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DIFFERENCES IN RISK PERCEPTIONS AND BEHAVIOURS AMONGST PROFESSIONALS AND TRAINEES IN THE AVIATION ENGINEERING DOMAIN

Dimitrios Chionis

University of Bolton, UK

Nektarios Karanikas

Aviation Academy, Amsterdam University of Applied Sciences, NL

Based on: Chionis D., Karanikas N., (under review). Differences in Risk Perceptions and Behaviours Amongst Professionals and Trainees in the Aviation Engineering Domain. *Aerospace.*

Risk Perception: Approaches

- Preference (X) = Expected Benefit(X) + Perceived Risk(X) + content/context
- Subjective assessment of the probability of adverse outcomes and the awareness about the magnitude of their respective consequences
- Medium in the relationship among locus of control and safety behaviours during operations
- Complex construct that regulates behaviour and is affected by cognitive processes, emotional attitudes, and social projections

Current Situation

- Risk perception differences have been researched without examining specific risk dimensions
- There are no studies on risk perception dimensions of aviation maintenance engineers/technicians
- Risk perception is important for company activities because it influences:
  - ✓The decision-makers
  - ✓The operational processes
  - ✓Emotions
  - ✓Safety attitudes
  - ✓The organizational safety culture and climate

What if we don't study risk perception dimensions

- Improvement of risk behaviours remains weak: we don't understand where to intervene
- Specific risk perceptions per employee group & specialty remain unattended: lack of customization of interventions to particular needs
- Safety education & training do not focus on weaker risk perception dimensions: they become less effective
- Decreased potential of safety culture & climate assessments and programs

Aim of the study

- Do aviation engineering professionals and trainees:
  - ✓equally perceive risk across various dimensions?
  - ✓behave similarly and choose to reject/accept risk in different contexts?

Methodology

Survey Tool:

- Online, voluntary and anonymous questionnaire
- Questions targeted to risk perception dimensions and risk behaviours

Sample (70 participants):

- *35 Professionals:* fully licenced personnel according to the respective local or regional regulations
- *35 Trainees:* undergoing OJT or studying for at least one year at an aviation engineering institution

Other variables of interest:

- *Age*
- *Experience (working – under study/training)*
- *Educational level*

Risk perception dimensions

Incident Types

1. Temporary transmission system failures during a leak check.
2. Temporary blinking instruments during a pre-flight inspection.
3. Slight oscillation of engine power right after starting the engines.
4. Recoverable braking system failures while parking the aircraft.
5. Short distraction while working on a shaft under the aircraft.
6. Minor hydraulic leakage during turnaround under high time pressure.
7. Temporary high engine temperature indications during engine tests.
8. Minor fuel leakage from the bowser during a delayed turnaround.

Dimension per Incident Type

1. Centrality of the incident for safety
2. Controllability the user has over the situation
3. Importance of team coordination
4. Familiarity with the incident
5. Effects of stress
6. Effects of fatigue
7. Level of confidence in own abilities
8. Effects of the night shift
9. Effects of technological complexity
10. Consequences on humans (i.e. injuries)
11. Material consequences (i.e. damages)

Risk Behaviors

Scenario Themes

Scenario 1: trust to the capabilities and expertise of others

Scenario 2: self-sacrifice and ignorance of self-interest

Scenario 3: compliance with procedures over the breach of the latter when the stakes are high

Scenario 4: responsibility undertaking when one has committed a mistake/error

Scenario 5: prioritisation of safety over other task objectives

Example Scenario

You are checking hydraulics during a Cessna-172's turnaround which has to depart ASAP to transfer a sick child in critical condition but stable. You notice some suction screens plugged from degradation deposits. What would be your probable action?

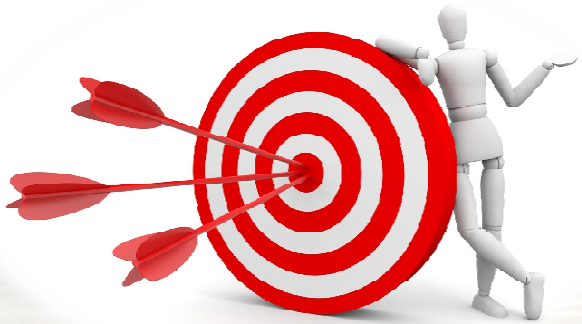
a. I replace the suction screens and rush the minimum checks. The patient is in critical condition, and there is not warranty that will remain stable.

Scenario 3

b. I replace the suction screens, replace the fluid, check for supplementary contamination sources, and test the engine. The patient is stable and delaying the flight will not have detrimental effects.

Overall results

- Do aviation engineering professionals and trainees:
  - ✓equally perceive risk across various dimensions? ***Partially***
  - ✓behave similarly and choose to reject/accept risk in different contexts? ***Partially***



Significant Differences

Risk Dimensions	Perception (overall median values across all participants and incidents)	
	Professionals	Trainees
Familiarity	5.5	3.5
Fatigue	5	3
Self-confidence	5	3.5
Injuries	3.5	2
Scenarios	Percentage Risk aversion choice	
	Professionals	Trainees
Scenario 2	54.3%	28.6%
Scenario 3	80%	37.1%
Scenario 4	88.6%	42.9%

Possible explanations

Risk Perception Dimensions

Professionals

✓No effect of desensitisation resulting from prolonged exposure

✓Fatigue addressed consistently as a major human factor

Trainees

✓Minimal exposure to fatigue conditions during their training

✓Limited real-world experience leading to underestimation of risk factors

Possible explanations

Scenarios

Scenario 2 (self-sacrifice)

✓Professionals: Increased sense of belonging and giving back, leading to ignorance of self-interest

Scenario 3 (compliance)

✓Professionals: Emphasis given on conformity and compliance with rules and safety policies during working life (e.g., subject of audits)

Scenario 4 (responsibility)

✓Professionals: Responsibility acceptance developed over time

Recommendations

- ✓Adjust continuous training to enable aviation maintenance engineers to develop and maintain risk perceptions through:
  - ➢context-tailored coaching
  - ➢utilisation of augmented/virtual reality technologies
- ✓Tailored training to professionals and trainees <u>separately</u> regarding risk perceptions & <u>commonly</u> for risk behaviours
- ✓Standardised approach to hazardous conditions to minimise possible conflicts amongst team members and boost effective risk communication

Recommendations

Scenario Based Training

- ✓To develop risk perceptions in correspondence with their job status
- ✓To assess the effectiveness of risk perception training through real-world and context-specific cases

Indicative Interventions

Professionals:

✓To enhance perceptive adaptability to hazardous situations associated with:

- New technologies
- Night shift effects
- Influences of stress
- Team coordination challenges
- Building of self-management skills

Trainees:

✓To increase familiarity with:

- More or less probable hazards and risks
- Understanding and experiencing the effects of fatigue
- Managing self-confidence

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Thank You

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Contact: dchionis10@yahoo.com, nektkar@gmail.com

Connect: dimitrios-chionis-psycho, nektarioskaranikas