have policies for, so passengers should be aware of these policies before their flight takes off. Airlines communicate these changes with passengers through email and text messages.

4.8 HAZARDS IN THE AVIATION INDUSTRY :

The aviation industry is one of the most hazardous industries in the world. The top 3 hazards that need to be considered are pilot error, air traffic control errors, and bird strikes.

Pilot error is an ever–present danger in the aviation industry. Nearly 80% of fatal aviation accidents are blamed on pilot error or response to emergencies. There are three types of pilot errors – flying too low for safe landing, flying through a restricted area, and running out of fuel during flight – all of which can be avoided with proper training and knowledge.

Air traffic control errors are one of the top hazards in the aviation industry that cannot be avoided because they are not controllable by pilots or passengers on board an aircraft. Air traffic controllers must coordinate take–offs and landings without seeing what's happening on the ground.

4.9 FLIGHT GRANT AGREEMENT :

A flight grant agreement is a legal instrument in which the grantor agrees to provide funding or other support for a flight of an aircraft, and the recipient (recipient) agrees to make good on any losses incurred in such flight.

The terms and conditions for such agreements are determined by the grantor's unrestricted discretion. There are many cases where such agreements include a provision that grants the recipient of funds an option of repayment, including interest, at a predetermined rate.

4.10 CHALLENGES IN AVIATION SAFETY :

The aviation industry is always looking for ways to improve safety and reduce the risks associated with flying.

One of the biggest challenges in aviation safety has been the lack of a global database of aircraft black box data. There are many reasons why this information is not available but one major reason is because there are no international regulations to make airlines provide this data. There are so many challenges in aviation sectors, few are explained below :

Warning Signs of an Aircraft Fire

There are many warning signs of an aircraft fire.

The first and most obvious sign of fire is fire itself. You should be able to see or hear the flames and/or smoke, which is often the indication that a cabin crew member should evacuate the airplane immediately. The next indication of a fire might be smoke, which can happen before flames appear. Smoke can also occur as a result of an electrical fire or as a result of damage to the air conditioning system. This is because there may be excessive heat from the engine combustion process circulating through air conditioning ducts and conduits, producing smoke in any location where a leak has occurred. Haze or fog can also indicate engine exhaust gases leaking into cabin spaces from engine mounted under wings, due to compressor stall caused by ice ingestion, bird strike damage, etc.

Ramp Fatalities and Serious Injuries in Flight

Airlines work to reduce the risk of ramp fatalities and serious injuries in flight. One way they do this is by reducing stress on the aircraft by limiting the number of passengers who are boarding at one time. They also make sure that there is enough room for passengers to easily move around as they board and that there is a clear path from the gate to the aircraft door. Airlines also have a crew member always assigned to loading and unloading baggage, so that they can keep an eye out for any potentially dangerous situations.

Oil Spillage in Flight

Flight attendants and pilots should be trained on how to handle an oil spillage in the air. They should know what to do if this were to happen.

When an oil spillage occurs in the air, people should avoid touching it as much as possible and notify the pilot or flight attendant. Flight attendants and pilots should take immediate steps to clean up any spilled oil or fuel before they can cause a fire hazard.

Flight attendants and pilots have a responsibility to maintain a sterile cabin environment because an oil spillage can spread quickly throughout the cabin, making it difficult for passengers to breathe.

Runway Incursions

The incorrect presence of an aircraft, vehicle or person on the runway is known as runway incursion. There are many factors that contribute to potential runway incursions. Cracks and expansion joints in the pavement, for example, may cause vehicles to skid when they drive over them. Over the years, airports have been trying various ways to reduce runway incursions. One such way is using sensors which help identify cracks and expansion joints in the pavement by detecting changes in the light infrared signature of these areas. This has helped airports reduce runway incursions by 90%.

Sensors can be used by airport authorities and aircraft operators to ensure that their vehicles don't hit cracks or expansion joints on runways.

❑ **Check Your Progress :**

1. Safe evacuation plan is a _____.

   a. Emergency planning b. Pre–emergency planning

   c. Immediate planning

2. The _____ machine has been used at airports in America for scanning which is not harmful to human health.

   a. Rapiscan b. Rapeescan c. Repiscan

3. _____ machine, which will help to find any prohibited items in the bag.
   a. X–roy b. Z–ray c. X–ray
4. TSA stands for _____.
   a. Transportation security administrator
   b. Transport security administrator
   c. Travel security administrator
5. One of the biggest challenges in aviation safety has been the lack of a global database of aircraft _____.
   a. Black box data b. Red box data
   c. Orange box data
6. The presence of a human being on the runway is known as
   a. Runway Inclusion b. Runway Incursion
   c. Runway Exclusion
7. Passenger tripping over during boarding procedure is known as
   a. Ramp walk b. Ramp nudge c. Ramp fatality
8. Inclement weather includes
   a. Storm during take off b. Incessant Rain
   c. Fog d. All the options

4.11 LET US SUM UP :

Airport safety is the responsibility of everyone. By keeping latest information, technology and proper training we can control the hazard in an efficient way. The safety in airport or flight is one of the major criteria to motivate the passenger or traveller to use the airport or flight. If everyone followed the policy and procedures, it would be easier to increase the safety in airport operations.

4.12 ANSWERS FOR CHECK YOUR PROGRESS :

Check Your Progress :

1. b	**2.** a	**3.** c	**4.** a
5. a	**6.** b	**7.** c	**8.** d

4.13 GLOSSARY :

EDS : Explosive detection systems

TSA : Transportation security administrator

ULD : Universal load device

4.14 ASSIGNMENT :

1. What are the typical safety measures at airport ?
2. Write a short note on safety measures in airport operation.
3. How safety is important issue at airports ?
4. What are the safety concerns during the inclement weather ?
5. Discuss the challenges in aviation safety.

4.15 ACTIVITIES :

1. Visit the nearest international aircraft and find out the challenges in airport operation safety.

4.16 CASE STUDY :

Case Study – 1 :

Mr. Watson has already booked the ticket and scheduled to travel after two days. Suddenly he received the message that his flight has been cancelled due to a new disease called corona and this disease is spreading across the globe. At the same time, he got to know that only few special flights are available to that destination where he wants to go.

What are the factors he needs to consider if he wants to travel ?

Case Study – 2 :

Mr. Watson is travelling by the flight. At the time of enjoying his meal, he felt that something is burning. After he finished his meal, he thought of finding out the source of the smell. After sometime he found the source of the smell.

In this situation what is he supposed to do ?

4.17 FURTHER READING :

1. Airport Operations, 3 editions by Norman J. Ashford, H. P. Martin Stanton, Clifton A. Moore, Pierre Coutu & John R. Beasley
2. Aviation Risk and Safety Management Methods and Applications in Aviation Organizations.
3. Manual on Information and Instructions for Passenger Safety by ICAO.
4. Cabin operations safety best practices guide by IATA\

BLOCK SUMMARY

Airport operation includes all the activities that occur at an airport to ensure the safe and secure arrival, departure, and servicing of aircraft. Airports typically provide services such as air traffic control, passenger handling, freight handling, ground transport services (taxis or shuttle buses), loading bridges for baggage carts or mail carriers, parking for private vehicles and taxis, heating/cooling/ventilation of airport buildings and hangars.

Airports are links between different modes of transportation–train stations or bus stations used by people who want to go to the city centre; car parks for people driving their own cars; airports used by people who want to fly.

BLOCK ASSIGNMENT

Section – I : Short Question Answer

1. What is a pre–take off briefing ?
2. What is an unstaffed exit row briefing ?
3. What is the purpose of baggage safety ?
4. What are the most common airport inspections ?
5. How can you spot a suspicious person in the airport ?
6. Are there any advantages of field lighting in airport ?
7. Explain the bag storage in flight ?

Section – II : Long Question Answer

1. What is the process for baggage security and how can it be improved ?
2. What is a safe evacuation plan for airports ?
3. What is the role of airport operations in safety ?
4. What are the local rules and procedures in an airport ?

❖ **Enrolment No. :** ☐

1. How many hours did you need for studying the units ?

Unit No.	1	2	3	4
No. of Hrs.				

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

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AVIATION HAZARDS

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ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self- instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual- skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is

particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self- instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)

PREFACE

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included many tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect. All the best for your studies from our team!

AVIATION HAZARDS

Contents

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BBAATR-203

Aviation Hazards

BLOCK 4 : SAFETY OPERATIONS – II

SAFETY OPERATIONS – II

Block Introduction :

The block introduces you to handling of some of the safety issues as mentioned in the Chicago convention. The Chicago convention led to the formation of the International Civil Aviation Organization (ICAO), a quasi legislative global body that designs Standards and Recommended Practices (SARPS) for its member countries and regulatory agencies around the world as a part of uniformity of standards. Reporting of Safety related issues and incidents are part of managing safety. Reporting is an essential part of Safety Management systems implemented in aviation. Proper reporting procedures lead to prevention of hazards that may cause disastrous effect. The reporting system identifies the gaps in the system and helps organizations to implement standard procedures. It also helps in designing new policies and processes for continuous improvement. The last unit of the block highlights some cases in reference to some of the factors involved in safety management. The cases provide an insight into how different factors can prove disastrous if not managed properly.

Block Objectives :

- To enumerate on the role of Chicago convention and ICAO in formulating a framework for managing safety implemented by global regulatory agencies.
- To list the importance, guidelines and responsibilities of Safety Reporting in aviation and understand the global perspective as laid down by ICAO.
- To list numerous instances as case studies citing various reasons that have jeopardized the norms of safety leading to accidents.

Block Structure :

Unit 1 : Aviation Safety and Chicago Convention

Unit 2 : Reporting Hazards and Documentation Procedures

Unit 3 : Insight to Safety Case Analysis in Aviation

UNIT 01

Aviation Safety and Chicago Convention

UNIT STRUCTURE

1.0 LEARNING OBJECTIVES :

- To enumerate on aviation law and the binding effect of Chicago convention
- ICAO and its framework for implementation of safety measures
- To list and detail some aspects of the convention
- Role of regulatory agencies in implementation of the aspects of convention globally

1.1 INTRODUCTION :

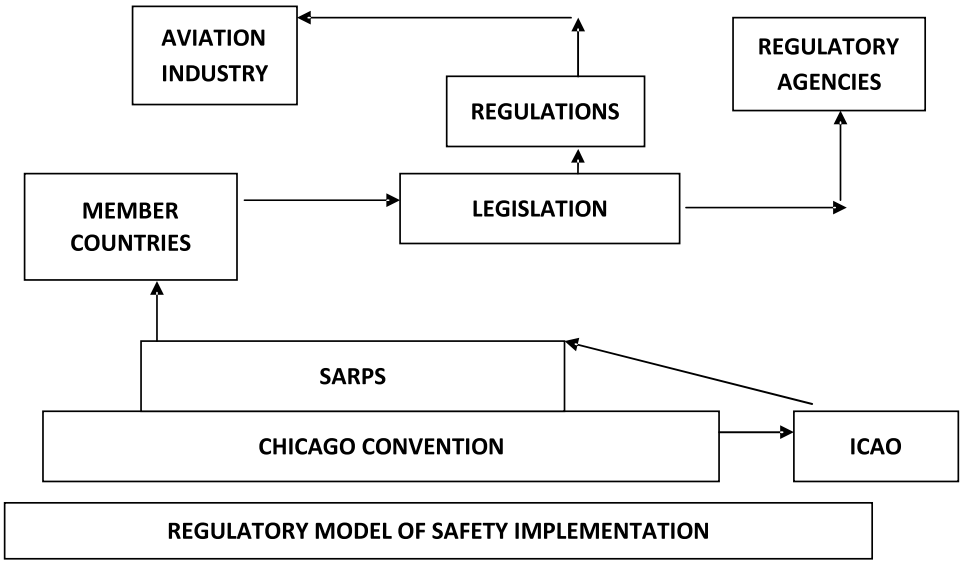
Aviation is considered to be one of the most competitive industry in the world but the one which has one of the most stringent regulations. Ensuring compliances and continually improving the same is one of the key thrust factors of the industry. Any legal aspect related to aircraft or airport operations including maintenance, navigation, air traffic control safety or licensing of personnel working in the sector comes under the purview of aviation law. Countries control civil aviation activities and have absolute sovereignty of the airspace within the country. The civil laws of different countries related to aviation are in lines with the Chicago convention for uniformity and other international treaties as undertaken by different countries. The unit shall highlight some of the aspects related to the Chicago Convention in relation to safety and relate to some of the best practices adhered by some agencies globally.

1.2 THE CHICAGO CONVENTION, 1944 :

The Chicago convention, 1944 is also known as Convention of International Civil Aviation and was signed by 52 member countries. The convention led to the formation of International Civil Aviation Organization (ICAO) in 1947. The organization in the same year became a specialized agency of the United Nations and was linked to the Economic and Social Council of the United Nations. The convention set forth the role of the ICAO in global aviation and gave it quasi legislative authority to formulate and implement standards known as Standards and Recommended Practices (SARPS) for managing safety. The SARPS are a part of annexure to the Chicago convention. These standards promulgated by the ICAO are binding upon member states. However, differences in policies of various governments are notified in relation to the implementation of the SARPS.

1.3 AVIATION LAW AND CHICAGO CONVENTION :

- According to Article 12 of the Chicago convention, it is a point to establish uniformity of aviation law and regulation by member countries for easy aviation operations across the globe and a standard procedure followed especially on terms related to safety.
- Article 37 of the convention emphasizes on practicable uniformity adapted by all the member countries in relation to regulations, standards, policies and procedures in areas of personnel, operations, services and matters pertaining to air navigation. All countries that are part of the convention have the legal liability to conform to highest levels of International safety as designed by ICAO and incorporate the same as part of their National aviation regulations. The country's role under different annexure pertaining to safety, personnel licensing, airworthiness of aircraft, and operations of aircrafts are bound by annexure of the Chicago convention.
- SARPS procedure of ICAO is designed keeping the best practices of safety into concern in consultation with member countries. A consensus needs to be achieved amongst member countries in order to implement SARPS. The process takes a long time and SARPS become annexure to convention after a voting of 2/3rd has been passed by member countries. SARPS do not become a regulatory practice unless a majority of the member countries approve the same.



REGULATORY MODEL OF SAFETY IMPLEMENTATION

❑ **Check Your Progress – 1 :**

1. The Chicago Convention of 1944 was signed by _____ countries

   a. 49 b. 50 c. 51 d. 52

2. Uniformity of aviation is mentioned according to _____ of Chicago convention.

   a. Article 10 b. Article 11 c. Article 12 d. Article 13

3. ICAO is a _____ body under Chicago convention

   a. Administrative b. Quasi legislative

   c. Legislative d. None of Options

4. SARPS once cleared by member country are added to Chicago convention as

   a. Annexure b. Legislation c. Rule d. Process

1.4 CHICAGO CONVENTION ON SAFETY OF AIRCRAFTS (AIRCRAFT AIRWORTHINESS) :

- Article 31 of the Chicago convention states that all aircrafts that fly to International destinations require a certificate of airworthiness. The certificate is issued by the country in which the aircraft is registered. Every member country follow the regulatory procedures of airworthiness of aircrafts as specified by ICAO and agencies working for different countries adhere to the specifications and regulations before issuing any certificate.
- Article 33 of the Chicago convention highlights uniformity of rules and regulations that are necessary, as the certificate of airworthiness issued by one country has to be recognized by another country. SARPS act as guidelines and certification processes adhere to norms as specified in these SARPS for airworthiness.
- Article 12 of the Chicago convention states that aircrafts registered in a country and bearing the flag of that country, need to mandatorily adhere to all the rules of that country in all aspects including procedures related to safety. In case of a flight that has been leased, the country for which the aircraft is operating and bearing the flag, shall govern and enforce all its rules related to aviation and safety of the aircraft.
- The certificate of airworthiness addresses provisions beyond flight operations and incorporate equipments, maintenance, structure of the aircraft, performance, design, engines and several other detailed aspects pertaining to requirements of the regulatory agencies of the country according to the standards and SARPS. Airworthiness of an aircraft comprises of specifications laid down by ICAO through an approved design, drawings, specifications, reports , inspections etc.

1.5 ROLE OF REGULATORY AGENCIES OF DIFFERENT COUNTRIES IN RELATION AIRWORTHINESS AS A SAFETY MEASURE :

Regulatory agencies of different countries across the globe follow standards and specifications as laid down by the ICAO through its SARPS. The role of the member countries include

- prescribe minimum standards for the design, material, construction, quality of assembly and performance of aircraft, engines, and propellers;
- Promulgation of Airworthiness directives of the country to the airline.
- Issue type, production, and airworthiness certificates and certify the airworthiness of aircraft;
- Provide comprehensive inspection of aircraft and air operators and also undertake periodic inspections as necessary.
- Airline companies cannot fly an aircraft without a legal Airworthiness certificate issued by the agencies of the country.

1.6 CHICAGO CONVENTION ON PERSONNEL LICENSING :

Personnel handling aircraft operations especially pilots, air navigation personnel and people involved in highly skilled technical tasks pertaining to aircrafts need certificates of competency. Article 32 of the Chicago convention needs to issue licence to pilots and operating crew. These licences are issued based on minimum standards of competency as laid down by ICAO. The standards are implemented by every member country. Different countries only recognize validity of licences of pilots issued in a particular country, when the issuing country follows procedures according to the standards as put across by ICAO and guidelines of SARPS have been followed during the licensing process. A certificate obtained by a national of a particular from another country may lead to disputes related to acceptance of the same in the home country as per the norms of the regulatory agencies of that country.

According to annexure 1 of the Chicago convention, to manage standards of safety, the convention states that

- No one may act as a flight crew member without a valid licence.
- To secure a licence applicant need to fulfil the criteria and medical requirements of the said country. The country that issues licence follows all the SARPS relating to licensing.
- The procedure is applicable for flight navigators, engineers, maintenance persons also.

1.7 LICENSING NORMS ADHERED BY MEMBER COUNTRIES :

The member countries under the Chicago convention follow strict norms related to licensing to manage safety as one of the key criteria of air travel globally. The countries

- Issue licences as per standard criteria laid down by the governments of the countries according to specifications laid down by ICAO.
- Validates licences issued by foreign countries based on the guidelines of ICAO.
- Conducts detailed medical examination and fitness tests for specified job roles.
- Conducts tests for drugs and alcohol to prevent any untoward incident breaching any safety norms for personnel undertaking flight duties.
- Drug testing for any kind of suspicion or incident or return to duty or pre–employment is mandatorily undertaken.

- Tests can be conducted randomly or periodically as per notification of the regulatory authorities.

1.8 INVESTIGATIONS OF DIFFERENT ISSUES PERTAINING TO SAFETY :

Every regulatory body operating within the framework of a country undertakes investigation on breach of regulations enforced for safety. The processes may be different for different agencies operating around the globe, however, breach of safety guidelines and SARPS lead to different actions. The best practices adopted by agencies include

- Issuing a letter to the individual involved in not following the norms and guidelines as laid down for safety.
- The letter carries all the relevant facts and circumstances where violations of rules have taken place.
- The individual is provided an opportunity to respond against the charges.
- The ground investigation team files the findings and forwards it to higher authorities.
- Administrative action according to nature of incident is undertaken. It may involve a warning letter for future compliance to regulations, to suspensions to legal warrants.
- Often Corrections that include proper training of personnel are incorporated to correct any non compliance or ignorance issues.
- Amendments to any certificates, revoking and suspension are also the powers bestowed upon the agencies and the same are undertaken for different circumstances.
- Often powers of agencies have led to suspension of an entire airline fleet of a company from a particular country due to non compliance issues of standards as laid down by the country.
- The safety concern for a country is of utmost importance and airline companies jeopardizing the safety regulations may under severe circumstances be suspended without a hearing.
- The person or the organization penalized for any action by regulatory agencies can take the matter to court of law or other agencies appointed for review. Different countries have different structures for appeal and the same happens according to the legal framework of the particular country.

1.9 ACCIDENT INVESTIGATIONS :

Accidents are extreme conditions pertaining to aviation safety and involve complex processes of resolution as a lot of stake holders are involved. According to Article 26 of the Chicago convention

"In the event of an accident to an aircraft of a contracting State occurring in the territory of another contracting State, and involving death or serious injury, or indicating serious technical defect in the aircraft or air navigation facilities, the State in which the accident occurs will institute an inquiry into the circumstances of the accident, in accordance, so far as its laws permit, with the procedure which may be recommended by the International Civil Aviation Organization. The State in which the aircraft is registered shall be given the

opportunity to appoint observers to be present at the inquiry and the State holding the inquiry shall communicate the report and findings in the matter to that State."

Accident investigation serves multiple purposes and to enumerate some, they are

- Provide corrective action
- Punish wrongdoers if involved
- To compensate injured parties according to norms
- To prevent any future accidents of same nature

Accident investigation authorities according to the Chicago convention should have

- Independence of conducting an investigation without any political interference.
- Unrestricted authority of conduct pertaining to the incident.
- Recording of analysis conducted and cause determination as per safety recommendations and SARPS.
- Countries are urged by ICAO according to annexure 13 to report any internal investigation related to any aviation incident to assist in modification of any safety standard.
- ICAO also maintains the opinion of creating a voluntary body separate from the country's aviation administrative function to voluntarily report incidents.
- Article 26 of the Chicago Convention requires the Country where the accident occurred (the Country of Occurrence) to conduct the investigation.
- Annex 13 permits the Country of Occurrence to delegate the whole or part of the investigation to another Country.
- If the event occurred outside the territory of any Country, then the Country of Registry shall conduct the investigation. The country also may recruit technical expertise from any source to assist with the investigation.
- Article 26 provides that the Country of aircraft registry may be given the opportunity to appoint observers to the investigation. Annex 13 provides that an accredited representative to participate in the investigation may be appointed by the Country of Registry, Operator, Design and Manufacture. Any State which, upon request, provides information, facilities or experts to the investigating State also may appoint an accredited representative to participate in the investigation. At the discretion of the investigator, advisers proposed by the operator, designer or manufacturer may be engaged in the investigation. The investigator may also seek the assistance of the air navigation service provider, or airport operator, or any other relevant party.
- The investigators should have access to the accident aircraft or wreckage, flight recorders, and air traffic control records and other relevant records.
- Investigators can also examine wreckage, test any part of aircraft and seek medical (autopsy, toxicological, etc.) documents of passengers or crew members that were involved in the accident.

- The admissibility of investigator reports in the court of law depends from one country to another according to the prevalent judicial system of the country. The factuality is judged by different courts in different countries and actions undertaken separately by the courts.

❑ **Check Your Progress – 2 :**

1. Aircrafts flying to international destinations need certificate of airworthiness according to _____ of Chicago convention

   a. Article 28 b. Article 29 c. Article 30 d. Article 31

2. The need to issue licences to pilots and crew by respective countries is mandated in Chicago convention according to

   a. Article 30 b. Article 31 c. Article 32 d. Article 33

3. Drug testing by member countries of ICAO is mandatory

   a. During employment b. Pre–employment

   c. On suspicion d. All the Options

4. Internal investigation conducted by any member country in case of aircraft accidents are reported according to

   a. Annexure 13 b. Annexure 14 c. Annexure 15 d. Annexure 16

1.10 LET US SUM UP :

The unit emphasizes on the role that Chicago convention brought across through its global partnering with member countries to create uniformity in different aspects of airline operation for safety purposes. The uniformity of practices is essentially required because carriers fly cross borders and different norms followed would jeopardize safety. The quasi legislative body ICAO was an outcome of the convention and through its Standards and Recommended Practices (SARPS), ICAO sets a benchmark for global aviation in terms of safety of operations and other aspects. The standards as set by ICAO are binding to member countries after consultation and consensus. ICAO works for practicable solutions in all the areas of aircraft operations. The unit highlights some areas of safety as mandated by ICAO norms and the role of global agencies from different countries is adhering to the same.

1.11 ANSWERS FOR CHECK YOUR PROGRESS :

Check Your Progress – 1 :

1. d **2.** c **3.** b **4.** a

Check Your Progress – 2 :

1. d **2.** c **3.** d **4.** a

1.12 GLOSSARY :

Framework : Process, Tasks and tools used for doing a task.

Compliance : Way in which States maintain order.

Uniformity : The state of remaining same in all cases at all times.

Annexure : A supplement of a document.

Quasi : Being partly.

Legislative : Having power to make Laws.

1.13 ASSIGNMENT :

1. What is the importance of Chicago Convention held in 1944 ?
2. Explain the articulation of aviation laws and Chicago Convention.
3. Write a short note on Chicago Convention on Safety (Aircraft Airworthiness).
4. How is Chicago Convention deals with personnel licensing ?
5. List the procedures involved in the investigation process.

1.14 ACTIVITIES :

1. List the security activities undertaken by regulatory agencies in India for pilots and crew members in India for both domestic and International flights registered in India and outside India.
2. Study any accident scenario that has happened in India involving an aircraft registered in India.

1.15 CASE STUDY :

A pilot and co pilot of a Jet flying from an International destination to their home country fell asleep with their flight on auto pilot. Since they had a stopover at a destination, they overshot the same before realising by around 50 km. Since one of the pilots had to be awake, the situation became grim. However, the flight landed at the destination without any major trouble. An enquiry was conducted by the airline company where both the pilots were summoned. A committee undertook blood samples and alcohol limits were high in case of both the pilots. The pilots said that they had consumed the same at the hotel a night before the flight. The committee found that fatigue, less sleep and alcohol led to both the pilots sleeping during the flight. As an administrative action both the pilots were taken off the roster for 2 months.

a. What should have been the ideal norms to be complied by the pilots in the above scenario ?

b. Is the disciplinary action undertaken by the airline company justified ? What better action could have been initiated by the airline company ?

1.16 FURTHER READING :

1. Commercial Aviation Safety by Stephen K. Cusick, Antonio I. Cortes and Clarence Rodrigues.
2. Aviation Risk and Safety Management by Christopher Drax, Roland Muller and Andreas Wittmer, SPRINGER.
3. www.skybrary.aero
4. www.wikipedia.org

UNIT 02

Reporting of Safety

UNIT STRUCTURE

2.0 LEARNING OBJECTIVES :

- To list the importance and responsibilities of Safety Reporting in aviation.
- To enumerate the guidelines as laid down by ICAO for Safety reporting.
- To list the various approaches to Safety reporting.

2.1 INTRODUCTION :

Safety related incidents and shortcomings are often precursors to major accidents across the globe indicating the presence of safety hazards. Data collected from such incidents acts as a potential resource for detection of hazards. Learning from accidents is crucial and help in bringing forward improvements. Safety data helps in making a system more proactive and helps in determining preventive measures to prevent recurrences.

2.2 SAFETY REPORTING :

Safety reporting is a process integrated in any Safety Management System followed by an organization where information is continually gathered in form of data on actual and potential safety deficiencies. Apart from information that is collected it also includes any filing of reports in context to incidents, accidents or lapses from standard processes of safety as laid down by the organization. Safety reporting is relevant not only in context of major accidents but also for incidents of lesser relevance where safety concerns have been breached and there is an eventual learning from the same.

The ICAO requirements laid down in several Annexes to the Chicago Convention, relating to the implementation of safety management systems (SMS), require that aviation service providers develop and maintain, within the scope of their Safety Management System, a formal process for collecting, recording, acting on and generating feedback about hazards in operations. The process shall be based on a combination of reactive, proactive and predictive methods of safety data collection.

2.2.1 Responsibilities for Safety Reporting :

It is the legal responsibility of aviation organizations to report various incidents and accidents involving operations of aircrafts to aviation authorities in their country of establishment. Mandatory reporting and its practices in the aviation industry are the baseline for safety culture. The responsibility for reporting, collection, exchange of data and investigation of safety occurrences are established by ICAO Annexure 13 and also mentioned in the national regulations of the European Union. The responsibility for reporting is undertaken based on reactive, proactive and predictive methods of data collection for incidents and accidents. Organizations have a detailed list of safety occurrences that are to be reported. These safety occurrences are often grouped into different domains like aircraft flight operations, aircraft technical maintenance and repair, air navigation services and facilities, aerodrome and ground services. Safety reporting if incorporated as a part of the culture makes any organization more responsible towards doing its duties. Good organizations follow a set of structured guidelines on mandatory reporting that are non–negotiable. The reportable safety issues that organizations work upon are

- Safety reports that are required by civil aviation authorities of any country.
- Aviation organizations have defined key performance indicators related to aspects of safety. These parameters judge performance of the organization that helps the organization to make a mark of itself within the industry. Wherever the indicators need to be achieved safety issues have to be mandatorily reported within the organization whenever required for smooth resolution of issues or elimination or reduction.
- Any high risk safety issue that may transform to a major hazard leading to loss of lives or damage to property needs to be mandatorily reported. Safety issues involving plant, machinery require immediate reporting for resolution as the same may lead to severe impact on operations and affect the entire system. Aircraft machinery requires thorough on ground checking as safety issues if not detected and corrected at the ground may prove to be fatal.
- Often recent safety related issues that have been corrected by an organization through involvement of a better technology or a process, need effective monitoring for performance judgement. These issues are reported mandatorily and the data analyzed for further feasibility studies.
- Safety issues that have involved human injuries in the past and have the potential for further incidents involving humans need to be monitored and reported for quick resolution. These issues are treated with utmost priority and mandatory reporting of the same is essential as the same may lead to serious incidents or accidents.
- Any safety issue that the management of any organization need to monitor are mandatorily reported.

❑ **Check Your Progress – 1 :**

1. Safety reporting data collection helps in

   a. Actual deficiencies b. Potential Deficiencies

   c. Lapses leading to incident d. All the options

2. Reporting and exchange of data related to safety is established by ICAO under

   a. Annexure 11 b. Annexure 12 c. Annexure 13 d. Annexure 14

3. Mandatory reporting of safety issues in organizations are often not reported due to

   a. Good Culture b. Lack of Culture

   c. Implementation of SMS d. Management Structure

4. Employees should be _____ for reporting Safety issues

   a. Recognized b. Rebuked c. Suspended d. Dismissed

2.3 ENCOURAGING MANDATORY SAFETY REPORTING :

Mandatory reporting of safety issues should be imbibed as a culture in organizations. Many employees of various organizations do not involve themselves in reporting process due to lack of culture. Organizations should encourage reporting through following means

- Organize mandatory Safety Management System training as a part of orientation of employees in the organization. Distribute manuals for reporting process during the orientation to inculcate the culture of safety reporting at inception.
- Training employees on reporting procedures and the importance of reporting within the organization. Inclusion of recurrent trainings for reiteration and strengthening of reporting practices.
- Encouraging and motivating employees to report safety incidents to build a culture and inculcate a fundamental outlook that management values safety reporting processes.
- Creating an environment of safety reporting for building a safe workplace.
- Recognition of employees reporting safety issues within the organization.
- Categorization of mandatory safety reporting issues that require high level of concern and adherence of reporting. Many organizations bifurcate tasks under different zones.
- Drawing of employee attention to details of tasks assigned through a continuous feedback mechanism to ensure proper delivery and outcome.
- Preparation and adherence to safety reporting documents and formats for mandatory safety issues.
- Keeping employees engaged in proactive Safety Management System processes.
- Keeping management of the organization alert for potential opportunities that extend beyond safety parameters.
- Make safety reporting practice as easily understandable and implementable as possible.

- Adherence to due diligence by management on receiving a report of safety issue. Non–compliance or not taking any action on a safety issue report leads to bad culture and lesser importance of safety within the organization.
- Continuous education of employees to be vigilant on issues that can jeopardize safety in the organization.
- Informing employees of the results based on their reporting inputs, in terms of safety, and their contribution that has led to benefit for the organization.
- Design process to reduce any interdepartmental conflict related to safety reporting and protect employee from any reprisals for reporting.

2.4 ICAO GUIDELINES ON SAFETY REPORTING :

ICAO advocates some basic structured fundamental strategies that help in reporting safety concerns in organizations. These strategies aid in risk mitigation and are aimed at preventing any errors related to safety reporting. To enumerate

- Management commitment and support for safety reporting leading to building of a positive culture and environment within the organization.
- Organizations must design a system of Safety reporting that is transparent and open. Safety reporting shall be advocated within the organization positively and shall not focus on blame or any sort of culpability.
- Human factor is the key to the process of reporting. The need to capture responses related to safety which is prime to any organization is done by humans. Human beings need to be encouraged and thoroughly trained to identify, capture and manage safety related aspects and report them in the right way to prevent any occurrence of accidents or incidents.
- Auditing programs lead to identification of the workability of systems within the organizations. Auditing programs for safety should be designed by organizations as a continuous process of improvement. Continual observations of areas that need critical inputs are also a part of audit system and the same identifies potential threat perspectives and helps in resolution of the same.
- Standard Operating Procedure designing for reporting procedures related to safety provides a clear directive for processes. The same is important for organizations to sustain the initiative of reporting procedure within organizations.
- Designing of system to analyze and study recurrences that have been reported. Often incidents of safety that are reported are not dealt through correct processes leading to safety being jeopardized. SOPs help in designing processes, however, analytics help in correct decision making to prevent recurrences and eliminating the risk from the system.
- Easy to use human centred design for safety reporting system through multiple channels.

2.5 APPROACHES TO SAFETY REPORTING :

Safety reporting as an essential component of aviation organizations, need to be varied, user friendly, flexible and impactful. Aviation sector works within a framework of a dynamic environment. When working at the tarmac of an aerodrome when an employee notices a broken light on the runway that may be a potential safety issue, the approach to reporting of that safety issue shall be

different from a routine inspection of lights conducted by a team of mechanics. Reporting of Safety related aspects depends a lot on the situation, environment and urgency. The mediums used are multifarious for communication. Systems have to be ensured by the management that each system of reporting shall have to be given equal weight age and a mechanism for resolution. The different mediums through which Safety reporting is undertaken are

- Emails
- Pre–designed paper formats
- Verbal communication over telephone or in person
- Web based portals
- Offline reporting systems
- Mobile applications

HAZARD REPORT FORM

Reported by _____

NAME _____ POSITION _____

SUBJECT

( )Workplace Hazard ( )Hazardous Work Practice

( ) Public Hazard ( )Aviation Safety Hazard

DESCRIPTION OF HAZARD_____

_____

ACTION TAKEN _____

_____

IS FURTHER ACTION REQUIRED _____

REPORTED TO _____

DESIGNATION_____

NAME_____ SIGNATURE _____ Date _____

FOR SUPERVISOR USE

DATE OF REPORT RECEIVED _____

ACTION TAKEN/RECOMMENDED _____

_____

_____

DATE IMPLEMENTED _____

NAME _____ SIGNATURE _____

❑ **Check Your Progress – 2 :**

1. A good safety culture should be always

   a. Non reactive b. Reactive

   c. Non reasonable d. Proactive

2. Safety reporting in organizations should be

   a. Watertight b. Opaque c. Transparent d. Translucent

3. Workability of systems can be identified through _____ programs

   a. Stretch b. Auditing

   c. Non Compliant d. Only Reporting

4. Safety issues should be reported through

   a. Emails b. Formats c. Verbally d. All the options

2.6 LET US SUM UP :

Safety reporting is a part of Safety Management System of an organization. It is a process where information related to safety is continually disseminated for analysis to identify potential deficiencies and work towards building a safe environment. Safety reporting imbibed as a part of culture of any organization and required by civil authorities of any country in terms of aviation. The resolution of any high risks is faster if it is reported mandatorily. Organizations in aviation should encourage reporting of safety through employee orientation, safety manual distribution to key people working in different areas, training, encouragement, motivation, standard procedure, formats, building culture, adherence to safety related documents etc. ICAO advocates strategies on safety reporting through designing of systems, commitment of management, involvement of personnel, audits etc. There are several approaches to reporting safety and each organization shall use different or all mediums for prioritizing the same.

2.7 ANSWERS FOR CHECK YOUR PROGRESS :

Check Your Progress – 1 :

1. d **2.** c **3.** b **4.** a

Check Your Progress – 2 :

1. d **2.** c **3.** b **4.** d

2.8 GLOSSARY :

Precursor : forerunner; Comes before another.

Deficiency : Shortcoming.

Breach : Act of breaking a law or agreement.

Predictive : Forecast.

Indicator : Thing indicating state or level of something.

Audit : Examining and verification.

Jeopardy : Danger of loss or failure.

Analytics : Systematic Analysis.

2.9 ASSIGNMENT :

1. Enumerate all the safety related documents that are mandatorily reported by Cabin crew before the departure of a flight in an airline.
2. What is the meaning of term safety reporting, explain ?
3. What are the reportable safety issues that any organisation work upon ?
4. Write a short note on approaches to safety reporting.
5. List the different departments with whom the cabin crew coordinate during the entire process of reporting.

2.10 ACTIVITIES :

1. Collect some of the formats used for reporting processes in various airlines in different departments. Make a comparative of the same to check uniformity.

2.11 CASE STUDY :

A housekeeping personnel working at the airport terminal noticed that some kind of smoke was emanating from a pipe located in one of the areas of the airport. He informed his supervisor of the same and the supervisor assured that the same would be reported to maintenance personnel. The supervisor forgot to report and the housekeeping person also got busy working in other sections. At around afternoon, there was a big blast from the point where smoke was coming from leading to some of the panels and fixtures of the airport getting damages. However, there was no loss to human life. An enquiry was conducted and the supervisor persuaded the housekeeping personnel of not sharing anything regarding the incident.

a. What should have been the procedure for reporting the incident ?
b. What changes does the organization need to make in their reporting culture ?
c. List the essential components that need to be made a part of the culture for reporting safety issues ?

2.12 FURTHER READING :

1. Commercial Aviation Safety by Stephen K. Cusick, Antonio I. Cortes and Clarence Rodrigues.
2. Aviation Risk and Safety Management by Christopher Drax, Roland Muller and Andreas Wittmer, SPRINGER.
3. www.skybrary.aero
4. www.wikipedia.org
5. www.icao.int

UNIT 03

Insight to Safety Case Analysis in Aviation

UNIT STRUCTURE

3.0 LEARNING OBJECTIVES :

- To list numerous instances as case studies citing various reasons that have jeopardized the norms of safety leading to accidents.

3.1 INTRODUCTION :

In the previous units you have studied about the importance of safety in aviation and the different ways how safety has been prioritized globally and how it is being implemented through various mechanisms and standards. In this unit you shall be studying about some of the practical incidents and cases that have jeopardized safety and led to accidents. The objective of the unit would be to sensitize you on certain aspects and analyze the causes that have contributed to such an incident. The cases have been created as a prototype of real life cases with omission of the actual places and other objects involved in the same.

3.2 CASE 1 HUMAN ASPECT AS A DETERRENT TO SAFETY :

It was a hot busy day at the airport with passengers waiting for their flights. The passengers of a particular flight seemed annoyed as they were arguing with the ground staff. The flight scheduled was already delayed by 2 hours and a lot of passengers had connecting flights to catch for which the resentment happened. After a wait of more than two hours the incoming flight arrived and passengers were made to be seated in the flight. The incoming flight was delayed due to some technical faults. The normal procedure of boarding was completed by the crew and the doors were armed for a takeoff. Suddenly the air conditioners in the cabin went off. The flight was stranded on the bay for another 15 minutes but the cabin inside was getting hotter. The pilot's voice came over the radio that there was a minor technical snag and the departure procedure shall be undertaken in some time. 30 minutes passed but the flight was still stranded and the discomfort of the passengers due to suffocation in the cabin increased. A lot of passengers

started arguing with the air hostesses and requested them to get the passengers deplaned. Around 40 minutes later the aircraft started taxiing for takeoff. The air conditioners were still not operational. As the flight was approaching the runway, a passenger seated on the Emergency Exit Seat suddenly got up and disarmed the doors of the Emergency exit and opened it. The flight came to a halt and there was chaos inside the aircraft. The Emergency Response team was summoned. The passenger was taken away for questioning. The flight en–route was further delayed.

On questioning it was found that the act committed by the passenger who was around 50 years old was out of a sudden impulse. There was no motive of the passenger to cause any harm to the flight or to others in the flight. The passenger was an educated person working in a company and was bound to the destination from where he had a connecting flight to catch for an important business meeting. As the flight was delayed by around 3 hours his office, sent another person to attend the meeting and directed him to stay back and send an explanation. The delay in the flight and his inability to attend the meeting led to performance issues in his job. The number of phone calls that he did and the mental agony that he underwent had affected him psychologically for no fault of his. The heat in the aircraft for the next 45 minutes due to malfunction of the cooling system made things worse. At one point of time he had come forward and had even requested the airhostess to deplane him as he did not want to continue the journey. Investigations in the matter by lot of state regulatory agencies revealed that the incident was triggered by the psychological state of the person at that point of time. Though the person had breached safety aspects as per the rules implemented by the aviation agencies and the government, his intent to cause intentional harm was not established. The man was sentenced with a penalty for his act and was debarred from flying for some months due to his act.

The case was put across a lot of safety agencies across the globe for analysis and these agencies came across with different inferences related to the incident as a feedback mechanism to be incorporated. The safety norms for the emergency exit were briefed to the passenger once the passenger was seated. The highlights of some of the agencies were

- The passenger's opening the emergency exit is unjustifiable under any reason or circumstance as the same can jeopardize the safety of other passengers seated in the aircraft or may lead to technical issues arising in the aircraft due to the act.
- The emergency exit carries some amount of value and inspite of the passenger being briefed about the dos and the don'ts he breached the value of the seat and involved him into an act that could have been danger for the entire aircraft.
- Situational factors can often trigger uncontrolled situations. In the case above a lot of situational factors played a major role in the incident that happened. The man co–related the situational circumstances with his personal stress and loss.

- The ineffective coordination of services rendered by the airline company especially delay in flights coupled with further issues may sometimes trigger negative intentions and behaviour. The issue requires proactive handling by the aircraft agencies for managing customer complaints and prevent spurt of negative emotions. Across the globe different airline companies are ensuring different fundamental approaches to render services and pacify passengers in event of delays.

Based on the above case answer the following questions:

1. In legal terms do you justify the act of 50 year old professional to open the emergency gate ?
2. "It is justified to penalise the 50 year old professional for the act happen under such condition or he must be leave giving a warming considering an exceptional case." Discuss on the statement.

3.3 CASE 2 FATIGUE AS A POTENTIAL RISK IN SAFETY MANAGEMENT :

Fatigue is a sign of weariness and tiredness. The same can be a result of physical stress or a psychological condition. Fatigue in a job like aviation where everyone needs to be mentally alert at all moments may impediment the ability to react quickly to emergencies leading to incidents. Fatigue leads to poor communication and decrease in productivity. Managing fatigue in a high risk area of operation like aviation is very important.

At an airport the supervisor in–charge of baggage and passenger screening from the security agency noticed that the baggage put in the scanner for scanning were moving randomly. The mandatory stop by the operator to stop and check the screen for non–permissible objects was not happening. He got suspicious and slowly moved on to the chair of the operator to find him in deep sleep in a straight seating position. The supervisor immediately woke him up, sent him to the wash room to refresh him and replaced the place with another person. On speaking to the operator it was found that the person was doing a double shift and had also not slept the previous night he had travelled in a bus entire night without sleep.

The causes of fatigue can be work related aspects or may involve non work related aspects also. Work related aspects include

- Long hours of work
- Timing and duration of work
- Breaks in between shift
- The nature of the work and
- The entire work environment as a whole.

Non–work related fatigue involves a lot of areas of concern of which the major challenges are

- Long time involved in commutation to work.
- Sleep disorders that may be related to the quality or the quantity of sleep.
- Family and social responsibilities.
- Managing too many tasks of different nature.
- Undertaking dual jobs for sustenance.

The consequences of fatigue may be severe in a high risk area like aviation and may involve,

- Lapse in attention or concentration at work.
- Poor risk assessment or inaccurate assessment of potential hazards and their consequence.
- Inefficiency in production.
- Diminished motivation.
- Impaired or delayed decision making.

In a high pressure work zone there are some basic countermeasures for fatigue include

- Adhering to guidelines and legal regulations regarding occupational safety as mentioned for different jobs.
- Napping acts as a good counter measure where employees have stressed out or fatigued. Napping results from 20 minutes to 2 hours and is an effective measure to get relieved from fatigue. A lot of work facilities that involve agility and zero fatigue at work induce napping facility.
- Supervisor to monitor all fatigue related behaviours and should initiate effective measures to curb the same.
- Staff should also report any fatigue related behaviour to supervisors and involve the team to prevent any safety related issues.
- Team work and co worker monitoring is an important element in distribution of work or any fatigue related behaviour.

Based on the above case answer the following questions:

1. What do you think about the supervisor action was complete in its sense. Does supervisor need to take matter further and penalise the staff for not being alert on such an important seat.
2. Is it right to allow for double shift on such an sensitive area of security by the management ?

3.4 CASE 3 MAINTENANCE INADEQUACIES AS A MAJOR CHALLENGE TO SAFETY :

The right engine of a Jet during acceleration for takeoff on the runway exploded. The pilots managed to stop the jet through emergency procedure and evacuation of the passengers took place. The explosion led to fire in the right engine. Shrapnel during the explosion severed the fuel line that led to fire engulfing the cabin area. However, the pilots also evacuated themselves safely and emergency response team that immediately was in action doused the flame. There was no injury or casualty. Upon investigation by a team formed by the regulatory agencies it was found that

- The reason for the explosion as deciphered was due to a crack in the engine fan blade.
- The jet engine was overhauled 4 years ago and the crack was not detected by the maintenance company who undertook the overhauling.

In another incidence a Jet after takeoff suddenly caught fire. The pilots desperately tried an emergency landing but could not return the flight back to the

runway. The aircraft crashed in a swamp killing all on board. Upon investigation by regulatory agencies it was found that the

- The fire started in the Cargo hold area of the jet.
- Devices that produce oxygen when a jet loses pressure was removed from another jet as a part of maintenance and loaded on this jet's cargo hold area.
- The staff who kept the devices were not trained enough to handle the same as the oxygen generators were improperly loaded as cargo.
- One of these generators released pure oxygen resulting in the fire in the cargo hold area.
- The third party handling cargo and the supervisor undertaking the checks of the cargo hold area were found to be responsible and lacked adequate knowledge about handling Oxygen generators.
- The investigators also blamed the aircraft company for installing smoke detectors and automatic fire suppressants in the cargo hold area. The regulatory agencies too were taken into the loop as they did not carry out mandatory checks on installations of fire suppressants in the cargo hold area.

There was too much of smoke that filled the entire cabin during landing of a Jet. The pilots could not see each other as the smoke emanating from an electrical system engulfed the entire cabin. The flight managed to land safely and emergency procedures were immediately put in place. Upon investigation it was found that

- An electrical component in the cockpit had caught fire.
- The component was repaired earlier and water leaking from the bathroom of the aircraft had entered the electrical panel.
- The mechanics who had worked for repair of the electrical panel had forgotten to install the panel that prevented water of bathroom seeping in the panel.
- The workers who had serviced the toilet also did not notice the same and report. The airhostesses during checking also overlooked.

Maintenance is a key element in safety in the aviation industry. Maintenances should always be an important prerogative of the operator and regular inspection and checks ensures that aircrafts stay in good condition during flight. Maintenances contribute to a wide range of aircraft accidents. The benefits of regular servicing leads to

- Maintenance of good aircraft performance.
- Easy to fly by pilots.
- Increased passenger safety.
- Increasing the life of the aircraft.
- Saving costs in the long run.
- Maintenance of regulatory standards.

Based on the above case answer the following questions:

1. Maintenance and service can prevent from major accidents in aviation sector. Consider above situations, what do you think that these accidents can be avoidable ?

2. What are the main reasons for any debacle in service and maintenance of aircraft ?

3.5 CASE 4 RUNWAY INCURSIONS AND AIR SAFETY :

As a jet descended on the runway a male intruder jumped onto the runway and was hit by the jet. There was no causalities inside the jet, however, the intruder was hit by the Jet and lost his life. There was substantial damage to the left engine of the Jet.

In another incident the Air Traffic controller after clearing the landing of a Jet gave permission to 4 workers to work on the runway and dry it as there had been heavy rains. It was early chilly morning. The Air Traffic controller after passing on the information went off to sleep. After around 20 minutes a Jet landed on the runway and hit the maintenance vehicles used by the workers to undertake the work. There was loss of hundreds of lives in the accident.

According to ICAO, any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and takeoff of aircraft. Runway incursions happens due to the factors where

- Increased risk of collision for aircraft on the runway as there is considerable speed.
- Incorrect entry of an aircraft or vehicle onto the runway protected area (without or contrary to ATC clearance or due to incorrect ATC clearance).
- Incorrect presence of a vacating aircraft or vehicle onto the runway protected area.
- Incorrect runway crossing by an aircraft or vehicle (without or contrary to ATC clearance or due to incorrect ATC clearance).
- Incorrect spacing between successive arriving or arriving and departing or departing and arriving aircraft
- Landing without ATC Clearance
- Take–off without ATC Clearance

The contributory factors in incursions are

- Weather condition like fogs, low visibility, rains, snow etc.
- Aerodrome design where active runways cross each other and simultaneous use of both of the runways.
- Traffic or business of the aerodrome where there are multiple line ups.
- Last minute communication changes by air traffic control.
- Improper communication and interpretation. Non adherence to standard phraseology also leads to gaps and may lead to collision.
- Use of more than one language by the Air traffic control. Competence in English language is essential for effective communication.

Based on the above case answer the following questions:

1. The accidents occur due to technology failure should be included in human error ?
2. How to control accidents related to runway incursions on airport ?

3.6 CASE 5 ENVIRONMENTAL CONDITIONS AND AIR SAFETY :

A Jet for landing at an airport, a thunderstorm lurked near the runway. Lightning flashed around the plane at 800 feet, and the jetliner encountered a microburst wind shear–a strong downdraft and abrupt shift in the wind that caused the plane to lose 54 knots of airspeed in a few seconds.

Sinking rapidly, the Jet hit the ground about a mile short of the runway and bounced across a highway, crushing a vehicle and killing the driver. The plane then veered left and crashed into two huge airport water tanks. On board, 134 of 163 people were killed.

The crash triggered a 7–year research effort, which led directly to the on–board forward–looking radar wind–shear detectors that became standard equipment on airliners in the mid–1990s. Only one wind–shear–related accident has occurred since.

A lot of Table top airports are environmentally unsafe during heavy cross winds and rain. Many accidents have taken place in these types of airports where aircrafts have overshot the runway and met with accidents.

Accidents can happen due to numerous reasons and diverse factors. The concern of safety followed proactively in organizations help in preventing certain circumstances that can turn into major source of accidents. Safety is a prerogative of all agencies, organizations, personnel involved with the industry. A proper implementation of the Safety Management System guided by global regulatory agencies leads to uniformity of operations across the globe and adherence to the best practices that keep the sky safe for flying.

Based on the above case answer the following questions:

1. Is it possible to avoid environment related accidents ?
2. Accidents can happen due to numerous reasons and diverse factors. The concern of safety must be proactively followed in organisations. Comment on the statement.

3.7 LET US SUM UP :

In this unit the learner is given an opportunity to learn various aspects of safety through caselets or certain situation. There are five case in this unit. Where case first discuss about the prevention from any accident or deterrent to a safety from human aspects. Possibilities of negligence are quite high from human as compared to machine. Second case discuss about the risk due to human fatigue at the airport or in airline. The fatigue may be mental or physical. Case number three discusses the safety issues related to maintenance of equipments and proper service of aircraft. In case number four the focus is on safety of runway area and how some of the human activity is threat for this sensitive area. Lastly case number five is all about the environmental condition and safety in air. This unit provides a good opportunity for the learners to apply mind in finding out possible solution to these questions.

3.8 ASSIGNMENT :

1. What are the different human related threats to safety ?
2. What are the consequences of fatigue in high risk area ?

3. What are the benefits of regular maintenance and service of aircraft ?
4. Explain the factor that leads to runway incursion.
5. Enlist the possible safety threats due to nature or environment to the airport or aircraft.

3.9 ACTIVITY :

Find out a situation from past where safety concern was lapsed due to human negligence and find :

1. What was the consequence of this negligence ?
2. It was possible to avoid this accident by other means or way.
3. Who was responsible for this negligence and how was that person/s penalised ?
4. What resolution was made to see that these kind of safety issues may not be repeated in future ?

BLOCK SUMMARY

The block highlights key thrust factors of ensuring compliances in the aviation industry continually. The Chicago convention lays down the framework for international regulations through ICAO on safety regulations. Member countries adopt standard procedures implemented by ICAO and incorporate as legislations in their framework of governance of aviation within the country. The block also emphasizes on certain key indicators related to safety of aircrafts and legal norms adhered by some global agencies. Reporting of any safety related issues is the key to efficient management. The block lays insight into the importance of safety reporting in aviation and guidelines implemented by global agencies in the process. The final part of the block highlights some practical cases as a story board incorporating some aspects that may jeopardize safety leading to incidents or accidents.

BLOCK ASSIGNMENT

Section – I : Short Question Answer

1. What is the role of regulatory agencies of different countries in enforcing safety in the aviation sector ?
2. How does Chicago convention help the agencies of different countries in aspects of implementing a safety management system ?
3. How to encourage mandatory safety reporting in an organisation ?
4. How are the issues pertaining to safety is investigated by agencies ?
5. What are the contributory factors in incursions ?

Section – II : Long Question Answer

1. What are the ICAO guidelines on safety reporting ? Give a detail account.
2. What is accident investigation ? Explain in detail about the accident investigation.
3. Discuss why should safety reporting be a part of organizational culture ?

❖ **Enrolment No. :** ☐

1. How many hours did you need for studying the units ?

Unit No.	1	2	3
No. of Hrs.			

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

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