

Essentials of Aircraft Owners And Crews on Air Safety

Kanyio, Olufunto Adedotun

Department of Transport Management Technology, Federal University of Technology Akure, Nigeria

Abstract

This study aims to investigate the essentials of aircraft owners and crews on air safety. It relied on facts from pieces of literature. The implications of changes in insuring cabin crew were being discussed and the duties of airlines to the crew staff were elaborated. Underpinning theories were expanded on air safety and related hazards of the cabin crew were identified in the study. It was concluded that Aircrew especially cabin/flight crew are needed to have excellent people skills, to be able to keep calm under pressure, team working skills, the ability to discern quickly even under duress and in confined conditions.

Keywords —Aircraft, Owners, Aircrew, Safety

I. INTRODUCTION

Air transportation has been well recognized as the safest means of transportation in recent decades because of the very low accident rates. The aviation community, including airlines, aircraft manufacturers, maintenance organizations, air navigation service providers, airport operators, and the safety regulators have been working closely to make our skies safer. Safety is perhaps the most overused and least understood concept in aviation or for that matter in any endeavor in the industrialized world. Generally, safety is the condition of being protected from or unlikely to cause danger, risk, or injury." Protection from the risk of injury, danger, or loss, which could be referred to as risk avoidance, must always be balanced with the need to efficiently accomplish a given task. In ensuring safety and security in Aviation, there is a need to factor in the safety and security of cabin crew.

The airline cabin crew is responsible for passenger service and passenger safety onboard the aircraft. Their role is to provide service to passengers while ensuring their comfort and safety throughout the flight. A cabin crew work requires working for long hours inside an aircraft, thus requiring individuals with an ability to deliver exceptional customer service with a positive attitude and empathy for passengers. He/she must have strong cultural awareness and ability to adapt to the new environment and people must be flexible and motivated to manage a demanding work schedule and should conform to the regulatory requirements on health and physical standards. They consist of professional people who are in charge of the cabin

and responsible for ensuring compliance with all related safety and security regulations.

The goal of cabin safety is to increase the survival rate by minimizing hazards in the cabin and its environment to reduce the effects of an accident [1]. The Cabin Safety Standards Division at Transport Canada uses the following working definition to best describe cabin safety [1]: Cabin Safety is a field that reduces fatalities and injuries resulting from an accident and provides for a safe environment for passengers and crew members in and around the aircraft, before and during boarding and deplaning phases, while the aircraft is on the airport apron with people on board, and during the operation of the aircraft. It includes the aircraft cabin, its exits, its configuration, its furnishings, its equipment, and its people. According to IATA [2], [3], [4], [5], [6] Cabin Operations Safety Programme pointed out that a cabin crew's duty is not limited to in-flight service and post-accident evacuation. Cabin Safety aims to reduce the number of incidents, accidents, and significant costs to airlines in injuries and material damage.

According to Kai-Hui, Margaret, and Li-Hua [7], "all airlines whether a low-cost or a major airline must have a crew on board for safety and security reasons". Hence, the cabin crew themselves must be safe and secure, which should be the responsibility of the airline owners. Safety is the primary concern of the aviation industry as strongly put by Rhoden, Ralston, and Ineson [8]. However, the emphasis on the safety and security of cabin crew has not received much attention in the literature. The safety and security of cabin crew safety depend on the behavior and actions taken by crew members in case of an emergency [8], which justifies that the role of cabin crew in case of an emergency cannot be overemphasized and irrefutable.

It was noted that the safety and emergency procedures (SEPs) are issued by the Joint Aviation Authority (JAA), however, airlines are free to decide on the method of training. The argument was supported by Mahony et al. [9] who stated that airlines can determine the variation and capacity of medical training, as no international standards exist. They further criticized the capabilities of flight crews regarding first aid and illustrated that more emphasis is put on other parts of the emergency training.

Due to the economic crisis, first aid training was often outsourced, causing a decline in first aid

competence. Regarding the provision of training, Rhoden et al. [8] explained that not even low-cost carriers (LCCs) can save on safety and training expenditures. The level of training that cabin crew is subjected to undergo will enhance high consciousness on their safety and security. Hence, aircraft owners must endeavor to be concerned about cabin crew's safety and security by periodic training of crew members to be able to adhere strictly to the rules and regulations that protect the crew member and their operation and insuring the cabin crew staff.

According to Pels [10], cabin safety and security is an important aspect in the civil aviation globally, yet many findings particularly those conducted in the U.S.A. showed that cabin crew members are at the greatest risk of injury because they often continue working after the seat-belt sign is illuminated [11], [12], [13]. Flight Safety Foundation-Taiwan (FSF-Taiwan) has compiled and analyzed statistics of Taiwan national airline cabin abnormal events provided by six major national airlines.

As earlier pointed out in the beginning, little emphasis is put on crew safety and security in the literature although it plays a crucial role in the aviation industry. John and Kwok [14] assessed that proper training measures can serve as means for preventing accidents. They indicated in their study that crew training and safety must be connected interactively, resulting in enhanced quality of training and hence increased safety and security in daily operations.

The liberalization of the Nigerian air services market since 1985 has contributed to the significant growth of the aviation sector in the country. However, the intensification of competition and the pressure to reduce costs, which have led to the emergence of new business models, in particular, have also raised concerns among aircrew (pilots and cabin crew) that these developments may lead to a deterioration of their employment and working conditions, including heavier working time schedules, development of various employment arrangements (such as typical contracts and bogus self-employment schemes), re-negotiations of existing collective agreements and other practices such as so-called pay-to-fly schemes. This has also had implications for the national authorities that are responsible for implementing and enforcing the relevant social legislation and has raised concerns among some air carriers associated with the knock-on impacts on the level playing field in the sector.

Moreover, the intensification of competition and the pressure of market forces may have a significant effect on the safety and security of aircrew which may affect the relationship between the aircrew and airline owners. The FSF-Taiwan in their study pointed out that the cabin crew injury rate continues to increase at a rapid rate [12]. Moreover, according to the latest International Air Transport Association

(IATA) report, the cabin crew injury and illness rates were significantly higher than those of other commercial air transport workers [15]. By combing these reports, we get a more accurate and complete picture of where the risk lies for the air carrier workers.

There is, therefore, the necessity for further research in the field of safety and security in the airline industry as a close relationship between these two constructs can be seen. Former research mainly focused on pilot training however cabin crew is in charge of reacting to safety hazards and resolving them. Thus, teamwork is essential for smooth airline operations and part of crew resource management (CRM) training, which should, according to [16], [17], increase flight safety and efficiency.

Prinz [18] noted in his project that the industry is recently faced with rising threats such as terrorism, but also changes in travel behavior have to be taken into consideration when it comes to crew safety and security. As established by [19] training and security are related and should influence each other. On the one hand, the desired level of safety will determine training efforts and on the other hand, proper crew training will result in increased safety standards.

A major challenge predominant in the European countries arises from the use of indirect employment arrangements in the air services sector concerns the correct application of national labor, tax and social security laws, given the cross-border nature of aircrew jobs, which becomes more complex when more parties and countries are involved (e.g. identifying which country's labor laws are applicable, which country aircrew should be paying tax/social security contributions in, etc.) which resulted to the so-called pay-to-fly schemes.

The implications of changes in insuring cabin crew will be discussed and the duties of airlines to the crew staff will be elaborated. The purpose of this study is to investigate the essentials of aircraft owners and crews on air safety. It will rely on literature facts.

II. LITERATURE REVIEW

It is worthy of note that the principal human component of flight operations is the flight crew, comprising both cabin and cockpit crews. At large carriers, personnel rosters for cabin and cockpit crews may exceed 20000 and 10000 employees respectively. In many cases, crew members may have never worked together before a particular flight [19]. Furthermore, it was stated that to maintain a safe, efficient, and smoothly functioning operation, airlines, and regulators have developed very detailed procedures to be executed by the crew members with little room for improvisation. These procedures, including normal, abnormal, and emergency conditions, are detailed in the crew members' operating manuals and backed up through a system of

checklists that are cross-checked between flight crew members.

A. Aircraft Owners

Aircraft ownership can be generally referred to as airline, as after the production of the aircraft it is acquired by a company that takes ownership and management of the aircraft. An airline is a company that provides air transport services for traveling passengers and freight. Airlines utilize aircraft to supply these services, and may form partnerships or alliances with other airlines for codeshare agreements. Generally, airline companies are recognized with an air operating certificate or license issued by a governmental aviation body. In Nigeria, Air operator's certificate is issued by the Nigeria Civil Aviation Authority (NCAA).

Airlines vary in size, from small domestic airlines to full-service international airlines with double-decker airplanes. Airline services can be categorized as being intercontinental, domestic, regional, or international, and may be operated as scheduled services or charters. Airlines follow a corporate structure where each broad area of operations (such as maintenance, flight operations (including flight safety), and passenger service) is supervised by a vice president. Larger airlines often appoint vice presidents to oversee each of the airline's hubs as well. Airlines employ lawyers to deal with regulatory procedures and other administrative tasks [21].

The pattern of ownership has been privatized in recent years, that is, the ownership has gradually changed from governments to private and individual sectors or organizations. This occurs as regulators permit greater freedom and non-government ownership, in steps that are usually decades apart. This pattern is not seen for all airlines in all regions. [20].

The world's airlines can be defined in several ways. In accordance with the size, American Airlines Group is the largest by its fleet size, revenue, profit, passengers carried, and revenue passenger mile. Delta Air Lines is the largest by assets value and market capitalization. Lufthansa Group is the largest by number of employees, FedEx Express by freight tonne-kilometres, Ryanair by number of international passengers carried and Turkish Airlines by number of countries served. The larger the airlines are, the need for more and skilful cabin crew. The next sub-topic will define the operations of cabin crew. Before the definition of cabin crew, there is need to discuss air crew as a whole.

B. Air Crews

Aircrew are member, team or personnel that operate a particular aircraft, they look after airline passengers during a flight, making sure they are safe and comfortable. The various types of Air Crew include:

1. **Flight crew:** They are responsible for the operation of the aircraft. Flight crew members include:
 - Pilots (Captain and First Officer: some older aircraft also required a Flight Engineer and/or a Navigator)
 - Flight attendants (led by a purser on larger aircraft)
 - In-flight security personnel on some airlines (most notably El Al) [20]
2. **Ground crew:** They are responsible for operations at airports. Ground crew members include:
 - Aerospace and avionics engineers responsible for certifying the aircraft for flight and management of aircraft maintenance.
 - Aerospace engineers, responsible for airframe, power plant and electrical systems maintenance.
 - Avionics engineers responsible for avionics and instruments maintenance
 - Airframe and power plant technicians
 - Electric System technicians, responsible for maintenance of electrical systems
 - Flight dispatchers
 - Baggage handlers
 - Ramp Agents
 - Remote centralised weight and balancing
 - Gate agents
 - Ticket agents
 - Passenger service agents (such as airline lounge employees)
 - Reservation agents, usually (but not always) at facilities outside the airport.
 - Crew schedulers

Airlines follow a corporate structure where each broad area of operations (such as maintenance, flight operations (including flight safety), and passenger service) is supervised by a vice president. Larger airlines often appoint vice presidents to oversee each of the airline's hubs as well. Airlines employ lawyers to deal with regulatory procedures and other administrative tasks [21].

An airline receives revenue from passenger tickets and pays for aircraft, fuel, crew, and airport usage. After costs for fuel, crew costs constitute the second largest expenses of an airline. Due to the complexity of aircrew, crew planning at airlines is usually divided into a *crew pairing* and a *crew rostering* (or *assignment*) phase. Firstly, anonymous pairings (or crew rotations) are formed out of the *flight legs* (flights without stop over) such that the crew needs on each flight are covered. So a *pairing* is

a sequence of legs to be assigned to one or more crewmember working in one or more crew positions (ranks). The crew positions and the number of crewmembers a pairing must be assigned to is referred to as *crew complement* [22], [23].

C. Cabin Crew

A cabin crew is in charge of the passenger cabin area and should ensure compliance with all applicable regulations (for example, the Civil Aeronautics Administration-Taiwan Aircraft Flight Operation Regulations, Canadian Aviation Regulations, Federal Aviation Regulations, Joint Aviation Requirements, etc.). It is the responsibility of crew members to follow and enforce company policies and procedures and regulatory requirements [24].

It is common for a Flight Attendant Manual Standard to specify that a flight attendant's responsibility is to communicate any onboard safety concern they may have or that may be communicated to them by a passenger to the captain [24]. Therefore, cabin crew must be familiar and comply with company safety policies, procedures, and regulations and respond as trained to turbulence, decompression, cabin fire, security related issues, and evacuation if forced to land or ditch in the water [18].

III. RELATED HAZARDS OF CABIN CREW

It was revealed that during normal duties, cabin crew members are exposed to numerous situations where injuries can occur. Although the injuries in his study were minor, the potential for serious injury was present [25]. Cabin Crew Safety and other related cabin safety reports, cabin-related hazards can be categorized as turbulence, decompression, fire, medical emergencies, inappropriate cabin or galley layout, short haul flight time stress, long working hours, jet lag, and standing for long periods.

Lifting and stowing of baggage, lifting bar containers, pushing and pulling bar carts or trolleys as well as opening overhead bins may lead to occupational injuries. Unruly or sick passengers present a risk of potential threats. Among nonfatal air carrier accidents, turbulence has been the leading cause of in-flight injuries to passengers and flight attendants in the United States [11]. This result is the same as results reported by FSF-Taiwan, which also found that turbulence is the major casual factor of injury [13].

Most frequently, handling hot liquids such as instant noodle soup, rice porridge, and hot coffee may contribute to the injuries especially in Taiwan national airlines [13]. Consider the following events which have happened to cabin crew in Taiwan national airlines during the past years.

A. Turbulence

Among non-fatal air carrier accidents, turbulence has been the leading cause of in-flight injuries to passengers and flight attendants in the U.S.A. [13]. Cruise is the predominant phase associated with turbulence-related injuries, accounting for 52 per cent of all events and 44 percent of these events happen in the galley [3]. For example, four cabin crew members were injured when they encountered sudden and severe Clear Air Turbulence in a flight from Taipei to Abu Dhabi. They were lifted off the floor while standing unrestrained in the galley during unexpected turbulence.

It was pointed out by IATA [3] that the majority of turbulence-related injuries were minor, yet almost ten (10) percent of injuries suffered by cabin crew were serious. In this case, a senior male flight attendant was maimed and has spent the rest of his life in a wheelchair due to turbulence and the delay of medical treatment.

B. Unruly Passengers

Ground staff had already detected a woman speaking loudly and boisterously when she was at the checking-in counter, but they did not notify any related personnel immediately. Perhaps due to the emphasis on passenger service or a lack of awareness of safety, they did not prevent this passenger boarding and did not take any positive preventative action.

Although the purser had been informed and one or two flight attendants had identified the threat while the passenger was boarding, they still assumed that everything would be fine. The passenger then continuously hit another passenger sitting beside her in flight and was spoken to by the airport police authority after landing.

C. Slide Deployed

Inadvertent slide deployment can cause serious or fatal injury to people in or around an aircraft. IATA [2], [3] revealed that fifty-nine (59) percent of accidental slide deployment was caused by cabin crew inadvertent errors and fifty-three (53) percent of these incidents happened at arrival phase. In a charter flight from Taipei to Hong Kong in the early morning, a junior flight attendant deployed an Airbus 340 3R slide due to lack of sleep [18].

In fact, the 3R exit door does not normally need to open. Replacing the deployed slide in Hong Kong resulted in a delay to the returning flight. On another flight from Ho Chi Min City to Taipei, Boeing 737-800 3L an attendant deployed a slide while answering a passenger's serving call button during taxiing. That slide dropped down on the catering's cart and was not deployed. Fortunately, nobody was hurt.

D. Cabin Crew Competence

As three senior flight attendants in first class were preparing to serve breakfast on a flight from Los Angeles to Taipei, one of them opened the oven using normal procedure that they were taught at training class. All of a sudden, the oven, being overheated for one hour and thirty (30) minutes, exploded. The beef noodle soup spilled on the other attendant who was standing beside the oven and preparing table settings. After investigation, it was found that the training instructors had given crew the wrong procedure for using these kinds of steam ovens [18].

E. Rule Breaking

According to Prinz [18], although the seat belt sign was illuminated and descent had commenced, a crewmember still allowed a passenger to use the lavatory while the aircraft was below 10,000ft. The passenger could not get out, and had to stay in the lavatory until the airplane touched down. The crew member neglected the required checks of the lavatories and didn't inform the cockpit crew immediately that the cabin was not ready for landing. Compliance with safety regulations is very important because crew members are critically important in reducing cabin-related hazards.

In 1931, Heinrich's safety pyramid or accident pyramid theory showed that for every three hundred (300) unsafe acts there are twenty-nine (29) minor injuries and one major injury (Heinrich, 1959). Thus, if all crewmembers strictly adhere to safety standard operating procedures then major injury would not occur.

F. Conflict between Passenger Service and Cabin Safety

5L could not get back to her seat prior to landing because she sold duty-free items to a full load of 747 passengers until the gear went down. In fact, this case breached the CAA-Taiwan Civil Aviation Law. The crewmember was not aware of the situation when she focused on her duties selling duty-free items [18].

He further states that some airlines place a high emphasis on the sale of duty-free items for commercial reasons, which can place cabin crewmembers under pressure to complete the service in the time available. Especially in regional short haul flights that provide elaborate passenger service, everyone, whether senior management, purser, or cabin crew, need to carefully consider cabin-related hazards that could cause potential injury.

G. Work Environment

The civil regulations specify the number of pieces, sizes, and weights of passenger's carry-on baggage which may be placed in the overhead bins or under the seat in front. Loose objects in the cabin may cause injuries, yet a safe work environment

could prevent cabin incidents and personal injury. Safety cases obtained from reviewing papers on cabin safety and face-to-face airline crewmember interviews show that an opened, oversized refrigerator door as well as any protruding objects can cause injuries when a crewmember suddenly stands up after retrieving an item from the bottom of a cart [18].

H. Cabin Safety

The goal of cabin safety is to increase the survival rate by minimizing hazards in the cabin and its environment to reduce the effects of an accident [1]. The Cabin Safety Standards Division at Transport Canada uses the following working definition to best describe cabin safety [1], [18]:

Cabin Safety is a field that reduces fatalities and injuries resulting from an accident and provides for a safe environment for passengers and crew members in and around the aircraft, prior to and during boarding and deplaning phases, while the aircraft is on the airport apron with people on board, and during the operation of the aircraft. It includes the aircraft cabin, its exits, its configuration, its furnishings, its equipment and its people.

IATA [2], [3] Cabin Operations Safety Programme pointed out that a cabin crew's duty is not limited to in-flight service and post-accident evacuation. The aim of Cabin Safety is to reduce the number of incidents, accidents and significant costs to airlines in injuries and material damage.

IV. UNDERPINNING THEORIES

A. Safety Culture

In recent times, management has come to realize that the general likelihood of an accident occurring in their organization depends not just on the actions of individual employees but on the safety culture of the organization. Organizational culture gained much attention in the 1970s and 1980s and it can be defined as 'the way we do things around here'. Safety culture can be described as the way in which the organization conducts its business and particularly in the way it manages risks [3].

Many studies have attempted to define safety culture and its dimensions but one that is most widely used and explicit is that developed by the Advisory Committee on the Safety of Nuclear Installations (ACSNI) [26]. The safety culture of an organisation is the product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organisation's health and safety management.

[27] presented a safety model which distinguishes four objects which are:

1. Hardware,
2. Software (i.e. rules and procedures, safety management and policy),

3. People/liveware (i.e. workers, supervisors, management, safety committees, specialists, authorities, unions), and
4. Risks (safeness of work environment, risky behavior and its regulation).

[19], [22] proposed a model which demonstrated three interactive dimensions between person, behavior, and environment in safety. Another very similar and useful framework demonstrated by [23] also distinguished three interrelated aspects of safety culture. It contains three elements which encompass internal psychological factors, behavioral aspects and situational features. The internal psychological aspects which reflected how people feel about safety can be assessed via safety climate questionnaires concerned with individual and group values, attitudes, and perceptions.

Actual ongoing safety-related behavior aspects which are concerned with what people do can be assessed through checklists developed as a part of behavioral safety initiatives, while the situational features describes how the organizations are accessed via policies, procedures, work environment, and safety management system audits/inspections [16], [19]. Safety culture in particular is often characterized as the enduring aspect of an organization clearly and is not easily changed.

Although over the years a variety of questionnaires have been developed by different researchers in an attempt to identify the key factors that comprise safety culture there has been little agreement concerning which dimensions should be incorporated into safety culture". They identified nine factors covering the most popular areas of management commitment, communication, and priority of safety, safety rules and procedures, involvement, work environment.

Management commitment is regarded as a prime factor of safety culture [19]. In-view of this, it was argued that management commitment, management actions concerning safety and the physical work environment was the common components of safety culture. The findings of [9] revealed that the most typically assessed safety dimensions related to management (72 percent of studies), the safety system (67 percent), and risk (67 percent). They also found that the supervisor or foreman is the key person in industrial accident prevention.

As well, several studies have pointed out that the first-line supervisor plays an important role in shaping the safety culture within an organization, setting the work atmosphere, and motivating employees to perform their tasks safely [8]; [9]; [10]. Effective communication can be categorized as top-down communication in which safety issues are passed on from management to frontline staff via safety policy statements, newsletters, or the intranet, confidential safety reports in which people are prepared to report accidents, incidents, near misses,

and safety concerns, and horizontal communication between peers.

Similar to NASA's Aviation Safety Reporting System (ASRS), FAA's Aviation Safety Action Programs (ASAP), and the Confidential Human Factors Incident Reporting Program (CHIRP), the Taiwan Confidential Aviation Safety Reporting System (TACARE) is operated by the Aviation Safety Council (ASC), Executive Yuan, Taiwan, 2002. TACARE encourages all airline related personnel in the aviation community including flight crew, maintenance, air traffic controllers, flight attendants, or any other person to report to this structured reporting system which provides an independent reporting channel based on the concept of being "confidential, voluntary and non-punitive".

They have also reported many cases regarding Taiwan national airline cabin safety issues during past years. Safety systems have been defined as including factors relating to safety officials, safety committees, safety policies, and safety equipment. Work environment is also an important factor. Cabin crew working in the cabin is the same as any employee working in an office work environment. Work environment factors can be accessed via surveys. The term workplace is also used. Safety cultures have been characterized as multi-dimensional by various statistical analysis techniques in social scientific research.

He considered these factors are the result of inter- and intra-respondent tendencies to evaluate certain questions in a similar way. Thus, there is no overall satisfying model of safety culture. It was concluded that five factors of positive safety culture are leadership, two-way communication, employee involvement, learning culture, and attitude towards blame.

In summary, although a lot of different factors have been found to underlie safety culture, the most commonly measured factors are regarded as management commitment, communication, priority of safety, and work environment followed by competence.

B. Safety Performance

Perceptions of safety rules, attitudes to rules and compliance or violation of procedures are related to risk-taking behaviors. These can involve rule breaking which may result in an accident [10]. Although there is a lack of research which supports the view that top management's commitment to safety is a feature of low-accident companies, have illustrated that management commitment to safety affected actual performance.

[19] pointed out that traditional measures of safety performance rely primarily on accident or injury data but the main problems are that such data are insufficiently sensitive and dubious in accuracy. They argued that one method developed to overcome some of the limitations associated with traditional measures

of safety is "behavior sampling". Furthermore, the measurement of safety culture/climate could be considered an alternative safety performance indicator, whereas the assessment of safety culture provides more insight into both safety improvements and unforeseen major accidents as noted by Pidgeon (Pidgeon 1998, cited in [19]).

There are a variety of quantitative and qualitative measurement tools available that can be used to assess safety culture. Questionnaires, peer observations, self-reports, historical information reviews, case studies, safety audits of safety management systems, etc. can examine the psychological, behavioral, and situational aspects of safety culture [7]. Surveys, which comprise a series of questions that measure people's beliefs, values, attitudes and perceptions along various dimensions of safety thought, are the most common method.

[8] suggests that research should not be undertaken to develop new measurement tools, but should rather focus on the validity of the construct and whether it indeed yields a vigorous indication of an organization's safety performance. This study compiles and validates a survey that assesses and identifies cabin safety culture factors within airline cabin crewmembers. The emphasis is on these commonly used measurement tools that have been developed and widely accepted in many industries as applied to the aviation community.

C. Operation of Aircrew

The airline industry and its operations have been a major focus of operation researchers, especially since the advent of the jet age in the late 1950s, which was followed by major technological advances. The industry has become a significant economic force from two perspectives: its own operations and its impact on related industries such as tourism and aircraft manufacturing. The revenue mainly comes from passenger tickets, while the costs include airplane expenses, fuel, crew, and equipment. The total profit is a complicated function of all the operations. Data from the Air Transport Association (2008) indicate that the largest administrative cost is fuel expenses, and the second largest is labour costs (23.4 %) [19].

Minimizing the crew costs is therefore an essential task in today's competitive airline industry, and even a small reduction can lead to significant savings. In addition, the recent appearance of low-fare airlines has increased the pressure to provide affordable tickets and reemphasized the importance of minimizing expenses. As a result, the airline crew scheduling problem has received much attention in both industry and academia.

Activities of Aircrew are:

- Aircrew look after airline passengers during flights and are trained to deal with emergency situations. Primarily, they are responsible for passenger safety.

- Aircrew will arrive at the airport at least one hour before take-off to be allocated duties by the Senior Cabin Crew member. They will be informed about passengers, such as unaccompanied children, who may need special attention.
- Aircrew check emergency equipment and ensure that the aircraft is clean and tidy. They will meet-greet passengers on board, direct them to their seats, and help them store their hand luggage.
- Before takeoff they also ensure all passengers are wearing seat belts. Some of the Cabin Crew demonstrate the use of oxygen equipment, explain emergency procedures, and point out emergency exits.
- During the flight, you may serve hot meals, snacks and drinks. You might sell duty-free goods such as alcohol, cigarettes and perfume. You'll continuously check that passengers are following in-flight regulations, such as not smoking.
- After landing they ensure all the passengers have safely left the plane, and they tidy the plane and prepare it for the next flight.
- Finally, they write a flight report, recording any unusual circumstances or problems. You may also have customs and immigration documents to fill in.

D. Safety and Security of Air Crew

Flight safety and security is the heart of all flight operation process. One of the causes of the aircraft accident is neglecting the flight safety and security. Flight safety and security are absolute, and could not be compromised. Humans will not be able to 100% eliminate accidents. What humans can do is minimize accidents, one of them by adhering to the rules and procedures of aviation safety and security.

The definition of aviation safety as stipulated in article 1, paragraph 48 of Act No. 1 on Aviation is the fulfilment of safety requirements when utilizing airspace, aircraft, airport, air cargo, flight navigation, as well as supporting facilities and other public facilities. Meanwhile, the definition of aviation security as set forth in article 49, is how to protect flights from unlawful acts in an integrated way by utilizing human resources, facilities, and procedures [19].

Safety and Security for Aircraft owners, have faced it own share from the air user and passenger as some unruly behaviours of some passenger especially towards the air crew has cause an point attention. Unruly and disruptive passenger events continue to be a real challenge and ongoing concern for airlines world-wide. The 2nd Edition of the Guidance on Unruly Passenger Prevention and Management has

been updated for the purpose of supporting IATA Member airlines to prevent, identify, defuse, and manage unruly passenger behaviour.

The Guidance also provides analysis including a compilation of significant risk factors and recommendations. This compilation includes a comprehensive set of appendices to assist in the prevention and management of such events. IATA's publication also highlight the design to help safety officers, training instructors and airline security managers:

- Evaluate Safety and/or Security Risks;
- Develop a Zero Tolerance Unruly Passenger policy;
- Develop Unruly Passenger Prevention and Management procedures;
- Re-evaluate and possibly amend current operator SOPs (if applicable);
- Develop strategies to prevent unruly passenger incidents and the resulting impacts.

Some of passenger act, IATA defined and established by the following non-exhaustive list of examples of unruly and disruptive behaviours onboard:

- Illegal consumption of narcotics;
- Refusal to comply with safety instructions (examples include not following cabin crew requests, e.g., instructions to fasten a seat belt, not to smoke, turn off a portable electronic device or disrupting the safety announcements);
- Verbal confrontation with crew members or other passengers;
- Physical confrontation with crew members or other passengers;
- Uncooperative passenger (examples include interfering with the crew's duties, refusing to follow instructions to board or leave the aircraft);
- Making threats (includes all types of threats, whether directed against a person, e.g., threat to injure someone, or intended to cause confusion and chaos, such as statements referring to a bomb threat, or simply any threatening behaviour that could affect the safety of the crew, passengers, and aircraft);
- Sexual abuse/harassment; and
- Other type of riotous behaviour (examples include: screaming, annoying behaviour, kicking, and banging heads on seat backs/tray tables).

This have been known to have serious consequence to Airline, with consequences ranging from; distracting cabin crew from safety related duties, trauma to passengers and crew, smoking/fire in a lavatory, tampered lavatory smoke detector not activating during smoke/fire in lavatory, tampered

security seals causing delays, injuries to passengers and cabin crew, trauma resulting in crew member illness or absenteeism, diversions and delays, image/media interest, negative publicity, legal proceedings.

E. Safety Risk Management

This is the identification, analysis, and elimination (or mitigation to an acceptable or tolerable level) of hazards. It is a data-driven approach to safety resources allocation, and therefore easier to defend and explain. It aims at balanced allocation of resources to address all risks and viable risk control and mitigation. Risk control strategies are:

- Avoidance: Operation or activity is cancelled because the risks exceed the benefits of continuing the operation or activity;
- Reduction: Frequency of operation or activity is reduced, or action is taken to reduce magnitude of consequences of accepted risks;
- Segregation of exposure: Action is taken to isolate effects of consequences of hazard or build-in redundancy to protect against it.

V. CONCLUSIONS

According to Belobaba, Odoni, and Barnhart [19], the summary of flight and Air crew operations are:

- ❖ Flight operations comprise a carefully choreographed sequence of tasks which must be performed in accordance with a fine-tuned schedule. These tasks, occurring in both series and parallel, demand temporal and spatial coordination and success depends on the synchronization of many different responsible parties. Flight and ground crews including cockpit and cabin personnel, dispatch, maintenance, ticketing/gate agents, guide/push crews, baggage handlers, caterers and fuelers each must abide by specific duties and procedures to keep the operation flowing smoothly.
- ❖ Cockpit and cabin crews come from a variety of backgrounds and work experiences. An airline may employ thousands of flight crew members who must function together at a high level of safety and efficiency. This can only be achieved through extensive training and adherence to well-established procedures and protocols.
- ❖ Activities before takeoff include flight planning, passenger processing, aircraft pre-flight, fueling, and other required ground processes. The pre-flight activities are orchestrated so as to achieve an "on-

schedule” push-back from the departure gate, although any maintenance and gate hold issues must also be considered.

- ❖ During taxiing to the departure runway, the cockpit crew prepares the aircraft for takeoff and updates the takeoff performance parameters with actual load data. In addition, any departure delays, aircraft icing and environmental conditions such as runway contamination may need to be addressed.
- ❖ The takeoff is a highly critical maneuver where a number of factors must be taken into consideration including airport/runway, environmental and emergency/abnormal contingencies. Departure from the terminal area, which may include route and speed restrictions, is followed by the climb to cruise altitude.
- ❖ The optimum cruise altitude is determined by a number of factors including company priorities of fuel burn and time, efficiency, ride comfort, other traffic and/or airspace limitations. During cruise flight, the cockpit crew must continually evaluate contingency options in the event of a passenger or mechanical disruption. In addition, some flight situations require adherence to specialized procedures including international routing, mountainous terrain and extended overwater operations.
- ❖ During descent, the crew begins preparing the cockpit and cabin for landing. In addition to conforming to ATC restrictions, the cockpit crew plans the approach to landing, which includes consideration of the meteorological conditions, the approach procedures available, environmental performance, aircraft mechanical condition and, if necessary, available fuel for holding. In the event of an unsuccessful approach, diversion to a more suitable landing point may have to be considered.
- ❖ After landing, the aircraft is taxied to the arrival gate while the crew readies the cockpit and cabin for parking. Once the aircraft is parked, passenger disembarkation is completed as well as baggage/cargo unloading. The flight crews proceed to the next departure gate, or to the ground transportation area if their duty day is complete.

It is therefore concluded that Air crew especially cabin/flight crew are needed to have excellent people skills, to be able to keep calm under pressure. They should be able to communicate in diverse foreign languages. Aircrew are required to be the one servicing the client/passenger therefore there are

intensive training been often passed across to them, since some of their service is not just domestic but international.

ACKNOWLEDGMENT

The Author appreciates BUTY GLOBAL research network (www.butyglobal.com) for taking time to read through this article.

REFERENCES

- [1] Transport Canada Civil Aviation, (2005). <http://www.tc.gc.ca/CivilAviation/commerce/CabinSafety/program.htm>
- [2] International Air Transport Association (2005). “Cabin Crew Turbulence – related Injuries. Safety Trend Evaluation”, Analysis and Data Exchange System, International Air Transport Association.
- [3] International Air Transport Association (2005). “Cabin Operations Safety Programme”, International Air Transport Association.
- [4] International Air Transport Association (2005). “Cabin Operations Safety Toolkit”, International Air Transport Association.
- [5] International Air Transport Association (2005). “Inadvertent Slide Deployments’, Safety Trend Evaluation, Analysis and Data Exchange System”, International Air Transport Association.
- [6] International Air Transport Association (2005). “Safety Management Systems - The senior airline manager’s implementation guide”, International Air Transport Association
- [7] Kai-Hui, L., Margaret, S., and Li-Hua, K. (2006). Development of Utilities to Assess Airline Cabin Safety Culture, 1-18.
- [8] Rhoden, S., Ralston, R. and Ineson, E. M. (2008). “Cabin crew training to control disruptive airline passenger behavior: A cause for tourism concern?” *Tourism Management*, 29(3), 538-547. doi: 10.1016/j.tourman.2007.06.002
- [9] Mahoney, P. H., Griffiths, R. F., Larsen, P. and Powell, D. (2008). “Retention of knowledge and skills in first aid and resuscitation by airline cabin crew”. *Resuscitation*, 76(3), 413-418. doi: 10.1016/j.resuscitation.2007.08.017
- [10] Pels, E. (2008). “Airline network competition: Full-service airlines, low-cost airlines and long-haul markets”. *Research in Transportation Economics*, 24(1), 68-74. doi: 10.1016/j.retrec.2009.01.009
- [11] FSF Editorial Staff (2001). “Remaining Seated During Taxi, With Restraints Fastened, Encourages Safety Focus”, Prevents Crewmember Injury. *Cabin Crew Safety*, vol. 36, no. 5.
- [12] FSF Editorial Staff (2001). “Strategies Target Turbulence-related Injuries to Flight Attendants and Passengers”. *Cabin Crew Safety*, vol. 36, no. 1.
- [13] FSF-Taiwan (2005). Analysis of cabin personnel injury for Taiwan airlines, 2001-2004’ *Flight Safety*, vol.43, pp. 19-21.
- [14] John, M. (1990). *The Putnam Aeronautical Review*. Vol. 1, Pp.170, Naval Institute Press.
- [15] International Air Transport Association (2006). “Cabin crew’s personal safety’, *Turbulence Management Training Material*”, International Air Transport Association Cabin Operations Safety Toolkit
- [16] Pirie, G. H. (2009). “Incidental tourism: British imperial air travel in the 1930s”. *Journal of Tourism History*, (1), 49–66.
- [17] Price, J. and Forrest, J. (2016). “Commercial aviation aircraft operator security”. In J. Price and J. Forrest (Ed.), *Practical Aviation Security: Predicting and preventing future threats* (pp. 341-392). doi: 10.1016/B978-0-12-804293-9.00008-4
- [18] Prinz, I. (2017). *Training and security in the aviation industry*. Bachelor Thesis for Obtaining the Degree Bachelor of Business Administration in Tourism, Hotel Management and Operations.

- [19] Belobaba, P., Odoni A., and Barnhart, C. (2009). *The Global Airline Industry*. 2009, John Wiley & Sons, Ltd Wiley, Chichester.
- [20] International Civil Aviation Organization (2008). “*List of Government-owned and Privatized Airlines (unofficial preliminary compilation)*” (PDF).
- [21] Elias, B. (2010). *Airport and Aviation Security*. CRC Press, 2010.
- [22] Imperial Air Transport Company (2011). “*Appointment of Government Directors*”. Flight. December 20, 1923.
- [23] International Air Transport Association (2015). Guidance on Unruly Passenger Prevention and Management
- [24] Transport Canada (1996). Flight Attendant Manual Standard, Transport Canada.
- [25] Moxon, R. (2010). *Airport Security*. Lecture at Department of Air Transport, University in Zilina, December 2010.
- [26] Thomas, O. (2013). Marketing Strategies and Business Performance of Domestic Airlines in Nigeria
- [27] Thomas, O. (2003). *Aviation Insecurity-The New Challenges of Air Travel*. Prometheus Books, 2003.