



Abstract

Crew Resource Management (CRM) is a crucial concept in aviation, emphasizing the coordinated use of all available resources, including human, equipment, and information, to ensure safe and efficient flight operations. CRM aims to enhance communication, decision-making, and situational awareness among flight crew members, thus reducing errors, mitigating risks, and improving overall operational efficiency. The CRM competencies include leadership, teamwork, and decision-making. The National Transportation Safety Board has determined poor teamwork was a contributing factor of major aircraft accidents. This project aims to investigate the teamwork competency within the operational hierarchies of Part 121 and Part 135 operations by examining accidents that occurred between the years 2000 and 2022. The study will delve into the dynamics of teamwork within regulatory frameworks and previous literature to identify patterns, challenges, and potential areas for improvement. By understanding the intricacies of teamwork within these operational structures, the goal is to enhance safety standards to help mitigate risks in the aviation industry.

Methodology

This study is an attempt to understand the underlying factors of aircraft accidents which occurred under Part 121 and Part 135 operations from 2000 to 2022, and that were caused or induced by poor teamwork by the flight crew. Specifically, the following research questions will be addressed in this study:

RQ1 - How do human factors such as fatigue, stress, and workload contribute to failed teamwork and subsequent aircraft accidents?

RQ2 - What are the specific communication breakdowns that have been identified in aircraft accidents attributed to failed teamwork in the flight deck?

RQ3 – What lessons can be learned from previous aircraft accidents attributed to failed teamwork, and how can these lessons inform the development of proactive measures to prevent future accidents?

Project Timeline



Asiana Flight 214



National Transportation Safety Board

• Incident Overview:

- Asiana Airlines Flight 214 crashed on July 6, 2013, while attempting to land at San Francisco International Airport.
- The crash resulted in three passenger deaths and numerous injuries among the 291 passengers and 16 crew members.

• Contributing Factors:

- Lack of teamwork in the cockpit identified as one of the contributing factors.
- Flight descended too low and slow, striking a seawall and causing the crash.
- Pilot error and automation issues were also factors.

• Cockpit Teamwork Dynamics:

- Captain was the pilot flying (PF), responsible for controlling the aircraft's flight path.
- First officer (Check-Captain) was the pilot monitoring (PM), tasked with monitoring instruments and assisting.
- Confusion and poor communication between the captain and first officer during critical phases.

• Cultural and Hierarchical Factors:

- Asiana Airlines had a hierarchical culture where junior crew members might hesitate to challenge senior pilots.
- Power gradient could have inhibited the first officer from speaking up or questioning the captain's actions.

• Importance of Effective Teamwork:

- Highlights the need for clear communication, mutual respect, and adherence to standardized operating procedures.
- Calls for enhanced crew resource management (CRM) training post-accident to improve communication, assertiveness, and teamwork skills among flight crews.

Significance of the Study

The significance of this project lies in its potential to contribute to the advancement of safety training and standards within Part 121 and Part 135 aviation operations. By identifying shortcomings and best practices related to teamwork, the findings can inform more effective CRM training programs, operational procedures, and regulatory measures aimed at reducing the likelihood of accidents and enhancing overall safety performance. Furthermore, scholarship plays a very important role in the preparation of undergraduate students at Embry-Riddle Aeronautical University (ERAU). This study is in alignment with two of the ERAU's strategic pillars: *the student experience* and *research and innovation* (ERAU, 2024). It is important that students learn how to create and present scholarly materials as part of their academic training. Additionally, this project will benefit the researcher by providing him with unique opportunities to enhance competencies that are valued by the aviation industry (e.g., critical thinking; ability to analyze data, ability to publicly advocate for and defend work).

Communication of Findings

Findings will be disseminated through multiple channels:

- Beyond Undergraduate Research Journal
- ERAU 2024 Fall Research Symposium
- Flight Safety Foundation – International Air Safety Seminar

Additionally, findings will be incorporated into:

- CRM (Crew Resource Management) courses
- Flight Safety courses in Fall 2024
- Faculty mentor, who is also the instructor for these courses, will ensure integration of findings into the curriculum.

Adequacy of Resources

- Aircraft accident databases like NTSB's CAROL database are necessary.
- Relevant literature such as FAA Advisory Circular 120-51E from 2004 is required.
- Adequate time allocation is crucial for thorough and rigorous research.

References

National Transportation Safety Board. (2004, June 8). Descent Below Visual Glidepath and Impact With Seawall Asiana Airlines Flight 214. NTSB. Retrieved from <https://www.ntsb.gov/investigations/accidentreports/reports/aar1401.pdf>

International Air Transport Association (2024). Evidence-Based Training Implementation Guide. Retrieved from <https://www.iata.org/contentassets/632cceb91d1f41d18cec52e375f38e73/ebt-implementation-guide.pdf>