ABSTRACT

Line Operations Safety Audit: A Cockpit Observation Methodology for Monitoring Commercial Airline Safety Performance

James Klinect, Ph.D.
The University of Texas at Austin, 2005

This dissertation presents a field observation method called the Line Operations Safety Audit (LOSA) designed to provide a proactive snapshot of system safety and flight crew performance *before* an incident or accident. The data indicators underlying this effort are based on a conceptual framework known as Threat and Error Management (TEM). This framework proposes that threats (such as adverse weather or aircraft malfunctions), pilot errors (such as selecting a wrong automation mode or missing a checklist item), and undesired aircraft states (such as altitude deviations or speed exceedances) are everyday events that flight crews must successfully manage to maintain safety. By having cockpit observers collect TEM data, LOSA provides an opportunity, never before realized, to understand the complex interactions among operational context, flight crew processes, and outcomes during routine flights. This type of insight benefits both airlines and researchers. For airlines, LOSA provides a diagnosis of operational performance strengths and weaknesses without relying on adverse safety events for such information. For researchers, LOSA addresses the shortage of field findings in aviation by providing TEM performance data gathered in its natural context.

LOSA has been developed and refined since 1996 with projects conducted at over 20 major international and regional airlines from 10 different countries. Using this experience as a foundation, this dissertation describes the rationale underlying LOSA as well as its methodology, data analysis strategies, and safety implications for the aviation industry. Some highlights include: a discussion of the 10 operating characteristics designed to gain pilot trust and lessen the tendency to "fake good" during an observation; the instrumentation, observer selection procedures, training objectives, and quality control checks used to enhance data reliability and validity; a multistage approach to data analysis and interpretation that demonstrates the transformation of LOSA data into knowledge that can drive airline safety management practices; and initial findings from an archive of over 2600 observations collected during the last five years. The dissertation concludes with a discussion of current regulatory, pilot association, and airplane manufacturer support for LOSA, and the efforts under way to expand its methodology to other domains within aviation.