

# Human Factor Issue – Glare Effects towards Airline Personnel

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*Abstract: The main objectives of this research are to identify the factors and effects of glare that could grave consequences towards the airline personnel and discuss effective, economical preventive measures; especially pilots and technicians. This research focuses on 102 airline personnel; consisting of pilots, ground handling services staffs, and line maintenance workers of a major airline in Malaysia who were stationed at Kuala Lumpur International Airport (KLIA) and Penang International Airport (PIA). A quantitative approach has been utilized to measure not just the awareness levels of glare effects, but also possible innovative ways to avoid glare effects. A validated, customized questionnaire involving Likert-scale and open-ended questions was successfully distributed and returned. Overall, the results showed that glare effects have been critically affecting their work during the day and night. In addition, several staffs have revealed several cases of eye hazards caused by prolonged glare effects. This has imposed the airline company to implement precautionary steps extensively, e.g. always impose the ruling of wearing shades, apply safety tints on glasses and windows around the working sites, and usage of special paints which do not reflect sunlight. It is hoped that more researchers and aviation companies can collaborate with safety equipment industries to innovate not just effective, but also economical solutions for preventing glare effects.*

## I. BACKGROUND

Vision is the basic function of the eyes. It is a state of being able to see. If there is no vision it means human are blind. Hence, if there is an excessive lighting enters the eyes it leads to glare.

Table. 1 Unsafe Acts

Contributory Factors	Airline	Non-Airline
Pressure	21%	23%
Fatigue	13%	14%
Vision	9%	10%
Environment	5%	1%

Based on the Table 2.1, vision is categorized as one of the contributory factors for unsafe acts.

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## II. METHODS

This research will be utilizing only on the quantitative research methodology. The instruments used to collect the data is questionnaire.

A set of questionnaires are expected to have fifteen to twenty questions which will be divided into 5 sections. Different question-types, such as listing/choice, Likert-scale and open-ended questions will be used in the questionnaire. The different sections of questionnaire are:

- Demographic information,
- Factor and Effect of Glare
- The possible ways to avoid glare

During the actual data collection, the questionnaire will be distributed at Kuala Lumpur International Airports (KLIA) and Penang International Airports (PIA) on Malaysia Airline Berhad (MAB) such as the hangar, ATC tower and other various location. Respondents were approached with an initial question of whether they have experienced light distraction (glare), before the questionnaire be given to them. All the respondents will be required to complete the questionnaire on the day and time itself to avoid any postponement on the research and to avoid from disturbing the respondents time and work. The following are the results of the data collected among 102 respondents which are the from various department which are the pilots, air traffic controller, ground handling workers, maintenance workers who are working at Penang International Airport (PIA) and Kuala Lumpur International Airport (KLIA). This survey is intended to find out the statistic on the glare issues towards the airline personnel.

## III. RESULTS

Table. 2 Question 1

Q1: Glare is distracting my vision
Analysis: 42 (41.2%) respondent agree that glare is distracting their vision. It might be because of the intense light that penetrates their eyes that causes reduction in visibility and annoyance to their eyes. As the annoyance occur at their eyes, they hardly can see clearly so it may be the biggest reason why they agree with it. Only a small number of respondents which are 2 (2%) respondent out of 102 respondents implied that they strongly disagree that glare has been distracting their vision. The different reason that lead to this most least number of respondents might be because they work indoors instead of outdoors. Therefore, there is high possibility they would not be expose to any sunlight.

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**Table. 3 Question 2**

<b>Q2: I suffered temporary vision loss after experienced the glare</b>
Analysis: 26 (25.5%) of respondents strongly disagree that they suffered temporary vision loss. It might be because, they did not see the bright light at a long period of time that could lead to vision loss. They might, see it for a short period of time only. However, there were 8 (7.8%) respondents strongly agree. This may be because of; their working time is different with the previous respondent. They might be at their workplace at a longer period that they expose to bright light for a longer time than others. When they were expose for a longer time, they can undergo temporary vision loss.

**Table. 4 Question 3**

<b>Q3: I undergo a severe impairment of eyes from the simulated of glare during take-off</b>
Analysis: 32 (31.4%) respondents strongly disagree. This might be because during take-off, the pilot did not been expose to too much of bright light since they need to focus more on the angle of aircraft while taking off. On the other hand, there are 2 (2%) of respondents strongly agree that they undergo a severe impairment. It might be because as they were taking off the aircraft, they were headed into the sun for a long time of period that makes the pilot undergo severe impairment.

**Table. 5 Question 4**

<b>Q4: I undergo a severe impairment of eyes from the simulated of glare during cruising</b>
Analysis: 42 (41.2%) respondents strongly disagree. This might be because they were flying during the night time where there was no sunlight or any bright light that will be distracting the pilot vision. Nonetheless, there were 4(3.9%) respondents strongly agree. It may be because the pilot might be flying into the bright sun for hours at a time and takes a serious toll on the pilot eyes.

**Table. 6 Question 5**

<b>Q5: I started to wear corrective lenses after experiencing glare</b>
Analysis: 34 (33.3 %) respondent strongly disagree. The first significant reason might be because they have been wearing the corrective lenses ever since working in airline. The difference reasons that lead to the previous reason is, they might not be expose to any intense or extreme light that needed them to wear any corrective lenses. On the other hand, there were 8 (7.8%) strongly agree and it might be because the respondent wants to see more clearly since their eyes has been dazzled and blurry after looking to much of light and also, they might want to achieve optimum visual performance without avoiding the light.

**Table. 7 Question 6**

<b>Q6: It takes me a long time to adjust the darkness after being in bright light</b>
Analysis: 36 (35.3%) respondents were neutral with it. Apart from that, the second highest are 22(21.6%) respondents actually agree that it did took a long time for them to adjust the darkness after being in bright light. While, the lowest percentage shows that there are 8 (7.8%) if the respondent strongly agree with it. This situation might be because of the dark adaptation. It typically takes between 20 and 30 minutes to reach its maximum depending on the intensity of light exposure from the surroundings. Therefore, it depends on each person eyes how long they can adapt to adjust the darkness.

**Table. 8 Question 7**

<b>Q7: Reflection of light that creates glare will make airline personnel difficult to read their instruments</b>
Analysis: 34 (33.3%) respondents. This situation might be because, most of the respondents were pilots and air traffic controller. Therefore, if any light or sunlight reflected to their screen or any smooth surface near their instrument, it will be difficult for them to read the instrument as there will occur of annoyance on their eyes. However, the last number of respondents which are 6 (5.9%) respondents disagree with statement above. It might be because they did not experienced glare while reading their instruments.

Out of 102 questionnaires been distributed, there were 42 responses for the open-ended question of how to reduce glare. The main reason for this section is to get the feedback from the airline personnel on their ideas and ways how they reduce glare once they experienced it. There was various feedback received, but one of the feedbacks with most respondents is wearing shades, spectacles. While one of the pilot's ways to reduce glare is wearing shades with uv400. This might be because UV400 sunglasses will protect your eyes from both UVA which is long wave ultraviolet and UVB which is short wave ultraviolet radiation. In contrast, the cost of it is quite pricey. There were also some ways received from this finding which are:

- Avoid shiny objects that has the reflection same as mirror. Using paint that can absorb the reflection
- Can reduce heat because sometimes glare cause by heat but the best way is having a glare vision at the glass or windows or windscreen
- Curtains in the flight deck
- Day flying use anti-glare and night flying use minimum brightness for flight instrument

Therefore, based from all the ways reducing glare, it clearly shows that it might help the airline personnel especially pilots for not experiencing any sever glare.



#### IV. CONCLUSIONS

To begin with, the first objective of this study has been able to show that human factor issues which is glare has distributed to aviation accidents. It clearly shown that with the presence of glare it leads to most impairment in the airline personnel ability to see their instrument, to fly their aircraft and unable to detect aircraft when take-off or landing when the glare was straight ahead or light reflection towards any smooth surface where it relates to the second objective. This situation is dangerous and can lead to accidents.

Therefore, with the ways to reduce the glare effects that majority of the respondent agreed on was it will minimize the effects of the glare and may have prevented some of the accidents identified in this study. Therefore, it shows that the two objectives have been achieved. On the other hand, one of the limitations of this research is that it only focuses on Malaysia Airline Berhad (MAB) airline personnel. Therefore, this study's finding only came from one airline. During this study, several promising research areas that require further in-depth analysis in future has been identified. It is recommended that further research be undertaken in the following areas which are ways to reduce the glare effects. It is because, based on this research studies it only achieved on how to minimize the glare instead of to reduce the glare effects itself. Next areas would be; this study be carried out not just on airline personnel from other airlines since this study had only focused on Malaysia Airline Berhad (MAB), but also from other departments<sup>3-21</sup> such as managements and maintenance. This can significantly relate the problem to everyone and expand the awareness in the aviation community.

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