

Organizational Safety Effects in Flight Operations

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Abstract

Organizational safety in aviation is at an all-time high. Accident rates have been decreasing every year since 1959. In 2017, the commercial aviation accident rate was one fatal crash for every 16 million flights and is labeled as the safest year in aviation. Although technological breakthroughs are a strong source of the safety improvements, advances in safety management systems and studies in human factors have had a significant contribution. A positive program to have a big impact on aviation is recurrent training. This training allows pilots and crews to refresh their training in nonstandard or emergency situations. Crew Resource Management is also a large player in the world of aviation. In 1979 CRM was introduced and there has been a large gradual decrease in aircraft accidents. Operational Risk Management was adopted by some aviation organizations to ensure the risks involved with the operations are identified and measures are taken to mitigate these risks. The adoption of an organizational culture of safety looks to have played a large role in aviation safety today. The programs adopted by these organizations have shown to have an effect on the safe operations and successful growth of aviation with a significant drop in aviation related fatalities.

Keywords: safety, incidents, commercial, aviation, training, technology, risk management

Organizational Safety Effects on Flight Operations

Aviation is currently experiencing its safest years on record. According to an accident investigation study by Airbus, huge reductions in accidents is a result of an ongoing commitment by the commercial aviation industry to focus on organizational safety (Airbus, 2017). Significant changes in regulations and a strong safety culture along with recurrent training, CRM, and technology improvements have been critical in the reduction in accidents.

In the early stages of commercial air traffic, accident rates were much higher. Statistics show that approximately 50 years ago, there were roughly 141 million passengers carried with around 87 crashes (Allianz, 2014). Comparing numbers from 50 years ago to 2014, commercial airlines carried 3.3 billion passengers and suffered 12 fatal accidents (Allianz, 2014). The number of

accidents and fatalities are lowering over the years while passenger counts, and traffic amounts are rising. In the last 20 years, commercial aviation accident rates divided by approximately a factor of 8 on fatal accidents while hull losses were lowered by a factor of 3 in all aircraft while increasing air traffic by more than 86% (Airbus, 2016).

These statistics show that there has been a paradigm shift in the emphasis and respect for safety in aviation as shown by the introduction of Crew Resource Management (CRM) and Recurrent Training. One of the major changes was the research into Crew Resource Management in the 1970s. CRM is defined by the NTSB as using all available resources, information, equipment, and people to achieve safe and efficient flight operations (Kanki, B. G., Helmreich, R. L., & Anca, J. M., 2010). CRM is one of the major areas adopted by organizations such as commercial airlines and the military. According to Matteson (2001), This adoption of safety culture led to a sharp decrease in human error related accidents such as Controlled Flight Into Terrain (CFIT). The FAA Safer Skies initiative had a recommendation of revising airline training programs to incorporate CFIT training into CRM programs (Matteson, 2001). This addition of CRM and CFIT training has increased situational awareness and has incorporated a high degree of Situational Awareness (SA) on possible scenarios that could lead to these types of incidents (Matteson, 2001).

Literature Review

In the book titled *Crew Resource Management* by Kanki et al, there is an extreme in-depth analysis of CRM. Kanki et al explain that after a string of accidents, NASA initiated an investigation into aviation accidents between 1968 and 1976 (Kanki et al, 2010). The conclusion from this research was that pilot error in some of the documented accidents was likely to reflect failures in team communication and coordination rather than actual pilot skill (Kanki et al, 2010). Some areas were identified such as workload management, task delegation, flight manuals, SA, leadership, Air Traffic Control (ATC) (Kanki et al, 2010). This research indicates that there was clearly a problem in allowing open communication on the aircraft between the crew. This investigation is one of the leading studies that showed that a change in safety culture was required for aviation organizations.

Recurrent Training is annual training required by aircrew to maintain proficiency throughout their duties as an aircrew member. The tasks required vary by each crewmember and also vary by operations. Air Carriers are required to maintain recurrent training per 14 CFR 121 (FAA, 2018). This regulation requires aircrew to complete proficiency checks annually and also receive CRM training. In the NTSB report AAR10/01 (2010) states that on February 12, 2009, a Colgan aircraft crashed in which the captain had multiple failed check rides and a record of having issues correctly applying adequate control responses to what was happening to the aircraft (NTSB,

2010). The copilot on this aircraft also raised the flaps without talking to the captain. This lack in CRM ultimately led to the aircraft losing its capability to fly. This shows that a lack of solid recurrent training to ensure a strong understanding of basic flight controls and CRM is not just a regulation but a necessity for safe operations.

According to Iordache & Balan (2016), aircrew conducting flight operations must have an understanding of human factors that can affect their personal ability to safely perform the operations (Iordache & Balan, 2016). A measurement of an aircrew's ability to perform the flight safety is taken prior to the flight operations. These measurements are done to ensure that the aircrew are of sound mind and judgement to adequately perform their duties. This risk management is another organizational safety measure that was adopted to ensure that external factors that may affect safe operations are identified and mitigated. The military and the FAA have versions of this process and utilize it before each flight (FAA, 2000).

Organizational Safety

The creation of organizational safety stems from a rash of incidents in which investigations showed there was a lack of safety culture involved. In 1979 the National Aeronautics and Space Administration (NASA) held a workshop conference to present NASA's findings in the human error aspects of the majority of aviation accidents as failures of interpersonal communications, decision making, and leadership (Helmreich, R. L., Merritt, A. C., & Wilhelm, J. A., 1999). This conference was the first official identification that difficult personalities and lack crew coordination was a major cause for some of the most horrific accidents to date. Another organizational change in safety culture was the introduction of Operational Risk Management (ORM). ORM allows the aircrew to identify the high or low level of risk that must be accepted before the flight to ensure the aircrew are not taking unnecessary risk to complete a flight. Lastly, Recurrent Training was introduced to require annual training for aircrew to maintain their currency and proficiency in flight situations that they may not encounter in their day to day operations. CRM, ORM, and Recurrent Training are all programs or training methods that have been adopted by military or airline organizations to ensure a culture of safety exists within their organizations.

CRM

CRM was first introduced into the airlines by United Airlines in 1981. The training was introduced in a seminar type setting in which the participants were required to diagnose their own personality traits (Helmreich et al, 1999). The focus of the approach for many airlines was a managerial style approach and emphasized changing individual styles by correcting areas that were identified as deficient such as lack of assertiveness by younger pilots and authoritarian

behavior by the captains (Helmreich et al, 1999). It was identified early on that CRM training should not be a one-time training and should be part of annual recurrent training to allow refresher courses throughout a pilot's career (Helmreich et al, 1999).

CRM has been established as annual training for pilots and is required for flight operations. The effects of CRM on airline safety is difficult to pinpoint due to the advances in technology along with other training programs that have been implemented. According to Helmreich et al (1999), the most logical way to assess the impact of CRM on aviation safety is to look at randomly audited behavior and attitudes of the aircrew on whether they approve or reject CRM (Helmreich et al, 1999). According to Helmreich & Foushee (2010), the desired effects of CRM in aviation safety have been achieved by viewing the desired behavior of aircrew during training and spot checks on normal flights. This establishment of CRM by the airline organizations have clearly had an effect on the safe operations of aircraft once these areas were identified as shortfalls in human factors considerations.

Operational Risk Management

Aviation organizations like the U.S. Military have instituted risk management programs such as ORM. Risk management is required when operating systems that work together in dynamic environments such as an aircraft flying through the sky. Aircraft are systems that operate inside another network of systems such as civil, military, or other systems as an integrated international Air Traffic Control (ATC) system (Iordache, V., & Balan, C. V., 2016). This understanding of complex systems working together implies that there are exposed risks in which a faulty functioning system can result in an accident or aircraft crash. These systems must all work together for safe operations in aviation and a failure of a system could cause issues for the entire chain of systems. These possibilities of failure must be accounted for to ensure that risk is being mitigated when there is a higher than normal risk to the operation of the aircraft.

Some risks are so little that it is easy to accept the possibility of failure, however, there are large implications if a larger failure occurs that could require immediate saving of the aircraft such as landing the U.S. Airways Flight 1549 that landed in the Hudson river. ORM is a formal process in which aircrew identify and control the risks at their level if the mitigation is possible at the aircrew's level. Organizations such as the airlines and the military require aircrew to identify these risks and determine if there is an acceptable level of risk or if the risk is too high and must be controlled or eliminated for safe operations for the aircraft (Iordache, V., & Balan, C. V., 2016).

Recurrent Training

Investigations in flight skill decay has indicated that pilots who do not fly regularly need recurrent training to maintain their ability to operate and aircraft safely and up to standards (Childs, J. M., & Spears, W. D., 1986). The studies show that skills in aviation decay rapidly and extensively after a long break in flying and some skills deteriorate more than others (Childs, J. M., & Spears, W. D., 1986). The skills that deteriorate must be identified and training must be tailored to these skills to ensure that the aircrew are meeting the standards of their respective organization. To accommodate this requirement to maintain currencies, the FAA put regulations in place in the FAR/AIM.

The regulation 14 CFR 121.427 requires each crew member to annually perform recurrent ground training which can include quizzes and instructional training to include emergency training to ensure the crewmembers are up to date on recent mishaps and changes or updates to procedures for their respective job (FAA, 2018). Aircrew are also required to attend CRM training in which the training must also include portions in a simulator. These regulations are in place to ensure aircrew are maintaining proficiency in areas that they may not encounter through their day to day responsibilities and may be required in an emergency situation such as an engine out approach. In a 1976 study by the United States Air Force, the researchers determined that aircrew that do not receive recurrent training encountered deteriorated skills and required extra training after the fact to bring them back to standards (Smith, 1976). This study indicates that the adoption of recurrent training by the military and airlines allows the aircrew to maintain constant proficiency and therefore ensures they maintain the required ability to act in situations that they don't encounter on their normal duties.

Conclusion

Organizational safety has been improved by the adoption of programs that instill a safety culture for the crew. This adoption came from many years of accidents in which human factors were not identified as the causal factor for the incident. By adopting a safety culture, organizations such as the airlines and the military have created training for programs such as CRM, risk mitigation processes, and recurrent training to ensure the aircrew are working together to complete the task as a crew and if the risk is too high, the crew will make the safe decision early and cancel or mitigate the risks involved. These organizational programs are helping guide aircrew to safer aviation growth by lowering accident fatalities while these organizations increase the numbers of operations.

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