

The Role of ATC's Situational Awareness in Wildlife Hazard Handling at the Aerodrome Control Unit Tower

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Abstract—The handling of wildlife hazard is an important aspect in ensuring flight safety at the Aerodrome Control Tower Unit of AirNav Indonesia, Denpasar's Branch. In this context, situational awareness becomes a key factor that influences decision-making and actions of ATCs regarding *wildlife hazard*. This research aims to analyze the role of ATC's situational awareness in handling wildlife hazard at the mentioned unit. Data collection methods include field observations, interviews, and document analysis. The research findings indicate that wildlife hazard incidents at the I Gusti Ngurah Rai International Airport are quite high, but the lack of detection by ATCs poses a problem that can disrupt the smooth flow of air traffic services. This is primarily due to high *workload* and insufficient situational awareness of the dangers posed by wildlife hazard. Recommended solutions include conducting regular briefings, launching campaigns on wildlife hazard awareness, and enhancing *situational awareness* among ATCs. The research results are expected to provide insights and recommendations for improving flight safety concerning *wildlife hazard* at the Aerodrome Control Tower Unit of AirNav Indonesia, Denpasar's Branch.

Keywords— *wildlife hazard, situational awareness, ATC*

I. INTRODUCTION

In the aviation industry, aviation security is a top priority. One important aspect in maintaining flight safety is the handling of *wildlife hazard*, namely the potential danger posed by the presence of animals around the airport area. At the *Aerodrome Control Tower* AirNav Indonesia Denpasar's Branch, handling wildlife hazards is the responsibility of the *air traffic controller* (ATC) in ensuring smooth flight operations.

In general, *situational awareness* is an important component in decision making by understanding the situation to anticipate any changes in the situation [1]. *Situational awareness*, or situational awareness, within the scope of ATC is a key factor that influences the quality of decision making and actions taken by ATC in dealing with *wildlife hazards*. Situational awareness refers to a deep understanding of the operational environment and

surrounding conditions, including the presence of wild animals and the potential hazards they can cause.

This research article aims to analyze the role of ATC's situational awareness in handling wildlife hazard at the AirNav Indonesia *Aerodrome Control Tower* Unit, Denpasar's Branch. This research was conducted with the aim of providing better insight into the importance of situational awareness in minimizing the risk of wildlife hazard and improving flight safety.

Increasing ATC's situational awareness can assist in detecting the presence of wild animals, identify potential hazards that may occur, and take appropriate action to reduce the risk of collisions between aircraft and wild animals. In the context of the Denpasar's Branch of the AirNav Indonesia Tower Aerodrome Control Unit, increasing situational awareness can also involve a better understanding of the habits and migration patterns of wild animals around the airport, so that effective prevention measures can be implemented.

The location of this research was carried out at I Gusti Ngurah Rai International Airport, especially at the *Aerodrome Control Tower* (TWR) Unit of the Denpasar's Branch of the Denpasar's Branch of Aviation Navigation Service Provider or better known as the Denpasar's Branch of Airnav. The Denpasar's Branch of the Airnav *Aerodrome Control Tower* (TWR) Unit has the responsibility providing Aerodrome Control Services in the vicinity of the aerodrome and maneuvering area of I Gusti Ngurah Rai International Airport. Air Traffic Controller (ATC) has the goal of air traffic services namely "five objectives of Air Traffic Services" by providing safe, comfortable and efficient air traffic services.

Based on researchers' observations and data on the ATS Operational Logbook Unit *Aerodrome Control Tower* Airnav Indonesia Denpasar's Branch from November 2021



to January 2022, there were 11 (eleven) recorded events related to disturbances caused by wild animals / *Wildlife Hazards* (attached). This shows the relatively high intensity of disturbances caused by wild animals and flocks of birds at I Gusti Ngurah Rai International Airport in the last three months [2].

Of the many incidents recorded above, one of them was a bird strike that was experienced by an A320 aircraft owned by AIRASIA airline with flight number AWQ7526 for the Jakarta - Denpasar route on December 26 2021. This incident was experienced by the plane during landing at I Gusti International Airport Ngurah Rai. It was reported that the bird strike caused a domino effect on delays that occurred in navigation services because it caused a runway inspection to be held, causing other departing aircraft to be delayed. In addition, aircraft that experience bird strikes must also be repaired, which of course requires extra time. Not only causing damage, this can also be a threat to flight safety [3].



Fig 1. AWQ7526 Aircraft Engine Inspection After the Birdstrike Incident



Fig 2. Post Birdstrike AWQ7526 Aircraft Engine Inspection Results

In ICAO 4444 Air Traffic Management chapter 7.1.1 letter e, it is explained that the *Aerodrome Control Tower* Unit has the responsibility of providing information, instructions and clearance to aircraft in its pilot area to maintain safety, speed up and expedite the flow of air traffic in the vicinity of the aerodrome by prevent collisions between aircraft in the maneuvering area and obstructions in that area. More specifically explained in note point 7.4.1.4 regarding runway incursion or obstructed runway, that animals and flocks of birds can become an obstacle in connection with runway operations [4].

Based on the events and documents above, we know that disturbance by wild animals is a threat to aviation safety, the responsibility of preventing aircraft collisions with obstructions (wild animals) in the duty area is one of

the responsibilities of ATC officers, this has an impact on air traffic services and improves ATC officer workload [5].

The threat relationship that exists in service, responsibility, effectiveness, workload and flight safety is indirectly related to the level of situational awareness of ATC officers on duty. Based on the description above, the researcher takes the subject of discussion in this study, namely "The Role of ATC's situational awareness in the Handling of *Wildlife Hazards* at the Aerodrome Control Unit Tower AirNav Indonesia, Denpasar's Branch". Because situational awareness is an important determinant of success in implementing air traffic control [6].

Through this research, it is hoped that the factors that influence *situational awareness* of ATC in handling *wildlife hazard* can be identified. In addition, the results of this study can also be the basis for developing better training and work methods in increasing ATC's situational awareness at the AirNav Indonesia *Aerodrome Control Tower* Unit, Denpasar's Branch [7].

With a better understanding of the role of *situational awareness* of ATC in handling *wildlife hazard*, it is hoped that flight security at the *Aerodrome Control Tower* AirNav Indonesia Unit Denpasar's Branch can be improved. In addition, this research can also contribute to a broader understanding of *wildlife hazards* in the aviation industry, as well as provide input for the development of policies and best practices in handling them [8].

II. LITERATURE REVIEW

Situational awareness is the ability to make good decisions that are influenced by several factors such as workload, stress level, fatigue, skills, expertise, individual training to perform both cognitively and physically, tactics, doctrine, procedures that influence how people act towards *situational awareness* them, and other system and environmental constraints that can affect performance results [9]. *Situational awareness* can be applied to Air Traffic Control (ATC) officers and can be used to measure the effect of increased taskload on ATC [10].

Air Traffic Control (ATC) is a system that relies heavily on the ability of human operators to manage safe flights [11]. The definition of *wildlife hazard* is very broad and can involve anything that has a negative impact on aircraft caused by disturbances to fauna during flight operations, usually this *wildlife hazard* is caused by bird attacks that around the flight path of the aircraft [12].

III. METHODOLOGY

In this study, the data collection method was carried out through a combination of three methods, namely field observations, interviews, and document analysis. Field observations were made to directly observe work practices related to research phenomena. Meanwhile, interviews were used to gain a deeper understanding from the perspective of the respondents regarding this phenomenon. In addition, document analysis was carried out to collect and evaluate data contained in documents related to

research. By combining these three methods, researchers can obtain comprehensive and in-depth data [13].

A. Data Collecting

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

Observation is one of the empirical scientific activities that bases both field and text facts, through sensory experience without using any manipulation [14]. Researchers conducted direct observations at the Aerodrome Control Unit of the AirNav Indonesia Tower, Denpasar's Branch. This observation was conducted to observe and record ATC work practices related to *wildlife hazard* handling. This includes monitoring the interaction between ATC and wild animals, using tools such as radar to detect the presence of wild animals, as well as actions taken to reduce the risk of *wildlife hazard* [15].

The researcher also conducted interviews with the ATCs on duty at the *Aerodrome Control Tower* Unit to gain a deeper understanding of the role of *situational awareness* in handling *wildlife hazards*. Interviews are an in-depth process of exploring and understanding the phenomena that are the focus of research [16]. These interviews aim to explore the views and experiences of ATC regarding handling *wildlife hazards*, the challenges they face.

Researchers also collect and analyze related documents, such as reports of accidents or incidents involving *wildlife hazard*, standard operating procedures relating to the handling of *wildlife hazard*. Document analysis is used to evaluate the consistency or suitability between one document and another to find the required data [17]. Researchers focused on data analysis on the ATS Operational Logbook Unit *Aerodrome Control Tower* Airnav Indonesia Denpasar's Branch from November 2021 to January 2022 [18].

B. Data Analysis

After the data was collected, qualitative data obtained from field observations and interviews with ATC were analyzed qualitatively. Qualitative research is a type of research that focuses on overall description, which aims to provide a detailed understanding of activities or situations that are currently occurring rather than comparing the effects of special treatment or explaining individual attitudes and behavior [19]. In the context of this research, qualitative analysis can be used to understand the situational-related ATC experience and perspective awareness and handling of *wildlife hazard* [20].

IV. RESULT AND DISCUSSION

The results obtained in ICAO Annex 14 Aerodromes Amendment 10 Volume 1 chapter 9 point 9.4.3 stated "Action shall be taken to decrease the risk to aircraft operations by adopting measures to minimize the likelihood of collisions between wildlife and aircraft" which can be interpreted "Action should be taken to reduce the risk of aircraft operations by adopting measures to minimize the possibility of collisions between wild animals and aircraft." Based on this literature, it is necessary to take action to

reduce existing risks, including in air traffic services in line with objective of ATS number two (2) [21][22][23][24].

Most of the *wildlife hazard* reports are reported by pilots and airport officials. From this, it can be seen that the level of awareness of ATC officers in the process of identifying *wildlife hazards* is still not dominant compared to pilots and airport officers and really needs to be improved. In providing air traffic services, ATC officers, especially those serving in the TWR unit, are required to continue to maintain continuous watch and visual scanning of their work area (traffic, airspace, maneuvering area, obstruction, and others), so that the early identification process for the presence of *wildlife hazard* should be done. can be more optimal if it is carried out by an ATC officer. If the initial detection rate by ATC is optimal, then the anticipation and management of *wildlife hazard* against traffic will be easier. For information, Airnav Denpasar's Branch already has handling procedures contained in the SOP and LOCA with the airport (AMC and PKPPK)[25][26][27].

Ardhiani et.al. [28] In the Unsyiah Psychology Journal entitled Qualitative Analysis of the Application of Situation Awareness in the Work Activities of Air Traffic Controllers (ATC) explains that the application of Situation Awareness relates to matters related to ATC's internal conditions (physical and psychological) and mostly related to outside conditions. ATC (other professions, natural conditions, and physical environmental conditions). Based on the list, it can also be seen that ATC needs to pay attention to things that are constantly moving dynamically (plane locations, distances between planes, and others) as well as things that are static (aprons, taxiways, and others) [29].

From the results of the research mentioned above, it can be concluded that the relationship between *wildlife hazard* and *situational awareness* is in external ATC conditions (environmental conditions), and more attention is needed towards *wildlife hazard* because of its dynamic nature.

Based on the observations of researchers at Ngurah Rai International Airport Denpasar, the lack of *situational awareness* is caused by the ATC workload. While the researcher was carrying out the research at Airnav Denpasar's Branch, the ATC tower served by implementing a combine sector. To note, the *Aerodrome Control Tower* Airnav Denpasar's Branch consists of 3 units, namely tower control, ground control, and clearance delivery. Therefore, ATCs serving in combined sector conditions are responsible for the movement of aircraft in the vicinity of aerodromes and maneuvering areas, flight plans, time slots, and others. As a result, ATC is unable to focus optimally on detecting *wildlife hazard* [30].



Fig 3. Unit at the Aerodrome Control Tower

- Include the issue of *Wildlife Hazard* in the Routine Briefing of ATC Personnel
Based on the observations of researchers while carrying out the research, at Airnav Indonesia Denpasar's Branch a briefing was held at every change of shift by the operations manager and the group on duty at the time. Researchers suggest that material related to *wildlife hazard* or events that are related and often occur during the past week be included. The aim is to raise awareness in every ATC personnel in carrying out tasks related to *wildlife hazard* [31].
- Campaign About *Wildlife Hazard* in Tower
Researchers suggest holding a campaign related to the dangers of *wildlife hazard* so that ATC is always aware of the danger and it is hoped that this will increase awareness. Campaigns can use social media or hardcopy in the form of posters or flyers. The contents of the campaign can be in the form of an explanation of phraseology related to *wildlife hazard* or handling in accordance with SOP/LOCA.



Fig 4. Example of a Wildlife Hazard Campaign Poster

V. CONCLUSION

In carrying out their duties, ATC really needs *situational awareness* related to matters related to ATC's internal and external conditions. Based on the observations of researchers while conducting the research, the presence of wildlife at Ngurah Rai International Airport is very high. However, the lack of detection from ATC causes consequences that can disrupt the convenience of air traffic services. One of the factors causing the lack of detection is *situational awareness* which is not yet optimal. So a solution is needed to increase situational awareness, namely including the issue of wild life hazard in a briefing routine to ATC personnel and a campaign on wild life hazard in the tower.

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