

SAFETY MANAGEMENT SYSTEM IN AIR TRANSPORTATION

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ABSTRACT

Realizing a research on aviation safety management system is not a task that can be easily and successfully achieved, that is because safety is not something we can see and touch, the real significance of safety is most of the times observed only when incidents and accidents occur.

This paper has the purpose to investigate the benefits of developing and implementing the Safety Management System (SMS) in airlines and establish the impact of SMS on increasing safety performance in airlines, specifically in passengers air transportation. The research and analyzing process aim to follow the way of establishing what are the aviation hazards, reporting incidents, the risk management system and assessing whether the company's safety matters are being achieved and weather quality and safety standards are met. This will be done by using the direct observation methodology and case study of airlines that have already introduced into their procedures and practices the safety management system and airlines that did not, based on data published by IATA (International Air Transport Association) in the period of 2012 and 2019. Latest updates on the statistics were released on April 2019 and comprise events and occurrences of the previous year.

KEYWORDS: *Safety Management System (SMS), Risk Management, Safety Audit, Airline Management, Safety Performance Indicators (SPI)*

1. INTRODUCTION

Adhering to safety and security is the ultimate and most important aim of all airlines and should never be compromised under no circumstances; keeping a safe environment at the work place should also be included on the corporate values of all airlines.

When speaking about safety in this paper we refer to a state in which "the probability of injury to people or property damage is minimized to an acceptable level through a thorough process of hazard identification and risk management" (Qatar Airways, Safety Procedures Manual – Revision 1.00, 2019).

"A well implemented safety and security culture is one of the airlines values and represents patterns and behaviors that link to the commitment of the Safety Management System" (Ropp, 2009). It should be created, released and applied starting from the top management and going down the organizational level to operational management.

In the image bellow we can follow the path of SMS implementation at the top level of management (GCEO/President) and transmitted downward to the CFOs, VPs, heads of departments etc. The figure reflects a possible top to bottom SMS framework adopted by the airlines.

In order to provide a positive safety culture and promote safety awareness, communication of safety information to personnel throughout the organization is done through various methods such as: the Flight Safety Bulletins, Cargo Bulletins, Cabin Safety Bulletins, Ground Safety Bulletins, OH&S

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Bulletins (Operational Health and Safety Bulletins), Monthly Flight Crew Magazine, Safety Banners/posters, Safety Videos, Workshops, Safety Conferences, Annual Training Standardization, Newsletters.

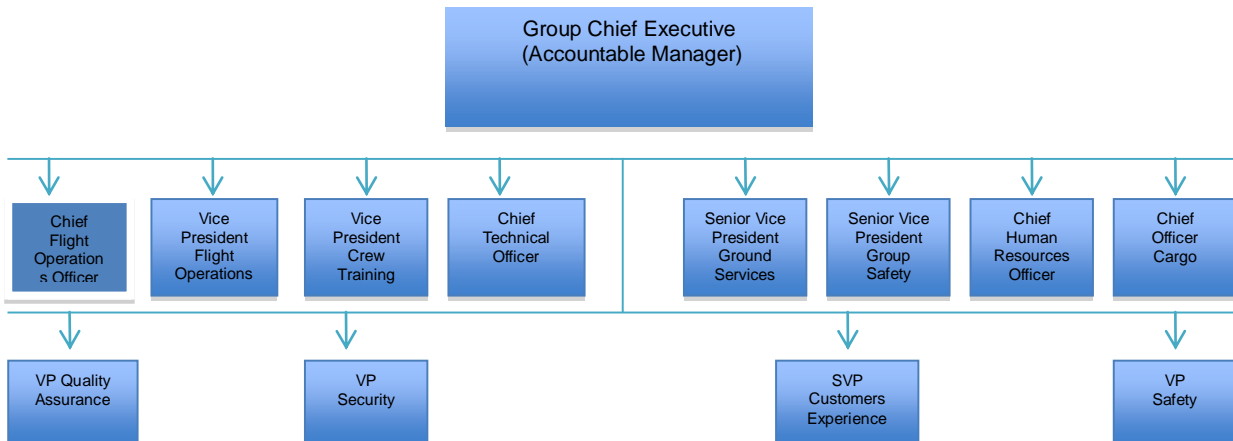


Figure 1. Top to bottom safety channels

Safety Management is a systematic management of the operational risks associated with flight, engineering and ground activities in order to achieve a high level of safety performance that is reasonably practicable” (CAA-Safety Regulation Group, 2002). SMS represents a businesslike manner to managing safety that must be capable of enabling employees to actively recognize risks and minimize them before they progress into errors or accidents.

1.1 Safety Management System objectives

Setting objectives and targets in an airline gives a sense of responsibility and a teamwork mindset for the employees. They represent the initial steps into realizing a safe working environment and always have to be maintained as a priority for all employees.

Some of the most important objectives for achieving the airlines goals for safety are:

- To recognize threats and try to eliminate them
- To build a safe working environment
- To minimize the appearance of incidents, accidents and injuries
- To make sure all employees respect the company’s standards and procedures
- To investigate the reasons of accidents
- To stop future reoccurrences
- To implement SMS training and make it available to all employees
- To carry out checks for all equipment, facilities and procedures and verify if they present any risks for the employees
- To perform audits and forward the related review to the appropriate department
- To manage crisis and major incidents and accidents on a safe manner

Following are some of most distinct safety performance targets:

- To reduce incidents, accidents and other occurrences to zero
- To perform line check flights
- To maintain 100% IOSA compliance.
- To annually carry out a Corporate Emergency Exercise

2. LITERATURE REVIEW

"The management of safety in the airline industry has been connected to organizational culture; in fact, the proactive management of safety, including SMS initiatives, depends on the establishment of a hazard reporting culture" (Canders, 2016).

"The perspective of the management of safety as an organizational process and of safety management as a core business function clearly places ultimate safety accountability and responsibility for such function at the highest level of aviation organizations" (IATA, 2009).

The international aviation organizations, ICAO (International Civil Aviation Organization) and EASA (European Aviation Safety Agency) have decided that each country's aviation organization have to implement the same legislation of industry's safety; on the same note, ICAO defined the legislation and enforced Safety Management System through safety modules, risk management, assessments and tests over safety and security drills at the airports, airlines and other aviation entities.

"Safety Management System (SMS), symbolizes a systematic way to managing safety, incorporating the fundamental procedures, rules, regulations and organizational structures. It makes an explicit element of organizational responsibility and the management process, setting out the organization's safety policy and defining how it will manage the safety of corporate actions as an integral part of its overall business" (ICAO, 2013). Safety management system represents the instrument through which a high level of aviation safety and security is accomplished by using the evaluation of security threats and risks. In order for SMS to work, airlines have to make sure that they identify the possible risks, evaluate and manage them effectively. It is the core responsibility of all airline and airport employees to comply with the safety rules and regulations.

The main elements of SMS are to safeguard, identify and react; to safeguard the airline employees and the working environment by setting up procedures that need to be followed and by offering means of defense through mechanical barriers, such as fences around the airport premises and positioning gates at all the access points. To identify risks through the security control systems such as technical surveillance equipment (CCTV, surveillance videos and security personnel) and to react by assessing and evaluating the causes of the occurrences and taking actions against future unsafe activities; developing action plans, system integrated programs, finding solutions and increasing the communication.

2.1 Aviation hazards

Proactive and focused organizations are adopting a different approach to safety, which intent to stop accidents from happening by identifying the possible hazards and by introducing measures that can possibly minimize the risk before it actually occurs and before safety performance is hindered. If airlines already implemented such an organizational practice, that addresses incident and accident prevention, then the implementation of safety management system becomes easier. After addressing and identifying the possible threats in the aviation industry, including human factor, climate, machines, airports and other contributing factors, it was considered that the following are the most hazardous occurrences:

- Aircraft fuel spilling inside the hangar,
- Aircraft fuel spilling outside - ramp operations,
- Bomb threats - including active shooters,
- Suspicious activities,
- Security threats focused on the aircraft,
- Weather condition,
- Fire,

- Injuries of the employees,
- Equipment damage,
- Flight crew errors.

Based on direct observation and case study of published data and IATA safety reports from the last six years, it was observed that the biggest threads related to aircraft are the human errors, basically the mistakes committed by the flight crew during the operations. In the image below we can see how many of the flight deck errors are related to the non-adherence to the standard operating procedures and how many of the aircraft accidents are related to flight controls errors.

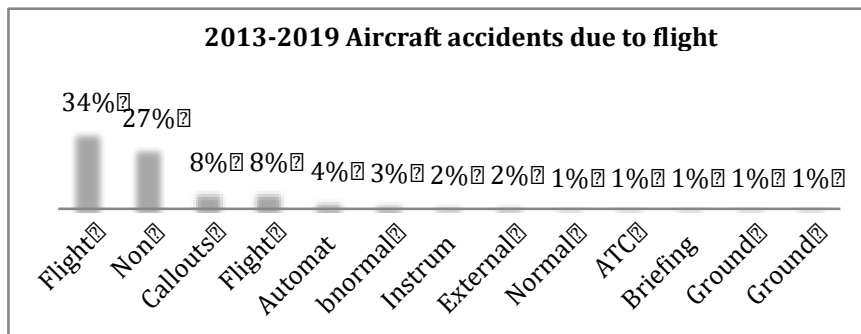


Figure 2. Aircraft accidents due to human error
 Source: IATA Reports 2013-2019

Other external factors that often lead to accidents are the weather condition, technical occurrences, ATC and fatigue.

Following is data retrieved from IATA 2013-2019 Safety Reports and interpreted in order to see what are the major airline threads that lead to fatal accidents.

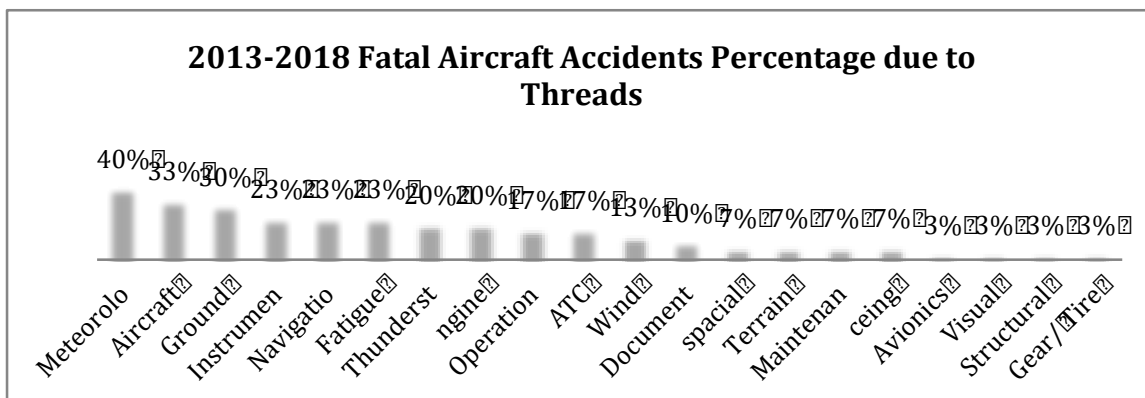


Figure 3. Fatal Accidents due to Threads
 Source: IATA Reports 2013-2019

Brown et al. (2000) suggested that behind every accident is a failed organization; and while the machines performance have increased over the time and the reliability of new equipment and computers had been maximized, the reliability of human beings and safety systems had remained mostly the same. As a result, human error and system faults have become the major causes of most aviation accidents.

Studying the IATA reports from 2010 until 2019 it was observed that accidents per million sectors flown are much more prone to occur to airlines that are not part of the legislative entities.

In the chart below we can notice the safety efficiency of airlines that partnered with IATA versus the airlines that are non-members. And we can easily say that IATA airlines have outperformed the non-member ones in every region.

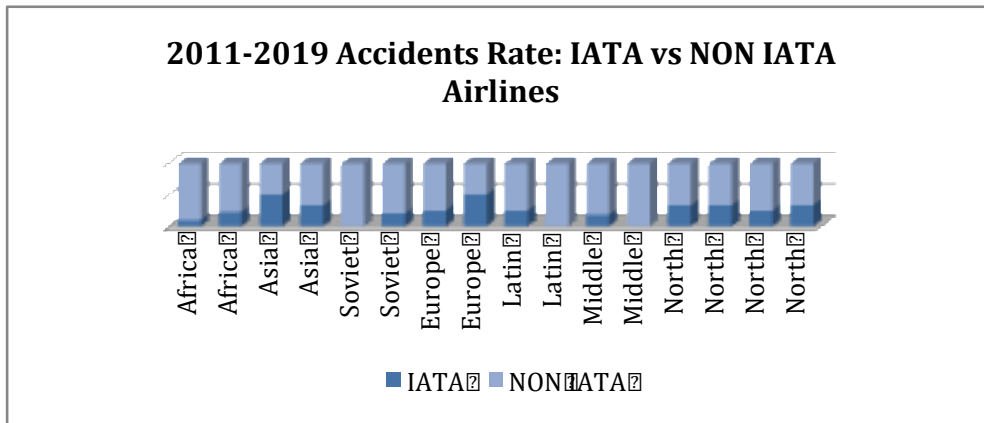


Figure 4. Accident Rate: IATA versus NON IATA Airlines
 Source: IATA Safety Reports 2010-2019

Following the research of accidents causes, and the global distribution of the accidents, it had been determined the analyzing process of the costs involved, which can be classified in minor liabilities, losses of human lives, substantial damages and hull losses.



Figure 5 Accident costs
 Source: IATA Reports 2009-2019

The process of identifying threats and the shutting down all possible shortages in defending an organization, lead to the implementation of hazard management; It records basic information about hazard, risk level, probability, severity, the possible consequences and associated hazards related to unsafe events history and complying with the safety standards could, theoretically, avoid the probability of an accident.

2.2 Risk Assessment

Once a hazard is identified, the associated risks must be analyzed and assessed. Risk assessment represents the primarily qualitative method of evaluation of the severity of damage caused by the hazard.

Each airline must define the levels of management that can make safety risk acceptance decisions and at the time when Control Safety Risk Team investigates the hazard, they can define hazards

with unacceptable risk. Safety risk controls shall be evaluated and documented in order to ensure that the safety requirements have been met

2.3 Positive safety culture

The stronger the culture of an airline is, the more effectively the airline addresses change. The safety and security of an airline are the highest priorities and they can be achieved only when they are attached to the internal culture. In each airline safety comes first philosophy and forms the basis of all other activities and the compliance with regulatory requirements is an absolute minimum requirement;

Just culture: is the whole under which all employees are encouraged to identify possible errors and inform the management about safety deficiencies. There should also be an understanding that reckless behavior and deliberate violations of company standards & procedures will not be tolerated. This is contained within the various departmental manuals and includes clear explanations of when employees will be sanctioned and disciplinary action will be taken against them.

Reporting culture: where all staff are encouraged to raise safety concerns and take the initiative to report hazards, threats and errors, enabling appropriate and timely safety actions to be taken.

Learning culture: by ensuring that everybody learn from their own mistakes as well as those made by others, at the same time providing timely information on safety issues to all staff.

Informed culture: by applying knowledge of possible risks and managing process as part of the decision-making. Appraising new systems and procedures for any safety implications should be the norm, so that potentials hazards, threats and risks can be identified and managed.

2.4 Reporting incidents system

Each airline has to gradually and continuously gather information necessary to demonstrate the efficiency of the programs implemented. The company needs to monitor data such as LOG books, voyage reports received from the online crew, and safety reports submitted by the employees. Managers and head of departments need to make sure that internal audits are carried out on regular occasions in order to assure that all safety related functions in the operational process are carried out and in order to discover possible areas of unacceptable risk. The organization shall implement and use a confidential employee safety reporting system and a system where employees are empowered to submit their feedback in order to raise awareness on the occurrences of non-standard operations. All information received from the safety reporting and feedback system needs be monitored on daily bases in order to identify the most emerging hazards and be included in analyzing process.

2.5 The risk management system

Risk Management system is an approach that has at its core the identification of hazards that arise at the operations level; it can be at the baggage handling, maintenance, scheduling, flight operations, ticketing, or other departments.

Being an integral and mandatory part of Safety Management System, "Operational Risk Management formalizes this approach by applying a logical process to investigate and review the level of risk associated with identified hazards, advising risk-based solutions, and keeping track of the efficiency of these solutions" (SCSI, 2009).

The concept is described by ICAO as "a rational process where managers take decisions on daily operations by considering the severity of any consequences implied by the risk and the expected benefit of taking the risk; this process is known as risk management" (SCSI, 2009).

"The term safety risk management sustains that the management of safety is a business process that needs to be given the same importance as any other business process" (Galotti et al., 2008).

Each airline should analyze whether the company's safety concerns are being achieved and weather quality and safety standards are met.

Airlines and their providers are permanently audited by regulatory agencies and checked whether they are following the IATA international standards and the Operational Safety Audit Program. The organization shall develop and implement corrective actions for identifying nonconformities with risk control and preventive actions for identified potential nonconformities with risk controls actions.

3. CONCLUSION

Safety management system has been acknowledged and accredited as being an important part of an airline operation and it is now a legal requirement in many countries around the world. It was finally recognized and accepted at a larger scale that the implementation of SMS in the air transportation is contributing towards the reduction of accidents and incidents; the same being also demonstrated by the data illustrated in the charts above that indicate the decrease in the percentage of accidents and incidents in the airlines members of IATA; the reason behind the increased safety operations being the adherence to the Safety Management System procedures. On the other side it can be seen that airlines that are not part of any regulatory entity such as IATA or IOSA have registered an increased number of incidents and accidents within the last eight years.

Operators in the airline industry need to constantly enhance and increase the levels of safety by implementing a dynamic risk management system in order to control and reduce the possibility of encountering accidents.

SMS was shown to be an effective vehicle for safety management, providing a way to rapidly identify emerging hazards in a proactive manner instead of waiting for an accident to happen.

Therefore, the study provides insights into aviation safety management strategies to minimize the occurrences of accidents and improve aviation safety. The system established a management platform in the aspect of safety technology services, safety information management, safety oversight and management, accidents and incidents prevention to improve information technology in airports safety management.

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