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Overview Of Approach Control Unit Cabin Facilities Related to Noise

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Abstract— **As an ATC, we should be able to give our full focus when providing air traffic services. If we cannot focus when working due to noise in the cabin, then the safety of the aircraft can also be threatened. Therefore, an ATC should get a work environment that can support his performance so that he can work optimally. This article delves into the challenges encountered by Air Traffic Controllers (ATCs) during their duties at the Tarakan Approach Control Unit, a crucial component of Juwata International Airport in Tarakan, North Kalimantan, Indonesia. The study revolves around the adverse effects of excessive noise levels within the ATC cabin on controller performance and aviation safety. Through qualitative descriptive methodology, this study explores the factors contributing to the noise problem within the Tarakan APP cabin. It identifies two major sources of noise: gaps in windows and doors, permitting external sounds to infiltrate the cabin, and the lack of sound insulation in the flooring. The results section introduces alternative solutions proposed by the author to mitigate the noise issue and enhance the ATC work environment. These solutions encompass the use of headsets, transitioning to a Voice Communication Control System (VCCS), installing sound-absorbing materials on the cabin floor, and incorporating UPVC to seal gaps in windows and doors. In conclusion, this study highlights the critical need for an enabling work environment that supports ATCs in ensuring aviation safety. The author encourages relevant authorities to consider and implement the proposed solutions to establish a more efficient, effective, safe, and comfortable air traffic control environment at Tarakan APP, ultimately benefiting air navigation services.**

Keywords— Noise, environment, air traffic

I. INTRODUCTION

Tarakan is a city located in the province of North Kalimantan. This city is separated from the island of Borneo, which makes it accessible only by sea and air routes. The city of Tarakan, one of the largest cities in North Kalimantan, which has natural resources in the form of oil is often only known as a transit city [1]. Within this city, there is an airport that serves as the main entry and exit point, known as Juwata International Airport. Due to air transportation being a significant mode of travel in Tarakan, flight safety measures are of utmost importance at Juwata International Airport.

In accordance with Law No. 1 of 2009 [2] concerning Aviation, which states that Aviation Safety is a condition in which safety requirements are fulfilled in the use of airspace, aircraft, airports, air transportation, flight navigation, as well as supporting facilities and other public facilities. Based on this regulation, it can be concluded that aviation safety is an important aspect needed in the aviation world. Since Airnav Indonesia is the only single Air Traffic Service provider, Airnav Indonesia needs to play a role in ensuring aviation safety. In providing air navigation services, one important factor that supports the maximum performance of an Air Traffic Controller is the presence of supporting facilities. Therefore, when facilities are in place, air navigation service will be optimal. During the On The Job Training at AirNav Indonesia Tarakan Branch at the Tarakan Approach Control Unit, the author encountered issues that were considered challenges in providing air traffic guidance services at the AirNav Tarakan Branch. There are several factors that contribute to the discomfort experienced by ATCs while providing air traffic services, even though the comfort of ATCs while delivering air traffic services is crucial. Therefore, the approach control cabin at AirNav Tarakan Branch should possess ergonomic value to support ATC performance, allowing them to provide optimal service in accordance with DOC 4444 Air Traffic Management, Chapter 2 [3], The environmental working conditions should meet established levels for temperature, humidity, ventilation, noise, and ambient lighting, without adversely affecting controller performance. Noise is any unwanted noise originating from a production process device or a working device that may, to a certain extent, cause hearing impairment [4]. The issue the author faces in providing air traffic services is the noise occurring within the cabin space, which impacts the clarity of hearback. The readback/hearback protocol is a communicative procedure used to minimize the risk of communication errors over the radio or telephone in high-risk environments [5]. While a controller's hearback of the pilot's readback is intended to ensure that the pilot 'got it right', it also offers an opportunity to help ensure that the controller gave it right [6]. Below is the data that the author collected while controlling in the Tarakan APP cabin.

Figure 1. Data results

As seen in the above image, the data collected by the author over a span of 71 seconds shows an average noise level of 75 dB, with a maximum noise level of 83 dB and a minimum noise level of 39 dB. This, of course, does not align with the Human Factor Digest 8 [7], which states High noise levels are not conducive to efficient air traffic control, especially during co-ordination and liaison when background noise may be carried via radios or telephones to the pilot in the cockpit or to controllers working in other positions. Loudspeakers in ATC environments are not recommended for routine use. Silent ventilation, carpeting, sound-absorbent plasters and curtains, and good attenuation of the workspace to preclude noise from aircraft or other external sources are the main practical means to reduce the ambient noise level in the room, preferably to 55 dB or thereabouts. Therefore, excessively high noise levels can lead to issues in the ATC work environment, and the noise level should ideally not exceed 55 dB. The factors that cause noise in the approach control cabin of AirNav Tarakan Branch include:

1. Gaps in windows and doors within the working area of the APP unit cabin.

   During the provision of air navigation services, an issue was identified regarding non-soundproof windows. This allows loud noises from the exterior of the Perum LPPNPI Tarakan Branch building to enter the cabin space through gaps along the edges of the windows in the APP cabin. The noise disturbance can disrupt the controller's performance and significantly affect hearback.


Figure 2. Window gap

Noise from outside the Perum LPPNPI Tarakan Branch building can also disturb controllers. This is due to the APP cabin being located on the second floor of the Perum LPPNPI Tarakan Branch building, positioned close to the entrance road to the airport. As a result, vehicle noises and rain can also enter the APP cabin space. This occurs because there are still gaps in the windows of the cabin space. Conversations outside the APP cabin can also disrupt controllers, as there are gaps in the door of the APP cabin. Since the APP cabin shares the same roof as the Perum LPPNPI Tarakan Branch office, noise from the office can enter the cabin space during office hours.

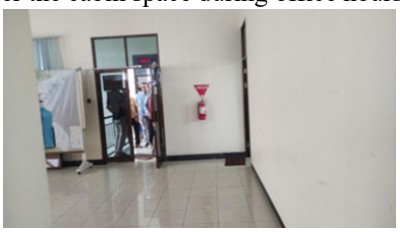
Figure 3. People talking outside the cabin

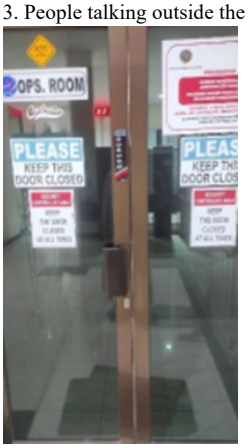

Figure 4. Door gap

2. Flooring within the working area of the APP unit cabin.

   The flooring condition in the APP unit cabin has not been equipped with sound insulation, resulting in reverberation of the existing noises within the room. Additionally, the APP cabin has not employed carpeting to minimize sound disturbances, as mentioned in Human Factor Digest 8 regarding workspace design. Even when using direct speech to communicate with the Malinau unit, our voices tend to echo on the telephone.


Figure 5. Floor & Direct Speech at approach cabin

These things can interfere with ATC concentration so that performance is not maximized, especially during peak hours where an ATC is required to provide more performance, therefore focus and comfort are needed. An ATC cannot clearly hear information from the pilot so that the hearback is not maximized. Pilots and controllers share responsibility for safely and effectively coordinating air traffic, and work together to achieve it [8]. If the hearback is not maximized then the performance is not maximized, Work environment influences an individual's performance and situation awareness [9]. therefore this noise is something that must be addressed.

II. METHOD

For this study, the qualitative descriptive method was chosen as the best method to conduct the research. This approach works well when the main goal is to give a simple and clear explanation of something. With a qualitative descriptive approach, researchers focus on understanding the basic details. To find out who was involved, what happened and where it all happened. This approach is ideal for getting a clear idea of things.

A qualitative descriptive approach needs to be the design of choice when a straight forward description of a phenomenon is desired. It is an approach that is very useful when researchers want to know, regarding events, who were involved, what was involved, and where did things take place [10].

During the author's stay at the research location the author observed and recorded things needed to support this research. By adopting a qualitative approach and using observational data collection, it will yield deeper insights and solutions. This method allows the researcher to dig below the surface and gain insights into the subject.

III. RESULT

In order for the provision of flight navigation services to be maximized, of course, problems that arise must be resolved immediately. Based on the description of the problem above, the author provides alternative problem solving from the author's point of view while undergoing On The Job Training at AirNav Tarakan, among others:

1. Use a headset when communicating between the controller and pilot.

   So as to minimize the occurrence of Breakdown Of Seperation (BOS) and breakdown of coordination (BOC). In addition, the use of this headset can reduce the noise that occurs in the Tarakan APP cabin room.
2. Changing Direct Speech to VCCS

   By using VCCS, communication between units no longer needs to use direct speech, so as to reduce noise.
3. Installation of sound absorbers on the APP cabin floor.

   This silencer is in the form of a carpet that is useful for absorbing noise that enters the APP cabin room. In addition, the use of this carpet can overcome sound reflection so that during the transfer of information to other ATS units does not occur echoing.
4. Install UPVC to cover the gaps in the windows and doors.

   With gaps in the windows and doors, sound from outside the APP cabin can enter, by installing UPVC in the gaps, it is expected to overcome this problem.

IV. DISCUSSION

During the author's on the job training at Tarakan APP unit, the author extracted the necessary information at Tarakan APP unit. This is supported by a journal which states that interviews for research purposes only need to focus on extracting information from one side only [11]. The author provides information related to problems that are often experienced by the author during field practice, namely the author often gets bad hearback when controlling air traffic at Tarakan APP. This can happen because the noise in the Tarakan APP unit has exceeded the threshold that should be, this is evidenced by the data that the author took on November 24, 2022.

Noise greatly affects the workload and mental health as ATC, it is supported by the article that the author cites that noise can cause damage to health and decreased productivity [12].

One of the solutions that the author suggests is to add a damper for the floor so that the sound from the navigation equipment does not reflect, this is also supported by an article that reads Install sound absorbers on the walls, floor, roof, and frame of the Tower cabin to eliminate noise entering the Tower cabin [13].

In addition, the author also provides a solution for the use of headsets in direct speech so that the hearback is clearer, this is supported by an article that reads The use of headsets to eliminate noise from noise sources and minimize the occurrence of miss communication or miss coordination [14].

VCCS is also recommended because it can reduce the sound from direct speech, because direct speech is very noisy when a unit contacts. This solution is supported by an article I found The low noise of the terminal devices is one of the important features of digital voice communication control systems (VCCS) used for air traffic control [15].

Then the last solution that the author provides is the installation of sound absorbers such as UPVC on the windows so that there are no gaps in the windows, so that the sound from outside the cabin can be muffled, because the Tarakan APP cabin space is close to the airport entrance. This solution is supported by an article that reads Installing UPVC to Close gaps in windows and doors. So that there is no air gap in the cabin room that allows noise to enter the cabin room [16].

V. CONCLUSION

As an ATC, we should be able to give our full focus when providing air traffic services. If we cannot focus when working due to noise in the cabin, then the safety of the aircraft can also be threatened. Therefore, an ATC should get a work environment that can support his performance so that he can work optimally.

The author hopes that the noise of the APP cabin room at Perum LPPNPI Tarakan Branch can be immediately followed up by the relevant parties and the alternative solutions can be studied more deeply and the author hopes that the alternative problems that the author conveys can be used as material for consideration, so that it is hoped that this problem can be quickly overcome in order to create effective, efficient, safe and comfortable flight navigation services.

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