**Human Factors in a Military Plane Crash**

On 2 May 2018, at about 11.30 am, a United States Air Force (USAF) WC-130H weather reconnaissance transport plane crashed onto a public highway shortly after take-off from Savannah International Airport in Georgia, USA. All nine members aboard the plane perished in the accident and the plane was completely destroyed. The aircraft was on its last flight to an airbase in Arizona to be decommissioned from military service. The aircraft had been in Savannah for about a month for scheduled maintenance and unscheduled servicing on the left-most engine, Engine Number 1.

During the take-off, Engine Number 1 malfunctioned and did not provide the required thrust but this was not recognized by the crew until the aircraft lifted off from the runway when the pilot observed the aircraft veered left significantly just before it achieved flight. The pilot called for engine shutdown for Engine Number 1 but the crew failed to follow the emergency procedure and the after take-off checklist procedures with the flaps left at 50 per cent.

The pilot banked left into the inoperative engine instead of turning right as stipulated in the Flight Manual to keep the left wing (with the engine problem) up in order to maintain lift for the aircraft. At about 900 feet and 130 knots the pilot applied left rudder which caused the aircraft to skid and resulted in the stalling of the left wing. The aircraft departed from controlled flight and nose-dived into a highway about 2.5 kilometres from the airport at two minutes after the take-off.

The USAF investigation using the Human Factors Analysis and Classification System found cockpit crew error as the cause of the accident and failure of the maintenance crew to properly rectify the Engine Number 1 performance issue as the cause of the engine malfunction. The investigation also found organisational culture issues concerning low morale and complacency of the unit involved in the accident. **Refer to the official USAF investigation report for details**.

You are tasked to conduct a review of the Human Factors analysis in the investigation report with the objective to propose solutions to prevent a similar accident in the armed forces. Using this accident as a case study, examine human capabilities and limitations in operating combat machine and operating in a high stress situation, identify the possible safety and risk management issues in defence and security operations, and examine design principles to reduce human errors both in the operations and maintenance of combat equipment. You may refer to other reliable news reports or commentaries in your review.

**Question 1 – Human Capabilities and Limitations**

(a) Review the investigation report and identify the human errors presented. Describe how these errors relate to physical and cognitive human capabilities and limitations.

(b) Explain how human limitations contributed to the cause of the accident.

(c) The take-off and landing phases are the most critical part of a flight. The loss of Engine Number 1 was a major emergency at a critical phase of the mission. Given this circumstance, examine how stress impacts performance and what can be done to manage stress in such situations.

(d) Using Crew Resource Management principles, evaluate the team performance of the flight crew comprising the pilot, co-pilot, navigator and flight engineer.

(40 marks)

**Question 2 – Safety and Risk Management**

(a) Based on the findings from the report, describe the safety climate of the 156th Airlift Wing, in

particular, the attitude towards safety displayed among the airmen including the maintenance personnel. Support your analysis with the evidences reported.

(b) The lack of discipline displayed by both the aircrew and the maintenance crew in deviating from established procedures was evident. Illustrate how these discipline issues relate to a unit’s attitude towards safety and risks.

(c) Present how a safety management system, with the implementation of education, intervention and monitoring programs can possibly avert such safety discipline issues.

(30 marks)

**Question 3 – Human Factors Design**

(a) The pilot was reported to be a very good pilot - he was awarded a Flight Safety award in January 2016 for successfully returning an aircraft which had suffered an engine flame-out safely back to base. However, he was unable to correctly handle his last emergency. Given the human errors discussed in this case study, propose design solutions that could assist the cockpit crew in handling the emergency during take-off.

(b) Assuming the role of the incident unit’s commander, recommend the steps to take for your unit to get better and prevent future incidents. Your recommendations should be based on the findings of the investigation report and should include training or re-training options.

(30 marks)