

# Causes of Sleep Deprivation Among Aircraft Maintenance Personnel at Subang Airport

**Mohd Harridon, Muhammad Firdaus Mohd Nizam**

University Kuala Lumpur Malaysian Institute of Aviation Technology  
mdharridon@unikl.edu.my

**Abstract-** Aircraft Maintenance Workers that were sleep deprived produced outputs that were below par and not up to the standard. This affected safety and endangered lives of passengers. Thus it was imperative to analyze the causes of sleep deprivation. We had parlayed six causes of sleep deprivation to Aircraft Maintenance Personnel at Subang Airport and we had gauged and measured their responses. The responses were mixed but prominent causes of sleep deprivation had been identified and counter measures could take place to mitigate the causes.

**Keywords-** fatigue risk management system, aircraft maintenance error statistics, fatigue in aviation, over weight aircraft accidents.

## I. INTRODUCTION

In the Aviation Industry, safety is uttermost important. If aircraft are not well serviced, it would affect their airworthiness and degrade their form. Degradation would cause maladies and tragedies and subsequently would take precious lives. Thus it's vital for the men and women that overhaul the aircraft be at their best. Aircraft Maintenance Personnel that are sleep deprived are not at their fittest level and hence would be unproductive and eventually their workmanship standard would decrease.

Thomas indicated that individuals with sleep deprivation would not be able to concentrate effectively and their attention span is shorten by a significant value [1]. She had performed several experimentation upon 17 individuals and results had shown the brain activities of these individuals had decreased [1]. We were concerned about this phenomenon and this had propelled us to actuate this research. We had studied sleep deprivations of 126 Aircraft Maintenance Personnel that worked at Subang Airport Malaysia (Sultan Abdul Aziz Shah Airport). Jackson reiterated that workers that were sleep deprived had degraded the safety of the pertinent industries [2].

She further mentioned that several researches had outlined methodologies to predict the outcomes or productivity of sleep deprived workers [2]. This is of particular importance to us as safety and productivity are prominent in the Aviation Industry. Powell had also agreed with Jackson with regards to the decrease of safety due to sleep deprivation [3]. Powell had studied industrial personnel and results had shown that the performances of these workers had deteriorated and their propensities toward accidents had increased [3].

Yang had performed experimentation upon 12 individuals and he concluded that sleep deprived individuals would perform much slower than those that were not deprived [4]. He even induced different level of sleep depravity upon these individuals and results indicated that different level of sleep depravity would produce different level of performances [4]. This showed that our research is imperative and vital as performances of aviation workers were at stake. We had conducted our study using a 5 Point Likert Scale where the scale was extensively used by researchers in various fields. Maurer stipulated that the usage of Likert Scale is acceptable in a wide variety of fields and areas and the scale is robust enough to capture responses from various individuals [5]. Maurer had actuated analyses upon Likert Scale and had deduced that the scale is reliable within inter disciplinary fields [5]. Li inferred

that the Likert Scale is suitable to capture responses from numerous people [6]. Li had mentioned that there were several evolution of the scale where each evolution created "appropriateness" for the scale to be used in certain situations [6]. Li even produced a new form of Likert Scale that integrated fuzzy sets theory and the results were promising [6].

## II. LITERATURE REVIEW

We had indicated earlier that sleep deprivation had relegated safety to a detrimental state. Our notion was supported by Rosekind where he inferred that sleep deprivation had impacted safety and also created loss to employers in terms of monetary capital [7]. He stated that the loss amounted to approximately USD1967 per employee per year [7]. This is indeed a grave situation.

Vidacek concurred and stated that his sample of workers showed signs of decrease productivity when they were sleep deprived [8]. He sampled 53 female workers and studied their outputs and sleeping patterns and came out with a deduction which implicated productivity and safety [8]. Meltzer had screened 3831 individuals and he found out that these individuals had suffered from loss of productivity due to sleep depravity [9]. Meltzer also confided that these individuals had also experienced degraded cognitive functions and their erratic sleep patterns were to be blamed [9].

The conclusions by Meltzer were an eye opener to us and we were significantly confident of the impact of our research. Even Stull shared our view. Stull had studied 404 people with sleep disorders and inferred that these disorders had caused fatigues among these 404 individuals and these fatigues led to loss of productivity and created safety concerns [10].

Gamez had studied 182 respondents that were sleep deprived and the study concluded that productivity had suffered due to sleep related predicaments [11]. Gamez used questionnaires in his study and he gained responses which were somehow akin to responses of Likert Scale. We followed suit where our research utilized Likert Scale. Woods stated that those with sleep depravity were susceptible to fatigue and this eventually led to unproductive outputs during work [12]. Woods also pointed out that the fatigue had also affected the quality of lives of these individuals as well [12]. We can clearly see

that sleep deprivation is a gruesome symptom that should be addressed, especially for those in the Aviation Sector where safety is paramount.

As mentioned earlier, our research utilized the 5 Point Likert Scale which had captured the nuances and general feelings of our respondents. The robustness of Likert Scale had made it popular among scientists and researchers. Laerhoven had discreetly analyzed the Likert Scale and he deduced that the simple nature of the scale provided researchers the ability to unearth answers from their respondents. Laerhoven gave an example of children that had preferred to answer Likert Scale in contrast to other scales [13].

Chomeya stipulated that the Likert Scale has the ability to quantify opinions of individuals and the ease of it was attractive to social scientists [14]. Chomeya further reiterated that personal attitudes of individuals toward certain issues were easily captured by the Likert Scale where the scale had retained sufficient reliability to actuate measurements [14]. Komorita agreed with Chomeya and had inferred the adequateness of the Likert Scale to gauge personal attitudes of people [15]. Komorita held the belief that the scale is a method to provide ratings to certain subjects and the ease of implementing the scale had made it popular [15]. We held similar belief and our approach of using the Likert Scale was validated by the summation of positive reviews towards the scale. Furthermore our scale was adaptable to the current scenario or environment at Subang Airport.

## III. METHODOLOGY

The investigation process to obtain the causes of sleep deprivation is shown in Figure 1.

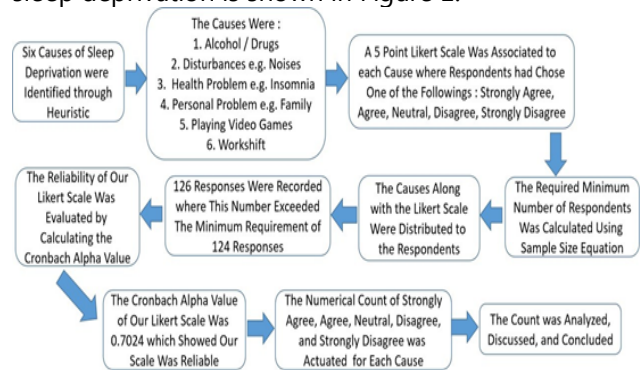


Figure 1 The Methodology to Obtain the Causes of Sleep Deprivation.

We had identified the contemporary causes of sleep deprivation through heuristics and we had arbitrary chosen 6 causes that had been parlayed to the respondents. Those 6 causes were : Alcohol / Drugs, Disturbances, Health Problem, Personal Problem, Playing Video Games, and Workshift. Each cause had been represented by a 5 Point Likert Scale where respondents had chosen either Strongly Agree, Agree, Neutral, Disagree, or Strongly Disagree as their answers.

We had calculated the required minimum number of respondents for our research and the calculation was done via Sample Size Equation. The values that were inserted into the equation were : Population Size = 500, Confidence Level = 80%, and Margin of Error = 5%. The Population Size is the total number of Aircraft Maintenance Personnel at Subang Airport.

There were numerous aviation companies that actuate aircraft maintenance at Subang Airport and thus to gain an exact value of the total number of Aircraft Maintenance Personnel at Subang Airport is quite difficult. Based upon several interviews with personnel at Subang Airport, the total number of Aircraft Maintenance Personnel was approximated to be around 300 to 500. We took the higher value to be our Population Size in order to be safe.

Our calculation showed that we require 124 responses. Our Likert Scale was distributed to the maintenance workers at Subang Airport and we had managed to obtain 126 responses which exceeded our minimum requirement. We then proceeded to calculate the reliability or the consistency of our scale. Through calculation, the Cronbach Alpha value of our Likert Scale was 0.7024. This indicated that our scale was reliable.

For each cause that was parlayed to the respondents, their responses which consist of Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree were counted. The numerical counts were then analyzed, discussed, and concluded.

#### IV. RESULTS

Figures 2, 3, 4, 5, 6, and 7 show the results in graphical form.

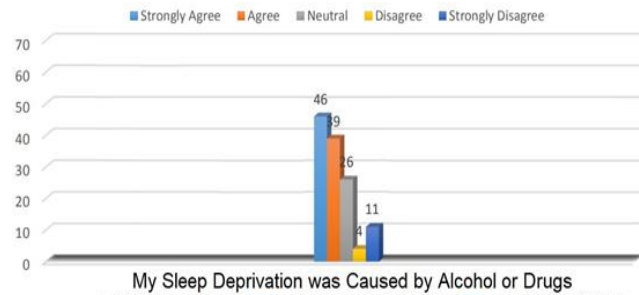


Figure 2 Alcohol or Drugs.

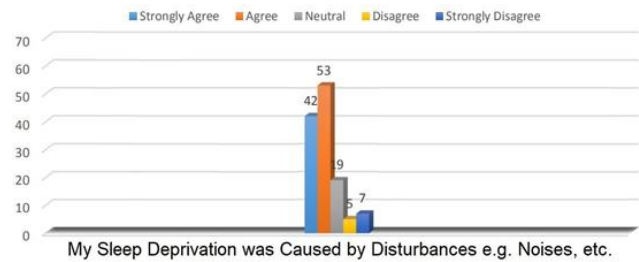


Figure 3 Disturbances.

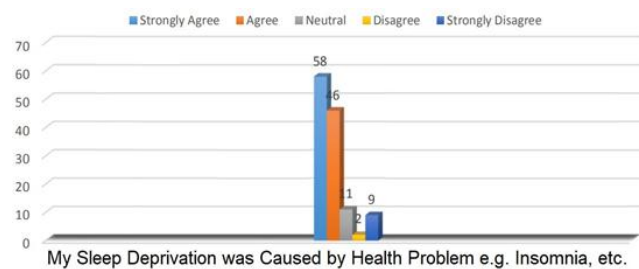


Figure 4 Health Problem.

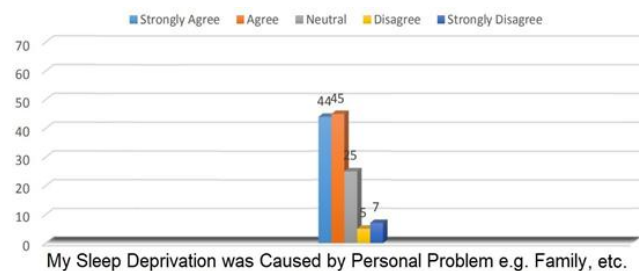


Figure 5 Personal Problem.

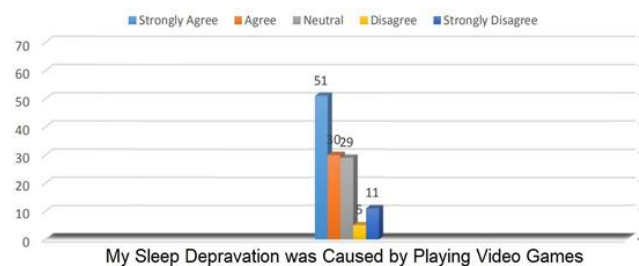
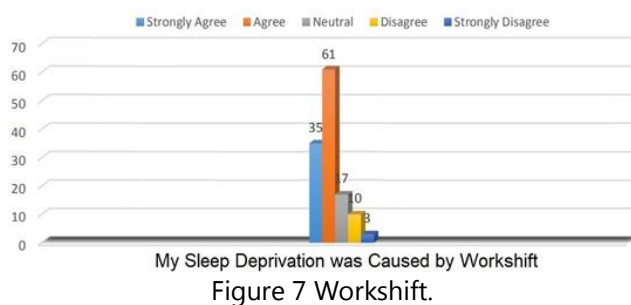


Figure 6 Playing Video Games.



## V. DISCUSSION

Looking at Figure 2, a great number of respondents had strongly agreed that alcohol or drugs had disturbed their sleeping patterns which subsequently impaired them during work. Only 4 respondents disagreed and 11 respondents strongly disagreed. We found this disturbing and perhaps a sobriety campaign could be actuated to mitigate this issue and eradicate unwanted predicaments.

Figure 3 showed that a majority of the respondents (95 respondents) had indicated that disturbances had played a role in depriving them of sleep. These disturbances were denoted as noises from various sources such as noisy neighbours, moving cars, loud music, and others. This might show us that most personnel were living in places that were clad with noise pollution.

Peering Figure 4, we discovered that 104 respondents had been deprived of sleep due to their health conditions. This represented 82.5% of the total respondents. This a grave situation and it would be fruitful if relevant authorities or employers install a health or fitness programme at the workplace to eradicate this issue. Eradication would eventually lead to higher productivity and higher standard of safety.

Figure 5 showed that personal problem had played a major role in depriving sleep of most of the workers. 70.6% of the total respondents had denoted this as an issue. We can perhaps postulate that personal problems were factors that contributed to the declination of the work standard of Aircraft Maintenance Personnel. Implementation of counselling sessions is one of the ways to deter this problem from snowballing and having an impact towards the workmanship of the workers.

A great number of respondents (81 respondents) had also indicated that playing video games had impacted their sleeping patterns. This is a leisurely activity but it seems to be out of control where the activity had interfered with the sleep schedules of the workers and eventually imparting disturbances toward the quality of work of the workers.

It is interesting to note that the workers workshift had contributed to the depravity of sleep of a majority of the workers. Only 13 respondents were not affected by the workshift. The work schedule of the workers should perhaps be revised in order to gain optimum performance from the workers. Having workers that are groggy coming into work is unacceptable because these workers would perform poorly in their jobs.

## VI. CONCLUSIONS

It can be seen that several factors had cause sleep depravity among Aircraft Maintenance Personnel. We have put forth 6 causes of sleep depravity to our respondents and a majority of the respondents agreed or strongly agreed with these 6 causes. A benign activity such as playing video games seemed to be affecting the sleep patterns of the aviation workers and subsequently affecting their productivity and outputs. We were also concerned that personal problem had also played a role in decreasing the worker's performances at work and this eventually was denoted as a safety issue. Sleep deprived workers are prone to mistakes and mistakes would cause aircraft to malfunction and somehow lead to tragedies and mishaps. We had parlayed several recommendations in the Discussion Section and it would be best for relevant parties to implement the stated recommendations.

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