Lessons Learned from an International Airport Safety Competition: A Risk Analysis Approach

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Outline

ATAERA and Africa Safety Challenge
Student Team’s Approach
Lessons Learned
Ramp Safety Matters

Every year, every where:

• 243,000 people are injured
• US$10 Billion in ramp accidents by major airlines.

ATAERA: Africa Safety Challenge

Air Transport and Aeronautics Education and Research Association (ATAERA)

- Network of 11 aviation programs across the globe working together in education, research and partnerships with the aviation industry.

6 month timeline November 2017-April 2018.

14 students teams from 7 universities learned from international airport experts about improving ramp safety.

3 finalists prepared a report and 7-minute video.

1 team selected to implement plan at Kigali Airport.
Africa Safety Challenge: Kigali International Airport

- 600,000 passengers and 12,097 flights annually (2014)
- 50% air traffic growth in 2012 - highest in East Africa

www.Rwandan-flyer.com
Develop a plan to improve ground operations safety at Kigali Airport. Specifically, the ground handling during aircraft turn around process.

Student Team from Purdue MS Aviation and Aerospace Management program

Caroline Marete (Kenya; Fulbright Scholar)
Qiaoxu Ye (China)
Joshua Shipman (Indiana)
Esteban Aguirre (Ecuador)
Mary E. Johnson, faculty sponsor
Deliverables

- Risk analysis of ground handling
  - Potential measures to improve safety & efficiency.
    - **Five measures specific to Kigali Airport**
      - Outline for a five day training workshop with a 7 minute safety training video
Approach to Develop Training Plan

Step 1. Describe the System
Step 2. Identify Hazards
Step 3. Analyze Risk
Step 4. Assess Level of Risk
Step 5. Prepare Mitigation Actions
Step 1. Describe the System

Aircraft ground handling process:

**Mission** – Safe operations

**Man** - The people

**Machine** – Equipment

**Management** – supervisory

**Media** – Environment

Photo credit: Dave Proffer
Step 2. Hazards Identification

• Created a process map.

• Listed possible hazards divided into 5 categories: Personnel, Equipment and Property, Ecological, Reputation and mission.

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Outcome</th>
<th>Common Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate lighting on ramp</td>
<td>Physical injury to personnel</td>
<td>Enhanced lighting/flashlight (Torch lighting)</td>
</tr>
<tr>
<td>Lack of appropriate supervision for human resources</td>
<td>Higher probability of error</td>
<td>Ensure a supervisor on site</td>
</tr>
<tr>
<td>GSE operators speeding</td>
<td>Vehicle accident, contact with AC</td>
<td>Speed control bumps</td>
</tr>
<tr>
<td>Lack of proper Personal Protective Equipment (PPE)</td>
<td>Exposure to injury and/or toxic material</td>
<td>Ensure proper operator gear</td>
</tr>
<tr>
<td>Deviation from SOP</td>
<td>Physical Injury, compromised safety</td>
<td>Provide documents on site</td>
</tr>
</tbody>
</table>
Step 3. Analysis of Potential Risks

Assigned Risk Assessment Codes from A to E based on severity. Assigned a likelihood from 1 to 5

Example: Hazard of damage to equipment and property

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Severity</th>
<th>Likelihood</th>
<th>RAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOD on Taxiway and Ramp area</td>
<td>B</td>
<td>4</td>
<td>4B</td>
</tr>
<tr>
<td>Ground equipment left unattended</td>
<td>B</td>
<td>2</td>
<td>2B</td>
</tr>
<tr>
<td>Equipment out of calibration</td>
<td>C</td>
<td>2</td>
<td>2C</td>
</tr>
<tr>
<td>Improper loading of the cargo into the cargo compartment</td>
<td>C</td>
<td>4</td>
<td>4C</td>
</tr>
<tr>
<td>Improper placing of the passenger stairs</td>
<td>B</td>
<td>5</td>
<td>5B</td>
</tr>
</tbody>
</table>
**Step 4. Assess Level of Risk**

<table>
<thead>
<tr>
<th>Severity Likelihood</th>
<th>No Safety Risk (E)</th>
<th>Minor (D)</th>
<th>Major (C)</th>
<th>Hazardous (B)</th>
<th>Catastrophic (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequently (5)</td>
<td>5E</td>
<td>5D</td>
<td>5C</td>
<td>5B</td>
<td>5A</td>
</tr>
<tr>
<td>Probable (4)</td>
<td>4E</td>
<td>4D</td>
<td>4C</td>
<td>4B</td>
<td>4A</td>
</tr>
<tr>
<td>Remote (3)</td>
<td>3E</td>
<td>3D</td>
<td>3C</td>
<td>3B</td>
<td>3A</td>
</tr>
<tr>
<td>Extremely Remote (2)</td>
<td>2E</td>
<td>2D</td>
<td>2C</td>
<td>2B</td>
<td>2A</td>
</tr>
<tr>
<td>Extremely Improbable (1)</td>
<td>1E</td>
<td>1D</td>
<td>1C</td>
<td>1B</td>
<td>1A</td>
</tr>
</tbody>
</table>

**Low** – No action required  **Medium** - Monitor, determine if Risk can be Mitigated to a Low RISK  **High** - Must be Mitigated to a Medium Risk

Figure 2. 5x5 risk analysis matrix with RAC codes.

Adapted from FAA Advisory circular *AC120-92B: Safety Management System for Aviation Service Providers*. P. 25
## Step 5. Prepare Mitigation Actions

<table>
<thead>
<tr>
<th>FOD on Taxiway and Ramp area</th>
<th>4B</th>
<th>Damage to AC</th>
<th>Conduct FOD walks with ground crew. Develop FOD awareness among the personnel.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deviation from SOP</td>
<td>4D</td>
<td>Physical Injury, compromised safety</td>
<td>Provide detailed documents on site. Assign investigators to record and report any violations to the safety management. Enhance Safety culture training among ground crew members.</td>
</tr>
<tr>
<td>Birds crossing the taxiway</td>
<td>4C</td>
<td>Damage to aircraft engines</td>
<td>Implement bird activity monitoring and deterrent strategies. Analyze bird population trends and enhance airport habitat management. Use of Radar for real-time detection.</td>
</tr>
</tbody>
</table>

**Effectiveness:** Reliability to reduce the risk.

**Cost/benefit:** Do benefits outweigh the costs?

**Practicality:** Available Resources: Technology, finances, administrative, operational capacity
Step 6. Monitor and Review Progress to the Plan

- Are the mitigation actions in place and having the desired outcome?
  - Reassessing the risk based on observations or trends of performance indicators.
  - Checking for unintended outcomes or creation of new hazards.

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Lessons Learned

• Working with diversified teams
  • Team of students from four different countries.
  • Diverse team of experts.
• Collaboration in solving aviation safety challenges: academia, industry experts, volunteers.
• Safety issues are a global challenge in aviation.
• Practical problem solving approach.
• Experts sharing experiences: Expert webinars.
• Safety takes time.
How can we apply the lessons to other airports?

• This approach is applicable to airports of all sizes globally.
• Encourage collaborations between different aviation stakeholders.
• Engaging aviation students – NEXTGEN of aviation professionals to engage in practical problem solving challenges in the global aviation industry.
  • Different points of view on the organization culture.
  • Creative approaches.
  • Practical learning applied to a real airport challenge.
• Expert input is critical to project success.