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CONDITIONS OF AIRLINES SECURITY

Abstract

The common belief that security in aviation is created through global and regional international aviation organizations is true, however it does not entirely convey the core of the problem. Standards and guidelines creating the system of security in aviation are important, however, they are merely strategic tools for creating the policy and security strategies in aviation. The real activity in this area is realized at the beginning of aviation structure, directly in air companies, particularly in airlines which provide air transport and cargo services. The reason to undertake research in this area was the attempt to find answers to the questions, like: to what extent the policy conducted by air companies influences their image, as well as the passengers’ evaluation and feelings of security. Another question is whether investment in security is profitable for airlines? The above mentioned problems, in the form of a report on research results, are included in this article. It should be also mentioned that the partial research undertaken while working on the issue of security in airlines may be the basis for further research in the area.

Keywords: security in aviation, security threat in aviation, emergencies.

Introduction

Air transportation is one of such rare branches which despite turmoil and economic crisis has been systematically growing. The number of passengers is constantly rising and it should be mentioned that within one decade the number has doubled. It refers both to the international trends as well as local airline services. According to the available data, in 2002, the Okęcie Airport in Warsaw was visited by over 5 million passengers and six years later, in 2008, the number equalled almost to 10 million. This figure remains still on the same level. On the basis of various estimates, transportation needs of the Polish people do not exceed 20 million passengers annually. The number of passengers who undergo a check-in at the Okęcie Airport estimates approximately 10 million1. Therefore, this situation is not much different from the international trends.

Development dynamics of air transportation

In 2013, airlines carried 3.1 billion passengers and 49.3 million tons of cargo, in regular flights worldwide2. It should be added that in 2009, despite the beginning of the economic crisis, over 2 billion people used airline services. This figure may constitute

1 In 2013, a total of 10.6 million passengers and 40 thousand tons of cargo were checked in/out, see: http://www.lotnisko-chopina.pl, accessed on: 2nd September 2014. The number is still valid.
a reference point. Despite an extremely difficult situation worldwide, in 2013, a growing
demand on passenger carriage was observed. This trend was continued through the whole
of 2014, therefore it can be considered as being relatively stable. During that time, an
average passenger load factor remained on the level of approximately 80%. Air
transportation, in spite of catastrophes and incidents in aviation, is invariably considered to
be the safest means of airlifting people and property.

**Personal qualities of airline personnel**

The airlines which are responsible for passenger’s carriage remain under constant
pressure of cheap airlines and thus are forced to cut some costs. It is not a good factor in
terms of desirable attitudes to the issue of security. Taking into account flying, technical
and maintenance personnel, airlines rely on a ready-made “product”, currently available at
the job market. Referring to the problem of accidents in aviation, however, it might be
assumed that the causality of accidents and incidents in aviation, particularly those
connected with a human factor, are conditioned by mistakes made at the beginning of
aviation career, as early as basic training and upbringing of young aviation trainees. This
occurs when separate causes which are long-lasting and difficult to get rid of, resulting
from a relationship between a student and an instructor, appear. Moreover, increasing
commercialization of air training and broader access to aviation should be also taken into
consideration. The negative personal attributes of pilots or serving personnel are acquired
at the initial process of the training. Such habits affect a future image of airlines, and
consequently their economic situation. Among the most common bad habits, there are:
nonchalance, irresponsibility, excessive recklessness, disrespect towards knowledge and
experience, promoting cunning and occasionally carelessness in aviation. It also concerns
the ensuring security of passenger’s carriage, so to perceiving reliability of airlines. In this
system, human is and it should be the most important. Here, it should be added that the
majority of air catastrophes, according to various estimates reaching the level of almost
90%, is caused by a human factor, that is by individual and multiple competences, which
create a required level of security in an air company. This occurs when the role of a
properly understood process of examining air accidents and rational, unaffected prevention
without corporation solidarity, appear to be significant. The main interest of the executives
responsible for the security of air companies, is to decrease the occurrence of air accidents
gradually, in order to eliminate them entirely if possible. Moreover, a manager is obliged
to do his greatest so that a similar situation will not reoccur in the future. How can it be
achieved? By asking such a direct question, the following answer can be expected: airlines
must not save on training and preparation of their personnel, in particular pilots and what is
more important servicing the personnel.

The main aim of the research was to establish the way of how security in aviation
organizations is perceived. For a long time, it has been believed that the crucial role in
creating security refers to international aviation organizations, especially the International
Civil Aviation Organization, as well as regional organizations. The author of the paper
does not entirely acknowledge this view, pointing to a vital role of air companies
themselves (airlines) which consider standards and directives defined at the highest levels
as a certain direction of creating the security policy which needs to be further organized
and implemented on the executive level. It should be an exact role of airlines and air
companies. In the course of the research, the following research objectives often
elementary and partial have been resolved: In which way do airline personnel selection and

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3 Ibidem.
creating the human resources policy affect an enhanced image and security of the offered services? What is the aim of the training system in airlines in order to meet the aviation requirements? What is the role of the simulator training and which training areas may be enhanced by the simulator training? To what extent, experience and conclusions resulting from examining various air incidents might prove to be useful for the training and improvement of security of the company?

At the beginning of the investigation, the author had assumed a working hypothesis, which stated that the role of international aviation organizations causes an indirect (political) influence on creating the aviation security. The main responsibility in this area belongs to air companies, therefore, future attention should be paid to them. In a range of their activity, responsibility and competence, there are the “key” to the implementation of standards and directives approved at the highest levels, for instance, actual possibilities to provide passengers with safe transport carriage and safe aviation services.

In the least complicated model of creating security in aviation, referring to the security policy in airlines, training activities should focus on such components as: crew performance in emergencies, aircraft efficiency including adequate equipment and preparation for a kind of conducted tasks, efficiency of a system which prepares and supports air operations as well as the operation and efficiency of ground handling at the airport. Each of the above mentioned components, constitutes a sophisticated area of individual and complex competences. It is also a source, or rather a peculiar cause of threats, susceptible to the existence and interaction of various types of internal interferences, for example, environmental operating conditions, exploiting aircraft, protective devices and additionally a “human factor” consisting of experience and internal emotional state of a crew which further affects the performance of flight.

The level of security has been systematically growing and is significantly higher than it used to be, especially in the 80’s of the previous century. Besides, the level of technological advancement of aircraft has been increasing, which can be observed in the degree of the advancement of air constructions, and, most of all, the advancement of systems supporting air operations. The cabin of contemporary aircraft, to a greater extent, reflects modern electronic control systems of increasingly higher advancement and becomes more modern and thus a demanding working place. It provides a pilot with a great deal of data, occasionally requiring from him to take an action or react properly to an incoming impulse.

Man in the security system of an aviation organization

Pilots employed by contemporary carriers, particularly these operating on a long-distance routes for the most part of flight, often for 10 - 15 flight hours, pay their attention to controlling on-board instruments, for instance, passive piloting aircraft, merely monitoring flight parameters and performing radio correspondence. Other activities connected with piloting the aircraft are performed with the use of an on-board computer. In this way, modern piloting of the aircraft is becoming increasingly advanced aviation engineering. Therefore, it contains a smaller element of the past air fantasy. Depriving a crew of the necessity to concentrate on the task gets rid of emotions that are typical for “manual” piloting of aircraft and leads to the routine. It is a new source of the security threat in aviation that has become a new phenomenon for airlines, not for flying personnel though. For a long time, this has been observed by pilots who often claim that modern flying limits the pilot’s role to an emergency “module” for aircraft automated systems, which performs steering in an open mode. This may seem to be a slightly unusual approach, particularly for people looking at aviation operation from the passenger’s
position, the customer of an airline. However, it does not look strange from the position of an aviation expert, since it only confirms the possibilities of modern aviation technology. What does it mean in practice? - Considerable changes in the manner of piloting, since a pilot responds only when there is a deviation from the set algorithm of the autopilot operation, usually confirmed by a proper alarming signal which forces the pilot to react, for instance, by taking control over aircraft. Nowadays, a contemporary pilot has been limited to the role of being an operator, whose responsibility is, first and foremost, to monitor passing information in the plane’s cockpit. The time has come to start a discussion whether this could be a ground-located cockpit, similar to unmanned aerial vehicles, where a crew might operate three or four operating machines at the same time. Undoubtedly, such a situation will occur in the future. Even now, a new role of an air carrier, changes in the training system and the system of passenger service should be put under greater consideration.

A growing amount of information seems to pose the security threat in aviation, especially to a carrier. It is a consequence of increasing technological advancement, which, in order to insure the efficient operation of aircraft systems, needs to process a larger amount of information, including an environmental situation, where the air operation is being executed, also the condition of aircraft, air and ground situation of the aircraft, etc. Thus, an amount of information addressed to the pilot has been constantly increasing, however time and spatial conditions of modern air operations result in limiting the time necessary for the analysis of the incoming data. It influences the optimization of the decisions made, and so a crew performance in emergency and extreme situations. In each of these situations, the crew performance may differ from passive to active. It depends on the training and individual crew preparation.

Investigation of air incidents

Now, let us consider passive crew performance in piloting aircraft by an example of the incident involving Airbus A 320 with 144 passengers on board. The incident took place in 2009. The aircraft took off from San Diego airport and was about to land in Minneapolis. It was piloted by two experienced pilots who while being busy with talking to each and using their personal laptops, they did not even notice that they flew 240 km over the final route point. The crew did not respond to any air traffic controllers and lost count of time. The American authorities having in their mind that it might be a terrorist attack, alerted the military aviation. Then, it has appeared that, following the official statement of the American National Transportation Security Board, the reason was inattention⁴. This case may lead to two contradictive conclusions: firstly, in the aviation system man is the weakest link; secondly, only man remains the weakest link in the chain of air events. Meanwhile, a crew which is properly prepared for performing their tasks, diminishes the probability of an accident in extreme situations.

This is illustrated by another example, probably the most spectacular in the history of aviation. It refers to the incident which happened in 2009, also involving Airbus 320. The airliner carried 150 passengers and six crew members. It took off from the La Guardia airport, in New York, and was bound for Charlotte in North Carolina. After the take-off, at the altitude of 3,200 feet, it collided with the flock of wild geese and had its two engines shut down. The captain of the aircraft has made a right decision to perform emergency

⁴ The American aviation authorities started the investigation into aircraft pilots of the Northwest Airlines who were having 144 passengers and 5 crew members on board, for over an hour, did not make any contact with a ground control and by over 240 km passed the aircraft where they were to land, see: http://wiadomosci.wp.pl, posted on: 23rd October 2009.
landing on the Hudson River in the centre of Manhattan. The incident ended safely. Both the passengers and crew members were unaffected by the situation. This event confirms the pilot’s role in the aviation system, as the machine would not be able to make such a decision. Acting on algorithms set by man, the autopilot (machine) would have been searching for an airport, which would definitely finish tragically.

It seems that such a kind of problems could have been prevented from happening by the implementation of proper training which means providing with the possibilities of predicting any in-flight possibilities, even these which can occur theoretically, prior to the likely occurrence of such mishaps. It requires a great amount of technological advancement of the simulation systems so that they would be able to reflect reality as closely as possible. The following question arises: Will such training performed in laboratory conditions, with no consequence of awareness of the executed actions, implemented procedures and decisions improve security? Such a discussion took place in the aviation area at the end of the past century. The main reason for airlines’ willingness to accept the necessity of simulator training was to increase costs, and, consequently, additional financial burden affecting the condition of a company. Moreover, pilots were not particularly eager to undergo such training due to other reasons: mostly because of the fact that the construction and capabilities of the simulators reflected a real flight environment to a very minimum extent.

**Can technology be the source of a threat?**

The cockpit of a contemporary airplane resembles a multi - person laboratory rather than an individual pilot’s working station. The limitations of pilot perception and, at the same time requirements he has to deal with in order to interpret and process hundreds of various types of data, explains the assumptions and demands for air constructions. Therefore, a wide range of directive indicators is used which provide the crew with, as much as possible, already processed collective information, gathered from various groups of instruments. Automatization, introduced in such a way, not only facilitates piloting aircraft, but is also beneficial due to the ongoing standardization. It enables faster and easier training for a new type of aircraft. This solution, however, indicates certain drawbacks.

Excessive digitization and automatization, which can be more and often observed in the cockpits of contemporary airplanes, requires the time necessary to prepare the crew to use systems. Complications arise during acquisition of more extensive and advanced knowledge, which is indispensable to manage and operate modern systems in practice. There appear threats of errors and mistakes, whose consequences might prove to be disastrous, as in case of Boeing 757 aircraft, owned by the Airlines 965 company, which crashed into the peak of the El Deluvio mountain on 20th December 1995, in the vicinity of Buga, Columbia. The result of this catastrophe was the death of 158 persons at the site. Therefore, as it seems or has been proved before, technology aims at limiting the pilot’s perception, which requires new solutions, and probably, as it has been already mentioned, moving the aircraft cockpit to the ground station, likewise unmanned aerial vehicles.

The technology which might be exploited for this purpose has been available over a long time now. The only problem which has been noticed by operators, in this respect, is to overcome a psychological barrier among passengers. Nowadays, it is difficult to imagine loading aircraft that will fly across an ocean without a crew. From the pilot’s perspective, it should not make much a difference whether he is alone in the aircraft cockpit or in the

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cockpit on the ground. It should be noted that on the ground, there is more space for developing additional systems and possibly positioning other crew members, if it is considered as being necessary. There is no doubt that it will happen in the foreseeable future. It is only a matter of time when people will get used to it, as we can now observe trains without a driver, running in many airports, for instance, in Frankfurt or Atlanta. There are also driverless underground trains (metro), transporting millions of passengers and this fact does not seem to scare anyone. It should be remembered, however, that higher automatization automatically puts forward higher demands on the personnel and the pilot who must become familiarized with the capabilities and operation of the systems so that in extreme situations he could independently solve problems, also those unforeseen by constructors. This objective must be achieved with the use of simulators.

The simulators find the application mainly in learning basic pilotage on the airplane and helicopters, and in the training of crew members. They can be applied in conducting continuous training, as well as training various advanced parts of future combat missions performed by military aircraft crews, which in turn not only decreases general training costs but also enhances its efficiency and general security of air training. Raising security standards in training directly is a result of the use of current technologies and simulation techniques. Thus, the simulators enable on the one hand, to master basic pilotage elements, on the other hand, however, they prepare flying personnel to cope with emergencies. Therefore, it is possible to acquaint pilots with extreme emergencies which may appear in real flight conditions, and cannot be practised in reality during regular flights or training flights in military aviation, without exposing equipment and a crew. This is a real advantage of simulators.

**High security costs**

Airlines are fully aware of high security costs. It can be heard more commonly that security is too costly. The observed improvement of security results from the investments before the crisis, which now provides with the results. Will it be so in the future? It is difficult to state which approach will prevail: economical rationalism or passengers’ interest, maybe a solution will be found to compromise both? The airlines being under pressure of the crisis, more frequently admit that “security is a poor business”. Therefore, various kinds of technological inventions meant to improve security are purchased rather reluctantly. There are no investments in protective equipment. No additional protective devices are ordered, although they are offered by aircraft manufacturers. As long as doubts of airlines are understandable, since they take into account profitability, it is more difficult to comprehend for what reason do not the aviation authorities make an attempt to impose new solutions. It is obvious that they should exercise more interest in this respect.

However, this system is changing slowly. The aircraft security indicator of 60 major airlines is rising, and in this respect indicators from 2011 may be considered as being particularly good. Air traffic is growing along with flight security. The most dangerous airline is the Japanese All Nippon Airways, confirmed by data of the International Air Transport Association (IATA), which presented its analyses in Geneva, indicating explicitly that the level of civil aviation security is still increasing, despite the growing traffic. This is proved by the number of air catastrophes, which occurred in the 1980’s or 90’s, for instance, as far as 1996, 2,272 passengers lost their lives, whereas in 2011, as a result of air crashes died only, or rather as many as 498 persons. The tragedies

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6 Underground in Dubai - a fully automated system of trains opened on 9th September 2009 which became one of the longest fully automated systems of trains in the world, see: http://pl.wikipedia.org/wiki.
usually occur during domestic flights, that is over short distances which do not exceed 500 km. In comparison, four times more people died on German roads at the same time\(^7\).

The positive result obtained by airlines is not accidental. It is confirmed by years of a huge effort, being the consequence of more and more technically efficient airplanes, but also of increasingly efficient and capable monitoring systems. In addition, pilots are better trained and prepared for any kinds of unexpected situations. Africa was at the lowest level of ranking lists of the aviation security statistics for a long time. However, establishing the African Civil Aviation Agency (ACAA) in 2007 improved the security of African airlines\(^8\). Regrettably, Russia still takes the last position on ranking lists. The security level of Russian aviation is known to be catastrophic due to old machines, lack of funds for maintenance, an incomplete personnel and crew members training, along with poor infrastructure of small airports in the country’s province, in particular.

Five most hazardous airlines, according to the German Jet Airliner Crash Data Evaluation Centre (JACDEC) are: a Chinese airline - Hainan Airlines, Emirates Etihad Airways, Hong Kong Cathay Pacific Airways, Finnish Finnair (each time the security indicator is below 0.006\(^9\)). The most dangerous world carrier was considered the All Nippon Airways with the aircraft security indicator equalling to 0.005.

**Conclusion**

To sum up, it is worth mentioning that aviation security is created at the very beginning of air company. Flying culture creates the basis of this system, where appropriate training and preparation of the personnel to execute all tasks connected with aviation is of primary importance. Aviation organizations should treat security as a core duty with regard to passengers. This may sound as truism, although the author did not have such an intention. The most important issue is an attitude to security policy in aviation organizations, which means that it is the attitude to people who are a real asset of the company, because it is man - crew who must take his final decisions, especially in emergency situations. Airlines should prioritize preparation of pilots to take decisions in such situations. Therefore, proper training appears to be rewarding. Airlines should not save money in this matter, because the security of passengers and carried goods are affected. Consequently, the level of offered services, including an economic situation of the company, suffers the most. This happens where a “vicious circle” is closed, proving that the personnel’s interest explains the condition and good name of the company which employs the personnel and treats them appropriately.

The experiences collected by the aviation branch with regard to security serve to raise the level of security while being on a plane. Such experiences may also be used in the aspect of organization of the security system not only in other transportation branches, but also in a widely understood economic activity in the interface man - contemporary technology.


\(^9\) The primary aircraft safety indicators, recommended by the International Civil Aviation Authority – ICAO are indicators which characterize the number of air crashes per 100,000 flying hours, or per 100 million flying kilometres, see: Żurek, Wybrane metody oceny bezpieczeństwa w lotnictwo, edited ITWL, 2009.
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