ANALYSED ACCIDENTS RATE OF AIRCRAFTS BOEING 737 AND AIRBUS A320

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Summary: Air transport is currently the safest way of travelling. What was before considered as luxurious way of traveling has now become widely accessible. The expansion and development of aviation was primarily connected to higher standard for safety. Because aviation links cover whole planet, this side is covered with state regulations, as well as global regulations. First step towards ensuring the safety was establishment of International Civil Aviation Organization in 1944. The goal of my work is to compare current state of accident rate of two most used aircrafts, Boeing 737 and Airbus A320. The paper contains classification and the most occurring causes of accidents, as well as definition of the safety, as the most important element that have to be ensured by aviation industry. The target of my work is also to explain chosen accidents of the both types of the aircrafts caused by technology errors, and also by human factor.

Keywords: Air crash, incident, cause, human factor, Boeing 737, Airbus A320

1. INTRODUCTION

There are many changes that has affected air travel industry over the history of aviation. The technology progress has presented many new and important discoveries. Construction of the aircrafts and aircraft systems, coordination, economy, and safety has improved significantly. This process of improvement was unfortunately accompanied with many obstacles and loss on human lives. However, that was the price for the progress. Even though, the construction and systems are almost flawless, the one thing that is still imposing high rate of risk is human factor. The statistics shows that failure of the human factor is cause of almost 80% of air accidents. That is why the international organizations and air travel companies' requirements for crews are very high and strict. The crew has to be able to work under the pressure and be able to deal with several of dangerous situations while remaining calm. Companies Boeing and Airbus are both well established and trusted companies. They keep competing for being the aircraft best-selling company, as well as offering the highest safety standards. The financial side of the improving the safety standards is supported by government which causes lot of conflicts between the companies.

2. SAFETY CHARACTERISTICS

Safety can be looked at as an inevitable requirement that goes side by side with quality. The safety is most often measured by the accident rate. For example Australian aviation office defines safety as a state when the risk of air accident is lowered to the possible minimum. The goal is to provide transportation without any accident or incident. However, even though in this set up there are no incidents or accident, it is not possible to call this definition safety and rely on it. When it comes to this type of travel it is very important to always remember the possibility of unexpected events and preparation for dealing with such a situations.

In aviation, safety is the most important element subjected to careful observation and consideration. Despite the statistic, which shows that air travel is the safest, majority of people still view flying as a challenging psychological event. The reason is that air crashes have mostly fatal consequences, and

also there is a lot of publicity every time. That is why unfortunately the level of the safety is perceived negatively, and people think about it only when there is accident.

3. AIRCRAFTS BOEING 737 AND AIRBUS A320

Boeing 737 is the most used and manufactured aircraft in the world, and earned popularity over the years. There is one '737' taking off or landing every 5 seconds. During the history of this model there were 11 models manufactured so far, as well as two special intercontinental versions BBJ and BBJ2. The travel capacity is from 85 to 215 passengers. Even though there were some serious accidents, this aircraft is considered to be very successful. It is manufactured in Boeing Renton Factory in Washington. All together this type went through 296 million take offs.

Boeing 737 was originally meant to be smaller two motor narrow body aircraft for short and middle length distances, derived from Boeing 707 and 727. The first customer, Lufthansa, ordered 21 aircrafts in 67 million dollars value, in 1965. The second biggest order was from United Airlines. It was for 40 aircrafts. It has been produced in three versions: First Generation (Original), Second Generation (Classic) and Next- Generation. There is newest version coming, called Boeing 737 MAX.

Airbus A320 is civilian travel aircraft for short and middle distance, manufactured by Airbus company. It was the first civilian airplane with digital driving system fly-by-wire (meaning that cockpit communicate with serve motors only via electrical signals). After the success of Airbus A300 Airbus started developing the substitute for the most popular airplane in the world, Boeing 727. Digital technologies used in A320 were the symbol of two generation jump when compared to whole analogy Boeing 727 and generation jump when compared to Boeing 737- 300/400/500.

A320 was supposed to be whole world substitute for 727 and the oldest model 737. Airplane has computer controlled board maintenance. System of avionics was designed so it can be very easily modernized. Except the very first model A320, majority of the aircrafts can be modernized and keep up with the newest standards of avionics and be modern even after 20 years of service. The first flight of Airbus A320 occurred in March 1988 for the Air France Company. The manufacturing of 188 seats Airbus A321 started in 1989, 124 easts A319 in 1993 and 107 seats A328 in 1990.

4. ANALYSIS OF ACCIDENTS RATE OF AIRCRAFTS BOEING 737 AND AIRBUS A320

According Plane crash info server that collects data on more than a thousand major air accidents that happened in 1950 was 51 % of cases, the main cause of pilot error. Followed by equipment failure, weather, sabotage and terrorism, maintenance errors, failure of ground dispatchers and fuelling improper fuel.

In all cases, air travel statistics show that sixteen percent of cases there is a crew error due to the weather. And in five percent it is failure of the equipment. According to information published on the website of the Aviation Safety Network, which monitors air disasters, it is suspected that at least 12 air disasters that occurred in the last 40 years, deliberately provoked pilots and other workers that had to do with air traffic control.

In ten cases, pilots deliberately changed route to request political asylum in other countries.[3]

Compared with Airbus, Boeing is characterized by 0,705 % higher accident rate than its competitors. The result was calculated on the basis of the table of the number manufactured and damaged aircraft. Boeing 737 has been throughout its production in March 2015 produced 8471 pieces and crashed 78 pieces. Airbus produced 6494 pieces and crashed 14 Boeing was thus made about 1,977 units more. However, should the company produced about 1,977 Airbus aircraft more accidents at the current rate by only 32 aircraft crashed, which is compared to the 46 Boeing airplanes less.

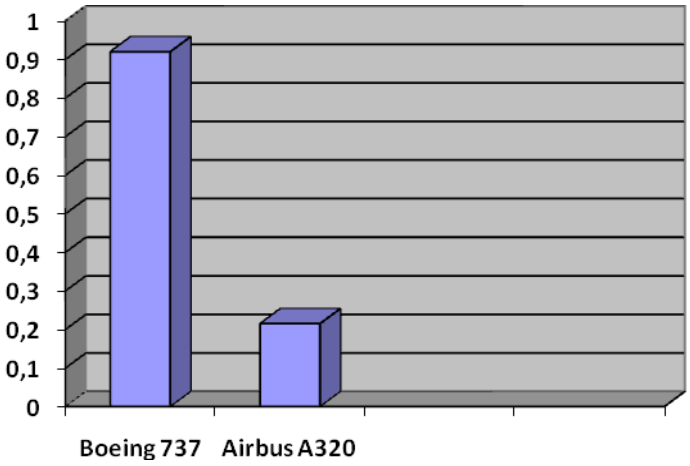

Figure 1 Graph no. 1 showing accident rate

The following graph no. 2 shows the number of accidents, depending on the cause of the accident. In both cases, the highest proportion of accidents is on the human factor. In the case of Boeing, it is 53 % and in the case of Airbus to 71 %. Compared to Boeing and Airbus it noticed one or an accident caused by a terrorist attack. Equipment failure at Boeing is the cause of 25% of accidents and 14 % of the Airbus accident. For both manufacturers have caused a large number of aircraft accidents just a cluster of several factors.

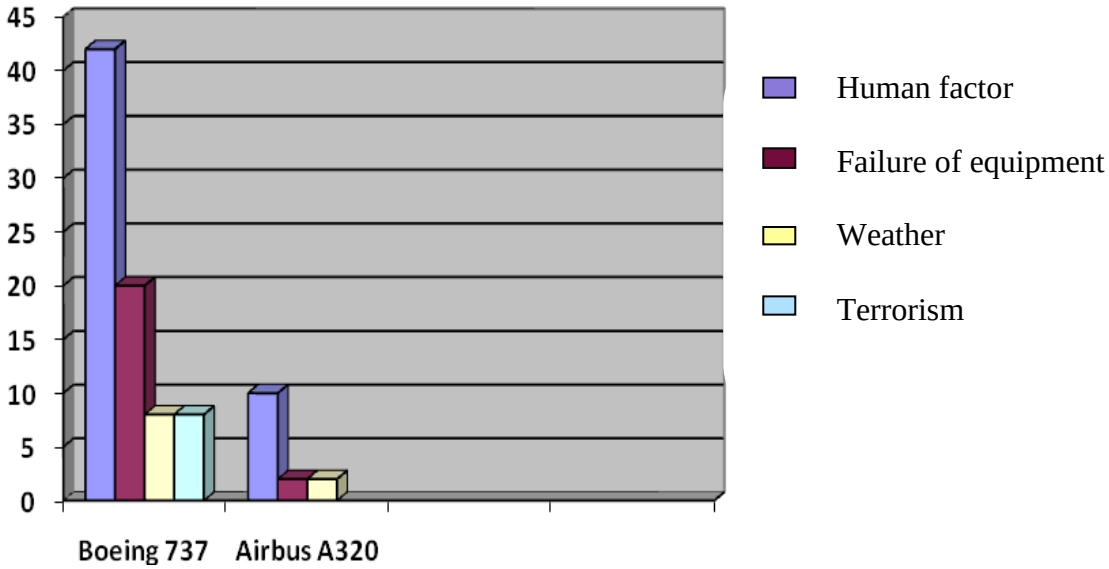

Figure 2 Graph no. 2 showing the proportion of accidents on the cause of the accident

5. SELECTED ACCIDENT AIRCRAFT OF TYPE BOEING 737 AND AIRBUS A320

In theses are described in detail and assessed accidents in both aircraft types. For each type it provides an analysis of accidents caused by a failure of technology and human factor, although the majority of air crashes are a cluster of several reasons

5.1 Crash of flight 522 Helios Airways

Flight 522 is known as one of the most important and also the strangest accidents of the civil aviation. The crash was a cluster of particularly serious and exceptional factors. It can be described as human error and equipment. The causes that led to the accident a few: the inability to detect the fault

of the crew cabin pressurization switch position, unable to discern the real cause of the problem loss of voice communications , onset crew unconscious due to hypoxia, fuel exhaustion and subsequent crash into the ground. Determine the cause and to take account of maintenance records, where it was found that less than a year before the crash occurred on board of this machine a sudden decompression and the plane had to make an emergency landing. Investigators came to the identified deficiencies in how the company Helios, as well as at Boeing. On April 20, 2012 sentenced three former members of a British technology to 10 years in prison.

5.2 Crash of flight 9525 Germanwings

The accident Airbus A320 of the company Germanwings is a momentary time most discussed an accident. Although the investigation is still ongoing, as the main cause of the plane crash states targeted suicide of first mate Andreas LUBITZ. After a thorough analysis of the cockpit recorder communication investigators found that the first officer Andreas Lubitz directed the plane to the ground intentionally. Shortly after reaching flight level the aircraft captain left the cockpit, probably because of the need to use the toilet. Andreas Lubitz then locked the cabin and the plane began to fall just before the fall and even increase its speed. The German Aviation Authority called on Disaster experts to develop a system able to take control of the plane to exceptional events. Accordingly, it should be possible in the future to dispose of technology enabling to intervene to control the machine and then carry out a safe landing on the ground. This new technology, however, could come to practice first in the next decade. Lufthansa after the accident said that their system training process is tried and tested for decades, but will be subjected to a thorough examination. Several European airlines after the accident, however, began to introduce the rule that the pilot may not be in flight in the cockpit never alone. Federal Association of German Air Force announced that the introduction of the new arrangements agreed by all major German airlines, including Lufthansa and its subsidiary Germanwings. The introduction of measures announced and British low-cost carrier EasyJet and Norwegian, Icelandic Canadian or Polish Airlines.

5.3 Crash of flight 427 USAir

Flight number 427 in the history of aviation known as one of the longest-addressed air disasters. Accident investigation lasted up to four and a half years. It does not contribute or similarity with unresolved incident of the same type of aircraft in 1991. The cause of the accident was discovered on June 9, 1996. The investigation eventually focused on test-assisted steering through thermal shock. The test was conducted August 26, 1996 in Valencia, California. The unit was covered with dry ice, and the stream of liquid nitrogen, freezing the ground simulation, which occurs at a height of several kilometres. Subsequently it was admitted in hydraulic fluid. The piston is moved left and right a few times and then stuck. The valve was disassembled and inspected under a microscope, where they found no signs of damage. This led to the result that the valve rudder jammed and cannot remain after the visible traces. Boeing engineers carried out a number checking tests and concluded that at a critical moment functioned valve upside down. After this finding, the Federal Aviation Administration ordered the manufacturer to replace the power steering valve construction. Boeing has invested $ 500 million in adjustments of the rudder control system. After the exchange has been no similar incidents with this type occurred.

5.4 Crash of flight 148 AirInter

The accident flight 148, as most of the accidents took place during landing, near the airport. Nevertheless, passengers who survived the accident, waiting for help for several hours because of the size of the area on which the machine is dark. During this accident, compared to previous perish all passengers. Flight 148 was a cluster of several negative factors. Initial disgruntled crew occurred after they learned that it will be necessary to land on another runway as it was intended. Investigators found that the autopilot can be programmed for speed descent in feet per minute or degrees. The analysis

showed that the pilot these figures confused and instead of sinking 3.3 ° set fall 3300 feet per minute. This phenomenon is at the Airbus occurs quite often, especially during training. [16]

If the autopilot determines that the aircraft is in distress doubled the values on which it was set. In this case, it was found that the machine at the same time received in the turbulence, leading to the pitch of 3 m / s. Thus, the plane actually decreased, thus autopilot evaluated as emergency and values doubled.[1]

Modern aircraft are equipped with ground proximity warning. Aircraft Air Inter, however, did not have this system. Most planes fly at altitudes below 3 000 m below the speed of 450 km / h but the company maintained aircraft speed 650 km / h until the final approach, due to the efforts of airlines flying time .When this speed the system sends false alarms that pilots burdensome and therefore Air Inter has decided these systems to aircraft not install at all. [16]

After finding reasons it was necessary to modify critical display that at a speed of descent in feet per minute display the whole number, not just the first two digits, which could be confused with grades. Adjusting covers about 1,000 pieces of aircraft, not just the A320.

The improved design has a black box, to withstand high temperatures for longer. All aircraft had to be equipped with a warning system close to the ground. Tightening has also been training pilots for the A320. One of the two pilots should have flown on the type min. 300 hours.

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