MANAGING AUTOMATION ERRORS IN FLIGHT: A SYSTEMATIC ANALYSIS OF 30 COMMERCIAL AVIATION CASES

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Abstract - Automation has greatly improved aviation safety and will continue to do so. However, the same technology that has helped prevent many incidents can also introduce new failure modes when crew-automation interaction is not properly managed. Often, automation does not produce the expected results, and human operators sometimes fail to recognize when automation is not working correctly. The study is based on two proposals: one suggests a more meaningful reclassification of automation errors, and the other introduces a new framework to evaluate how crews handle these errors. Using these two proposals, we examined 30 commercial airplane accident cases from 1974 to 2021 to analyze how flight crews manage automation errors during flight. We reviewed various error management sequences and their outcomes (success or failure) using real-life accident cases and aimed to understand the reasons behind these outcomes. The research paper extracted and tabulated relevant data from the selected cases to facilitate statistical analysis. Automation errors were categorized using a new taxonomy. Then, the flight crew's management of the event was derived from the findings in the accident reports. Finally, performance analysis was carried out. The outcome of the event was known in advance. The findings indicate that a failure to detect errors early is often the main cause of unsuccessful recovery. Additionally, attempts to stabilize the aircraft before analysing the problem frequently led to successful recovery. This research aims to improve safety outcomes by addressing how humans manage automation failures and by increasing awareness and response to automation malfunctions. Overall, the study shows that poor management of crew interaction with automation can create new risks that need to be mitigated through effective management of automation errors.

Keywords - Commercial Aviation Safety, Automation Malfunction, Crew–Automation Interaction, Human Factors, Management of Errors, Accident Analysis