

In these tumultuous times, what personal Human Factors limits should an aviation industry member (whether it be: flight crew member, ATC, LAME, ground handler, etc) pay particular attention to enhance safety?

Title: Decision-making ability the last to bounce back after COVID-19

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Abstract

The aim of the paper is to highlight the deficit in decision-making abilities in operational staff following a prolonged period of absence and to emphasise its importance to flight safety. The essay assesses National Aviation Administration's exemptions on certain recurrency training schedules which may have affected operational staff's decision-making. The paper discusses vicarious learning through safety promotion (an integral part of a functioning Safety Management System) and how decreased flying reduces staff members' company knowledge which may in-turn affect their decision-making ability. Furthering this, the paper evaluates the effect of the COVID-19 lockdown on individuals' Locus of Control tendency and how this may also impede their decision-making. Finally, the paper examines decision-making specifically, calculative versus impulsive risk-taking tendencies in less-than-ideal situations, drawing attention to research which demonstrates a high rate of runway excursions occurring due to the pandemic.

Introduction

Effective decision-making is a critical component of aviation safety. Decisions made by operational staff, including pilots directly influence the outcome of a flight, and by extension, the economic viability of airlines. Research examining pilots, and in particular their flying and decision-making ability post-pandemic, has found that their ability to manually control an aircraft was largely unaffected, in contrast to their decision-making ability (Childs & Spears, 186; Mizzi, Lohmann & Junior, 2022). Industry initiatives such as recurrent Crew Resource Management (CRM) training are designed to maintain operational staff's proficiency. However, due to mandatory government lockdowns and social distancing legislation, National Aviation Administrators were required to extend certain recurrency training schedules. Consequently, some training has been 'waived' for a period of time. Other safety initiatives, such as 'safety promotion', which consequently led to vicarious learning through company operations has diminished due to reduced flying. In some circumstances, the

adverse effect of the pandemic on pilots' decision-making ability has been offset by individual factors like personality, and in particular Locus of Control (LOC). LOC is the concept where an individual feels they have control over the events in their life (Rotter, 1966). Additionally, due to reduced flying an individual's ability to manage risk, specifically an individual's 'calculative' or 'impulsive' risk tendencies can be affected. Hence, the aim of this paper is to understand how the disruption caused by COVID-19 affected pilots' decision-making ability.

The pandemic caused by COVID-19 resulted in a significant downturn in flying. In order to adhere to government regulations regarding lockdown and social distancing, several National Aviation Administrators (NAAs) waived 'currency' requirements for operational staff (Civil Aviation Safety Authority, 2023). However, as the industry returned to normal working schedules, complying with regulatory requirements did not necessarily translate to being proficient for many operational staff members (Olaganathan & Amihan, 2021). Several papers have discussed 'decision-making ability' as being one of the first skills to decay when an individual is not frequently flying or practicing the skills required to make sound decisions on the flight deck (Childs & Spears, 1986; Mizzi et al, 2022). The International Air Transport Association (IATA) assessed the emerging human factor risks that are to be considered due to the mass stand-down which include, reduced attention (higher distraction), staff decreased collaboration, and inadequate knowledge of updated processes and procedures (IATA, 2021). Furthering this, a study conducted by Mizzi, Lohmann and Junior (2022) examined how external stressors influenced morale, enthusiasm towards work, and operational distractions in workplaces. Additionally, the study also assessed pilots' training schedules whilst 'stood down' and their relationship with their airline. The authors stipulated several findings from the research which aligned with IATA's 'human factor-related risks' including breakdown in crew communication (likened to staff decreased collaboration), flight crew distraction and misalignment with operational and procedural changes (Mizzi et al, 2022). These variables can all have a negative impact on effective decision-making on the flight deck.

Mizzi and colleagues (2022) also investigated 'at home' training whilst pilots were stood down during the pandemic. The results indicated, 47% had not completed any study whilst grounded, with only 5% of pilots keeping up to date with crew/procedure changes. Additionally, 15% of participants stated training programs inadequately prepared them for regaining confidence (Mizzi et al, 2022). All variables reported through IATA's guidance material and Mizzi et al's, (2022) study, have potentially adverse effects on decision-making ability, and by extension are likely to increase the chance of incidents. The aim of industry initiatives such as Crew Resource Management (CRM) and Line

Orientated Assessment (LOA) with a focus on Evidence Based Training (EBT) is to facilitate accurate decision-making where crewmembers perceive risk, identify threats, and implement effective strategies to deal with an adverse situation or emergency. Through such training, crew members are equipped with the skills deemed necessary to manage a variety of situations on the flight deck. Consequently, if there are gaps in operational staff's training, their decision-making ability may be hindered.

As aviation is a 'high-reliability' industry, procedural adherence and effective decision-making ability are critical skills in preventing incidents. Subsequently, other industries such as health and environmental sectors attempt to mirror aviation's ability to learn from its mistakes to improve processes and increase safety (Pourdehnad & Smith, 2012). As part of a functioning Safety Management System, an airline should be promoting safety across all operational staff (Civil Aviation Safety Authority, 2014). The purpose of safety promotion throughout an airline is to highlight relevant safety concerns to encourage staff to pay particular attention to a system or pattern seen throughout their workload. The application of safety promotion across an organisation can lead to vicarious learning which is the notion of an individual learning or modelling how specific actions cause consequences and how they are constructed through observing others. Vicarious learning is not dependent on direct experience (Manz & Sims, 1981).

Myers (2022) studied the effectiveness of 'storytelling' as a tool for vicarious learning of Aero-Medical Transport Crews. The study utilised qualitative methods to explore the process of storytelling including semi-structured interviews, observations with crew and data analysis. The results demonstrated that storytelling allows for flight nurses to crystallise their learning, direct potential future learnings, and also review their own existing experience. Vicarious learning in aviation has allowed for operational staff to increase knowledge throughout the working group and increase individual experience, aiding effective decision-making. With the majority of the aviation industry shutdown during the pandemic (66% of the international fleet was grounded due to strict quarantines and closed borders; IATA, 2021), the notion of vicarious learning and its influence on decision-making diminished. Consequently, due to the grounding of flights, operational staff are lacking the resource of shared company knowledge and learning, which may in-turn affect decision-making whilst conducting their duties.

Due to the nature of the pandemic, more than half of the international fleet was grounded (IATA, 2021). The pandemic appeared to affect operational staff differently including decreased well-being, financial strain, and career stagnation. These external variables could have potentially affected

staff's, 'Locus of Control' which can impact an individual's decision-making ability. Locus of Control is the concept where an individual feels they have control over the events in their life (Rotter, 1966). If an individual has a high internal Locus of Control, they perceive that they have control over their destiny and failure, in other words, success is not left up to fate or chance. Conversely, high external Locus of Control individuals may attribute success and failure to outside variables and sense a lack of control. High external Locus of Control can lead to 'learned helplessness' which can contribute to anxiety and depression disorders (Hiroto, 1974). Due to the extended shut down, as government bodies closed borders and limited individual movement, operational staff may have leaned towards an external Locus of Control tendency due to the lack of control in their career, potentially affecting decision-making whilst flying (Nowicki et al., 2018). The effects of individuals' Locus of Control are best illustrated in a study by You, Ji and Han (2013). You and colleagues (2013) investigated the role of locus of control in Chinese Airline pilots. The study utilised a number of self-reported psychometric scales including Aviation Safety Locus of Control scale, Risk Perception scales and the Safety Operation Behaviours Scale. The results of the study indicated that pilots who had high internal Locus of Control operated more safely. Additionally, pilots with high internal Locus of Control were found to be able to detect system malfunctions more efficiently and concentrate on relevant tasks to maintain control of the aircraft (You et al., 2013).

Locus of Control can also influence a pilot's decision-making in risky situations. Risk by definition is decision-making under uncertainty (Kaplan & Garrick, 1981). How pilots mediate their risk tendency in their decision-making ability can affect the safety of a flight. Several processes have been implemented throughout aviation to aid pilots in making effective decisions including decision-trees and memory items on checklists. However, if an operational staff member is 'out of practice' there may be hesitancy or a reluctance to make a calculative risky decision based on their skills at the time. This was seen with Northwest Airlines Flight 1482 where a DC-9 conducted a runway incursion which subsequently caused a collision with a Boeing 727. The NTSB report stated the captain was medically disqualified in February 1984 and had been re-issued with their first-class airman medical in October 1990. The accident then occurred in December the same year. One of the contributing factors of the accident was the First Officer exaggerating their knowledge and experience which consequently led to a reversal of command roles between the flight crew members (National Transportation Safety Board, 1991). The NTSB report also revealed the pilots discussed, 56 seconds before the collision, their suspicions of their location but made no attempt to rectify the situation, ultimately increasing the risk. The incident further supports the results of Child and Spears (1986) research regarding prolonged

periods of absence from flight which subsequently allows for decision-making ability and calculative risk-taking to become less sophisticated in comparison to when flying is continuously occurring.

Pilot's risk propensity in critical phases of flight can affect safety outcomes. Risk taking can be separated into two streams, 'calculative' and 'impulsive' risk-taking. Calculative risk-taking is the notion of understanding the hazards in an environment and making a 'risky' decision with the knowledge at hand (Ebrahim et al., 2021). Conversely, impulsive risk-taking, is initiating or being involved in an activity without any forward thinking or disregarding the consequences (Bakhshani, 2014; Herman et al., 2018). Pilots' tendency to be either 'calculative' or 'impulsive' can affect the outcomes of a flight and enhance or worsen safety, especially in critical phases of flight. Calculative risk-taking in the flight deck was seen in Reeve Aleutian Airlines Flight 8, a Lockheed L-188 Electra which suffered a decompression when the propeller sheared through the lower fuselage. Instead of returning back to their original departure point, the pilots made a calculative decision to fly to Anchorage, which had more emergency resources, however, was further in distance and to get there, pilots had to fly over mountainous terrain with their stricken aircraft (e.g., defective flight controls and throttles). The flight landed safely with no fatalities on board. Conversely, impulsive risk-taking was seen in the fatal crash of Atlas Air flight 3591 where a contributing factor was the First Officer's response to the accidental activation of the go-around switch whilst in descent phase, the flight ended with Flight crew fatalities. The NTSB report specified the First Officer had previously shown impulsive tendencies when flying in the simulator (NTSB, 2020).

Fischer and Smith's (2004) study demonstrated an individual's deliberation time 'acts' as a protective barrier to avoiding maladaptive risky activities (Fischer & Smith, 2004). If operational staff are showing a deficit in their decision-making (Childs & Spears, Mizzi, et al, 2022), there is an increased chance of impulsive risk-taking, consequently increasing the likelihood of incidents. This was demonstrated with Li, Nichanian, Lin and Braithwaite (2022) who investigated a proactive approach to mitigate potential risks in flight operations related to the pandemic, utilising Flight Data Monitoring (FDM). The study assessed 123,140 FDM events from long and short haul aircraft including Boeing 777, 737 and Airbus A319, A320 and A321, ranging from June 2019 until May 2021. The results revealed that in 2020 as flights decreased, the FDM system highlighted an increase in runway excursions/events on landing. The authors stipulate the results align with current research in relation to landing phases of flight generally being of high workload, and consequently decision-making in this phase is more susceptible to cognitive decay (Li et al., 2022). With pilot decision-

making not as refined as pre-pandemic standards, there is an increase likelihood of engaging in risk-taking activities, specifically impulsive activities in the flight deck affecting safety of flight.

Conclusion

In summary, research has shown operational staff's decision-making ability has declined due to the prolonged stand-down resulting from the pandemic. A number of factors have contributed to a decay in decision-making ability including, NAA's waiving currency training, limited flying, and personality tendencies such as individuals' Locus of Control and risk propensity. Ultimately, the stand-down period has allowed for some cognitive soft skills to become deficient, allowing for more potential errors to become apparent. As the industry comes out of major disruptions, individual operational staff should pay particular attention to their decision-making abilities specifically in less-than-ideal situations.

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