

Indispensable CRM

Inadequate crew resource management found in every fatal accident involving a commercial aircraft in Greek airspace.

BY RICK DARBY

Problems of crew resource management (CRM) were associated with all fatal accidents involving commercial aircraft in Greek airspace during 1983–2003, according to a human factors analysis of accidents. “Crew skill errors” occurred in more than 71 percent of the fatal accidents and “crew violations” were found in 57 percent, although there was a “strong statistical decrease” in the most recent decade, the report said. “Adverse mental states” were associated with more than 71 percent of the fatal accidents, and effects of the “physical environment” on flight crews played a causal role in 43 percent.

The findings were presented this year by a four-member team of Greek aviation safety researchers.¹ Their study was based on reports of 185 aviation accidents and incidents involving flight crew error, of which 41, or 22.2 percent, occurred in commercial operations.² All events were recategorized for the study as fatal or nonfatal accidents. In commercial aviation, 19.5 percent were fatal and 80.5 percent were nonfatal. The source reports, from the Hellenic Accident Investigation and Aviation Safety Board, were evaluated by the researchers using the Human Factors Analysis and Classification System (HFACS),³ introduced in 2000 by the U.S. Federal Aviation Administration, and derivative classification and analysis tools for maintenance human errors and air traffic control (ATC) human errors.

“Poor CRM” was a factor in 100 percent of fatal accidents, and 50 percent of all accidents,

involving commercial aircraft (Figure 1). “Adverse mental states”⁴ — primarily a loss of situational awareness — was a factor in 71.4 percent of the fatal accidents. The effect of the “physical environment” as a precondition for unsafe acts by pilots played a role in 42.9 percent of the fatal accidents, and the “technical environment” was an important factor in 28.6 percent.

The “poor CRM” found in all fatal accidents contrasted with its presence in 36 percent

‘Poor CRM’ Found in Every Fatal Accident

Commercial Aircraft Accidents in Greek Airspace, 1983–2003

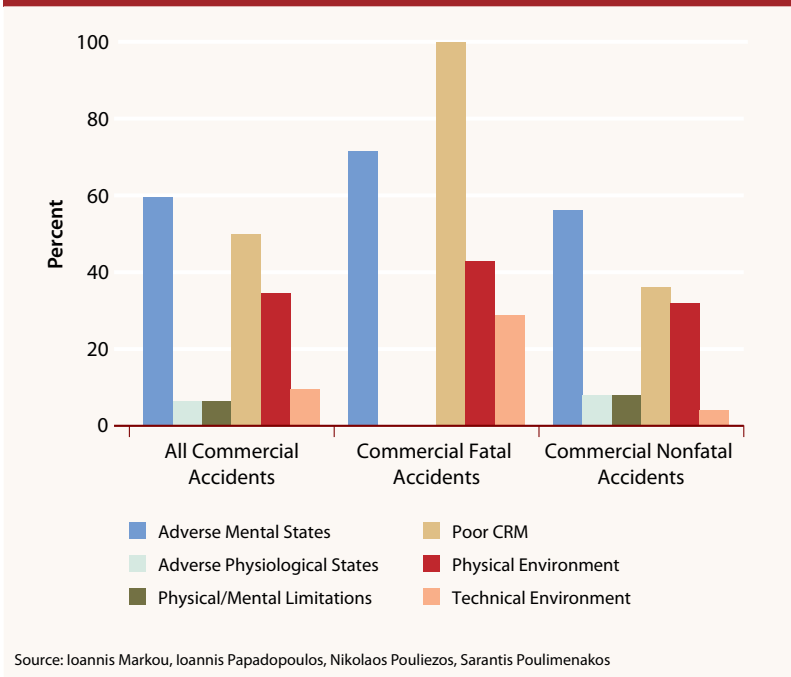


Figure 1

of nonfatal accidents involving commercial aircraft. Among the fatal accidents, “crew skill errors” were found in 71.4 percent and “crew violations” in 57.1 percent (Figure 2).⁵ “Crew decision error” was a factor in 28.6 percent and “crew perceptual error” was found in 42.9 percent.

At the organizational level, various types of poor supervision were found in some fatal accidents involving commercial aircraft (Figure 3). “Failure to correct problem” and “supervisory violations”⁶ were each a factor in 42.9 percent, “inadequate supervision” in 14.3 percent and “planned inappropriate operations” in 28.6 percent.

The study considered the phases of flight in which accidents occurred. Half of the fatal accidents involving commercial operations happened during descent/landing, and 37.5 percent during initial climb.

Nonfatal accidents involving commercial aircraft are shown in Table 1 (page 52). “Crew skill error” and “poor CRM” were the most common factors in the approach phase. “Adverse mental states,” “crew skill error,” “crew decision error” and “physical environment” factors were the most common in the en route phase. “Crew violations” was the most frequent factor in the loading, taxi and unloading phases.

Fatal accidents involving commercial aircraft are shown in Table 2 (page 52). In the en route phase, “poor CRM” was found in all the accidents, and “crew perceptual errors,” “crew violations” and “physical environment” played a role in two-thirds of the accidents. In the descent phase, “crew skill error,” “adverse mental states” and “poor CRM” were found in all the accidents.

The researchers analyzed the demographics of pilots involved in accidents. The age of the pilot flying and pilot not flying are shown in Table 3 (page 52). The pilot flying was over 50 years old in 65 percent of the fatal accidents involving commercial aircraft.

No maintenance errors were associated with fatal accidents during commercial aircraft operations; ATC errors were one of the causal factors cited in 12.5 percent of these accidents. ●

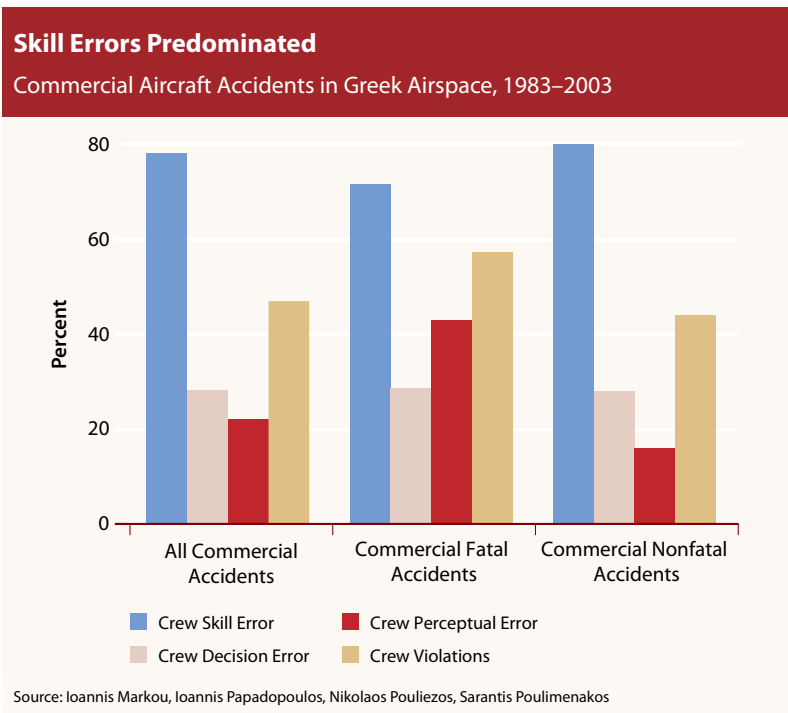


Figure 2

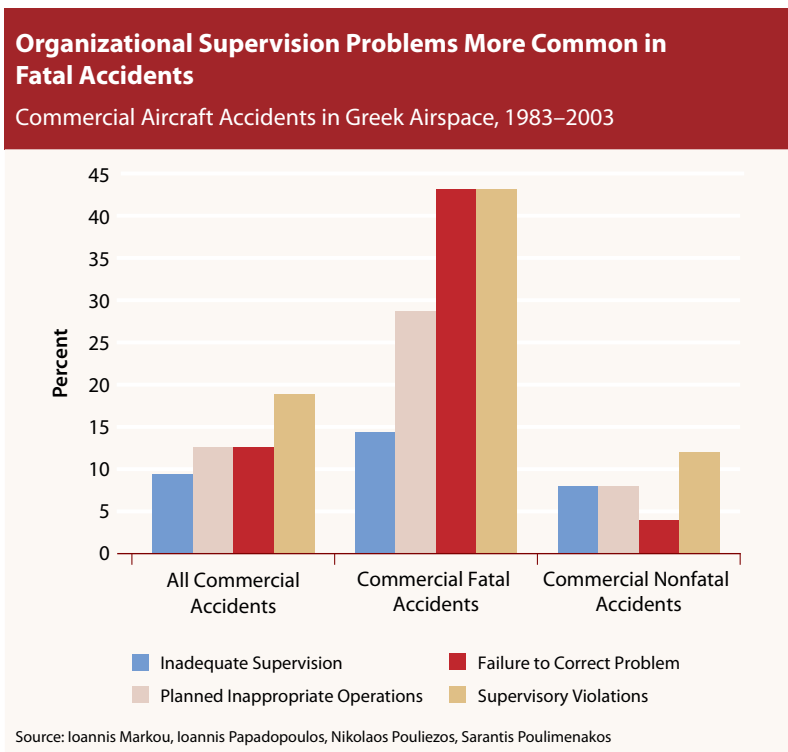


Figure 3

Notes

1. Markou, Ioannis; Papadopoulos, Ioannis; Pouliezos, Nikolaos; Poulimenakos, Sarantis. “Air Accidents-Incidents Human Factors Analysis: The

Crew Errors During Approach in Nonfatal Accidents

Commercial Aircraft Accidents in Greek Airspace, 1983–2003

Phase of Flight	Error Type: Percentage of Accidents								
	Crew Skill Error	Crew Decision Error	Crew Perceptual Error	Crew Violations	Adverse Mental States	Adverse Physiological States	Poor Crew Resource Management	Physical Environment	Technical Environment
Load, taxi, unload	60.0	20.0	0.0	80.0	60.0	0.0	20.0	20.0	0.0
En route	75.0	50.0	0.0	25.0	100.0	25.0	0.0	50.0	0.0
Approach	84.6	23.1	30.8	38.5	38.5	0.0	53.8	30.8	7.7

Source: Ioannis Markou, Ioannis Papadopoulos, Nikolaos Pouliezios, Sarantis Poulimenakos

Table 1

Fatal Accident Human Factors

Commercial Aircraft Accidents in Greek Airspace, 1983–2003

Phase of Flight	Error Type: Percentage of Accidents								
	Crew Skill Error	Crew Decision Error	Crew Perceptual Error	Crew Violations	Adverse Mental States	Adverse Physiological States	Poor Crew Resource Management	Physical Environment	Technical Environment
En route	33.3	33.3	66.7	66.7	33.3	0.0	100.0	66.7	33.3
Descent	100.0	66.7	33.3	66.7	100.0	0.0	100.0	0.0	0.0

Source: Ioannis Markou, Ioannis Papadopoulos, Nikolaos Pouliezios, Sarantis Poulimenakos

Table 2

Most Pilots Flying in Accidents Were Over 50

Commercial Aircraft Accidents in Greek Airspace, 1983–2003

	Pilot Flying Age (%)		Pilot Not Flying Age (%)	
	<50	>50	<50	>50
All Commercial Accidents	37	63	78	22
Commercial Fatal Accidents	35	65	75	25
Commercial Nonfatal Accidents	40	60	80	20

Source: Ioannis Markou, Ioannis Papadopoulos, Nikolaos Pouliezios, Sarantis Poulimenakos

Table 3

- Greek Experience 1983–2003.” *Proceedings of the 18th annual European Aviation Safety Seminar*, Athens, Greece. Alexandria, Virginia, U.S.: Flight Safety Foundation, 2006.
- The designations of accidents and incidents followed the definitions in International Civil Aviation Organization Annex 13, *Aircraft Accident and Incident Investigation*. The fatal and nonfatal accidents analyzed included commercial operations with airplanes and helicopters; turbojet, turboprop

and piston-engine aircraft; aircraft in all weight categories; and both scheduled and nonscheduled operations, including cargo, passenger and positioning flights.

- Shappell, Scott A.; Wiegmann, Douglas A. *The Human Factors Analysis and Classification System — HFACS*. U.S. Federal Aviation Administration Office of Aviation Medicine. Report no. DOT/FAA/AM-00/7. February 2000.
- “Adverse mental states,” in the HFACS classification system, include, for example, “loss of situational awareness,” “channeled attention” and “mental fatigue.”
- “Crew violations,” in the HFACS classification system, are not necessarily violations of civil aviation regulations. Examples include “failed to use the radar altimeter,” “flew an unauthorized approach” and “failed to properly prepare for the flight.”
- “Supervisory violations,” in the HFACS classification system, are not necessarily violations of civil aviation regulations. They include “authorized unnecessary hazard,” “failed to enforce rules and regulations” and “authorized unqualified crew for flight.”