International Journal of Educational Review
Volume 5 (2) 2023, 101-122
E-ISSN 2685-709X, P-ISSN 2685-905X

Educational Strategies in Wildlife Control at Airports as an Optimisation of Safety Management

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Article History: Received on 3 August 2023, Revised on 25 October 2023, Published on 4 November 2023

Abstract: One of the factors that can cause an aircraft accident is the presence of wildlife at the airport. Wildlife can pose a threat to aviation safety if not managed properly. The purpose of this research is to analyze the education strategy for controlling wildlife at the airport as a form of safety management optimization to find out what the inhibiting factors and supporting factors in handling wildlife to get the right wildlife control pattern. This research method is descriptive research with a qualitative approach where researchers seek supporting data by conducting interviews, observations and some document literacy from the airport studied, namely Muhammad Taufiq Kiemas Airport in West Pesisir Regency, Lampung Province. This research resulted in several findings that there are inhibiting factors, namely the absence of a wildlife hazard control unit at the airport so that the handling of wildlife does not have a planned and programmed standard procedure. However, there are several supporting factors, namely operational officers already know the types of wildlife and the causes of the gathering of wildlife around the airport. Facilities available at the airport such as perimeter fences can prevent and limit wildlife entering the airport from wild boar, monkeys, and apes. Handling of wild birds is done by traditional capture and not by the guidelines. Coordination and communication between the airport and Air Navigation are well-established and mutually supportive of wildlife control activities during operational hours. The results of this study are not only useful for the airport but also for the beginning of the development of further research on wildlife control. This research has a novelty, namely the steps of controlling wildlife at the airport and educational strategies in controlling wildlife as an optimization of safety management.

Keywords: Animals, Control, Education, Strategy, Wildlife

A. Introduction

The impact felt due to the Covid 19 pandemic in Indonesia, especially in the air transportation sector, was very impactful, where there was a decrease in the number of passengers due to restrictions on people traveling. However, slowly but surely air transportation continues to move up as public awareness continues to improve to carry out vaccination programs during the pandemic. One way to attract the public in

transportation is to open pioneer flights in several regions in Indonesia. Among several pioneer flight routes, the government opened a pioneer flight route with the Lampung (TKG) - Krui (TFY) flight route, which started on 12 January 2022 using a Grand Caravan aircraft with the flight operator Susi Air. The benefits of pioneer flight activities are that there will be the mobility of residents who want to travel between cities in Lampung province, namely the city of Bandar Lampung to Krui, which cuts travel time and is also expected to occur economic activities including the delivery of goods or cargo transported by air transportation. Another benefit is to open isolated areas due to the impact of natural disasters, so that aid can be sent by air transportation or open tourism investment in an area, as well as a gateway to information and cultural exchange from cities to regions/regencies. Therefore, the airport must ensure operational readiness so that the flight remains safe and smooth. All potentials that can disrupt airport operations must be identified early on to create safe, secure, and comfortable flights at the airport. Muhammad Taufiq Kiemas Airport located in Pesisir Barat Regency has airside and landside facilities with data - the data is Runway facilities with dimensions of 1100 m x 30 m, a Taxiway 98 m x 18 m, and Apron 90 m x 80 m and landside facilities, namely the Passenger Terminal with an area of 3,530 m2. The airside facility is a movement area at the airport consisting of the surrounding area and buildings or parts that function as a link between flight operations so that the area is controlled and supervised by aviation security (Avsec) officers. The implementation of the control itself is determined by regulations that are very strictly regulated by the regulator, in this case, the Directorate General of Civil Aviation, so that if there is a violation, sanctions can be imposed. One of the threats in the airside area is wildlife hazards.

Wildlife is a hazard whose existence cannot be known has a high risk for flight operators operating at an airport and is also dangerous for the airport itself. For this reason, it needs to be controlled by making wildlife hazard management, where the control is controlled by the airport which is stored in a document at the airport. Airport Certificate (SBU) or Airport Register is proof of fulfillment of the operating requirements of a facility to ensure the safety of airport operations and the safety of aircraft operations. This certificate is also a proof of formal confirmation and evaluation by or on behalf of the competent authority for aviation security, that a person or legal entity has the required competence to perform specified functions to a level as determined by the competent authority. This means that every certified or registered airport has a Minimum Service Standard for controlling hazards in its area, including wildlife control. The following are some events or incidents of aircraft accidents caused by wildlife activities both around and within the airport area at home and abroad.

Table 1. Wildlife Hazard Incident Reports in the world

No	Year of Event	Place of Event	Description
1	4 May 2020	Bardele, Somalia	Somalia African express plane carrying 5 passengers and carrying covid 19 medicine, but failed to land due to wildlife.
2	Late 2016	Gorontalo, Indonesia	Indonesia Lion Air JT 892 crashed into a cow that crossed the runway at night when the plane was about to land, 110 passengers survived.
3	7 November 2014	India	A plane hit a wild buffalo during take-off from Surat city, but no passengers or crew were injured. The Spice Jet B 737-800 aircraft carrying 146 passengers and crew was travelling to Delhi.
4	15 April 2007	Surabaya, Indonesia	Lion Air plane was forced to maneuver to avoid stray dogs that had entered Juanda airport
5	8 April 2007	Jakarta, Indonesia	Vietnam Air's Boeing 777 aircraft was delayed 3 hours due to rat infestation, and it was feared that the rats were eating away at the cables, endangering the flight.
6	23 Maret 2007	Bali, Indonesia	The windshield of a Merpati Airlines B737-200 from Denpasar to Kupang was broken on the way to Kupang by a bird. The aircraft was only allowed to fly again after the glass was replaced. Flight delayed for hours
7	7 Desember 2006	Jakarta, Indonesia	A B 737-200 Air Force presidential plane carrying Vice President Jusuf Kalla and his entourage to Bali was hit by a bird. This caused the group to feel the shock, even a lick of fire on the right engine was seen, followed by a burning baud aging.
8	15 Oktober 2005	India	An Alliance Air plane made an emergency landing at an airport in Rajasthan state after its engine was hit by a bird.
9	Akhir tahun Desember 2005	Amerika	Host Oprah Winfrey's private jet was forced to land back at the Santa Barbara, California airport after colliding with a bird. The windscreen was cracked.
10	18 Agustus 2005	India	A Jet Airways plane that was supposed to fly to the southern Indian city of Bangalore made an emergency landing at New Delhi

			Airport shortly after take-off due to a bird strike.
11	29 Januari 2003	Semarang, Indonesia	The left engine of Mandala Airlines RI 293 died during take-off at Ahmad Yani Airport, Semarang. Due to bird strike. The aircraft was carrying 129 Onh PLUS pilgrims. The bird was sucked into the engine when the aircraft passed a flock of flying cranes.
12	Oktober 2001	Moscow, Rusia	A Boeing 737 400 aircraft carrying Real Madrid players was forced to land again because a bird entered the aircraft engine and caused sparks and the smell of fire.

The presence of wildlife such as birds and other wildlife at airports is often an unwitting hazard that can interfere with flight safety. Other material losses such as flight delays, flight cancellations, and damage to facilities and aircraft, result in considerable losses.

As the parent organization of world aviation, ICAO (International Civil Aviation Organization) is very concerned about the problem of wildlife disturbances and bird strikes, in 1980 formed IBIS (ICAO Birds Strikes Information System), for handling wildlife, ICAO provides recommendations through Annex 14 on Aerodrome. In Indonesia itself, it is contained in the Regulation of the Minister of Transportation of Indonesia Number PM 87 of 2017 concerning Civil Aviation Safety Regulations Section 139 concerning Airports (Aerodrome) which states that every certified Airport is required to have Wildlife Hazard Management and environmental documents. While the technical implementation instructions are contained in the Regulation of the Director General of Civil Aviation Number: SKEP/42/III/2010 concerning Guidelines and Procedures for Civil Aviation Safety Regulations section 139 - 03 Wildlife Hazard Management at Airports and their Environments (Advisory Circular CASR 139 - 03, Wildlife Hazard Management on or in the Vicinity of an Aerodrome) as a derivative of the Minister of Transportation Regulation Number PM 55 of 2015 Civil Aviation Safety Regulations (PKPS) section 139.073 Wildlife Hazard Management and the Environment.

The location of Muhammad Taufiq Kiemas Pesisir Barat Airport is located in Lampung Province at a position of 05o 12' 42" South latitude (LS) and 103o 56' 22" East longitude (BT). Which is located close to the Bukit Barisan Selatan National Park area, but not included in the protected forest area. where natural conditions are still quite natural, allowing many wildlife and birds that have the potential to interfere with flight operations. In his journal entitled Application of Wildlife Hazard Management as an Aviation Safety Effort at General Ahmad Yani International Airport Semarang, he explains that what is considered in the operation of aircraft is flight safety, in which there are potential safety risks, namely bird strikes and the presence of wildlife, in his journal this author notes that the purpose of his research is

to analyze the application of wildlife hazard management regulations at Ahmad Yani Semarang International Airport.

Research conducted by (Muksin, 2017), provides a statement about the potential threat due to the presence of birds around the airport. As an international airport, I Gusti Ngurah Rai already has a wildlife control organization structure. Another study conducted by (Oktaviani et al., 2019) has concluded that the wildlife control program at General Ahmad Yani International Airport Semarang, which is an airport under the regulation of PT Angkasa Pura I (Persero), has implemented and applied the ICAO program on wildlife control (Wildlife Hazard Management) which is regulated in the Decree of the Director General of Civil Aviation Number SKEP / 42 / III / 2010 concerning guidelines for the Implementation of CASR 139-03 concerning Wildlife Control at Airports. The same research was also conducted by Muhammad Fickry Fadrullah, who raised almost the same research theme, namely wildlife hazard management which took the location of Soekarno Hatta International Airport, where this researcher took a research theme on how to identify, assess, and control work safety risks if caused by the presence of wildlife at the airport. Other research conducted related to the control of wildlife was carried out (Ulinuha, 2021) the results of the study showed that dogs at Silampari airport are wildlife that fall into the category of threat (hazard) so they need to be controlled. In this study, the control efforts were carried out in 2 (two) ways, namely: the first method by conducting passive management and the second method by active management. The purpose of this research is to analyze the education strategy for controlling wildlife at the airport as a form of safety management optimization to find out what the inhibiting factors and supporting factors in handling wildlife to get the right wildlife control pattern.

B. Methods

In this research, researchers will use a descriptive type of research with a qualitative approach, this was chosen to describe a phenomenon, about something interesting and not yet widely known. Not too deep in the discussion, certain social realities provide an objective description of the existing circumstances or problems, namely about controlling wildlife at the airport. Based on this problem, the researcher determines the method and research design, which is made to answer the research objectives. The research design used is qualitative research, which means that qualitative research is research that intends to understand the phenomena experienced by research subjects, for example, behavior, perceptions, motivations, actions, and others holistically. In (Christopher S. Collins and Carrie M. Stockton, 2018) Maxwell states that qualitative research design is an interactive model that has an interconnected and flexible structure. Interactive means that each component has implications for other components, not a linear relationship or one-way relationship.

There are five components in the research design of the interactive model, each of which has a set of questions that are the concern or things that the researcher should pay attention to, namely: Goals, Conceptual Framework, Research Questions, Methods, and Validity based on this interactive model, the research question is the

center of the research design which is integrated with the other four components. This means that the research question is the link between the objectives and contains what is known about the object to be studied, theories or concepts, and what models can be implemented. The model chosen should be able to answer the research question, with an acceptable level of validity. When creating the research question, the researcher must also consider what methods will be used so that the question can be answered. The relationship between the five components must be flexible or not rigid according to the conditions of the research field.

The research method used in this research is descriptive research using qualitative analysis. Descriptive research is conducted to describe precisely the properties and symptoms or the development of symptoms in the relation between research and other societal symptoms. According to Nawawi (1990), descriptive research is problem-solving by describing and describing the state of the subject/object of research (a person, institution, society, etc.) at present based on the facts that appear or how they are.

This research uses two data sources, namely primary data sources and secondary data sources. Primary data is data derived from interview data sources with informants, field observations, and surveys, while secondary data comes from documentation and field notes (Sukmawati et al., 2023). Sampling in qualitative research has its uniqueness because it generally uses non-probability sampling, where researchers will look for other informants based on previous informants (Riwayadi, 2023). Sampling will stop when the data obtained has begun to be saturated (repetitive), thus saturation and data sufficiency become the determinants of informants, data searches like this are called snowball sampling(Zickar & Keith, 2023). This procedure can be a solution when the number of respondents is not large.

In this study, the data collection techniques used are as follows (1) documentation is a record or evidence of past events that can change such as writing, pictures, or audio. Documentation is the search for various evidence of these events recorded into data that supports the research process. For documentation not to be lost/missed, a checklist is needed. (Amelia et al., 2023), (2) observation is a direct observation by researchers of various things related to their research. (Christopher S. Collins and Carrie M. Stockton, 2018), (3) questionnaires are lists of questions given to other people with the aim that they can be answered as honestly as possible so that data can be collected according to their needs. researchers. Consists of two types open questionnaires and closed questionnaires(Knott et al., 2022). An open questionnaire is a questionnaire that contains open questions so that respondents can provide answers freely, without coercion(Roopa & Menta Satya, 2012), (4) An Interview is an effort to collect data through question-and-answer activities between researchers and respondents or informants' objectives to obtain the data needed by researchers (DHARMAWAN, 1990). There are three types of interviews: structured, semi-structured, and unstructured. {Formatting Citation} A structured interview is when a researcher makes a neat list of questions in an ideal order and then asks the interviewee the flow of the list of questions that have been made(*No Title*, n.d.)(Opoku et al., 2023). Semi-structured interviews are where the researcher creates a list of

flexible keyword questions, but in the field, the researcher uses the list as a guide only so that improvised questions are possible(Elhami & Khoshnevisan, 2022). Unstructured interviews allow researchers to come to the field without any list and research guidelines, so this research is intended to provide a description and explain an existing phenomenon to solve problems by searching for data, collecting data, and analyzing the data. (Tohirin, 2012)

If the data collected is in the form of recorded interviews, the researcher makes several steps, namely: (1) prepare a full transcript of the interview without changing the recording into a collection of sentences that are the same as the audio interview. This processing is referred to as "Verbatim".(Evers, 2011), (2) fact compaction is reconstructing the subject's sentences into well-organized sentences that can make it easier for researchers to understand the meaning of the subject's narrative. This is needed because the transcript of the results of interviews conducted with informants are verbal utterances that are converted into typed sentences, this activity is used to maximize the content to make it easier to understand and not rigid. So, compaction of facts is changing the informant's opinion into sentences that are easier to understand, not jumping to opinion. Fact compaction is a tool used for factual accuracy that reflects the facts, and not the conclusions of the researcher.(Opoku et al., 2023), (3) preparation of probing for data deepening If the data that has been collected is considered incomplete and still raises questions for the researcher, then the researcher can look for additional data to be further explored in the form of small research notes. This is done to obtain data that has analysis credibility and further shows the uniqueness of the research results. This activity is called "probing". Probing is done to "cross-check" data on the subject with the aim that the facts produced are more accurate and in-depth. Probing becomes a cycle of deepening data so that the data is considered exhausted so that the researcher completes the data collection.(Morris et al., 2020), (4) collecting similar facts is a step taken by researchers to determine the quality of facts that have been obtained from verbatim data or other data. This step also helps researchers to find out whether the data obtained is in-depth, reflects triangulation data, the data is sufficient or not so that data deepening is needed. If the researcher has collected similar facts, the researcher will be able to see the depth of the research findings. Collecting similar facts must look carefully at whether the facts we collect can be close together and reflect the similarities between these facts. When the facts that we bring close together are inaccurate, it will interfere with the categorization conclusions in the framework of getting themes and theories (Sharma, 2022), (5) determining categorization If similar facts have been carried out and researchers have obtained in-depth and widespread facts, researchers will obtain a visual picture of fact-based data. Categorization is the conclusion of the analysis after the researcher sees the collection of facts and the interconnections between facts. The interconnectedness of these facts will also be assisted by interpretation codes so that the creation of categorization words, phrases, or sentences will truly reflect variants of similar facts. In psychology, categorization can be likened to a diagnosis conclusion from the initial symptoms of the facts obtained. A collection of similar facts is a particular coding picture that is developed towards the construction of general

conclusions in all activities to build theory constructively. This method is then referred to as constructive qualitative research, which builds theories from the meanings built by research subjects or informants.(Lochmiller, 2021), (6) concept building and narration. When the researcher has written down many categorizations, the next step is to choose the main needs, i.e. which categorizations are most important in answering the research problem. If it is found that the later categorization findings are not in line with the initial research problem, it means that the researcher must side with the facts in the field. This can make the researcher change the research design including the formulation of the research problem because the researcher has found facts that are based on the field (emic), which means that there is a problem or research focus chosen. In this way, the research proposal will finally match the reality that does occur in the field. In qualitative research, confirmation of research ideas with facts in the field is needed so that the resulting research is not only interesting in ideas but sustainable with facts in the field, where differences in diction, language, culture, and research settings may not be found in various reference sources(Irene Korstjensaand, 2018). Often qualitative researchers lose the focus of research because they are faced with incompatible processing data without integrating the results of data coding. There is also field data that is not converted into verbatim form, so if it is only stored in memory, it will gradually disappear(Bradley Plummer, n.d.). For this reason, exercises are needed where when more categorisations are found, the researcher can collect the data systematically. If the initial data comes from field data, this is good, but if the data comes from a collection of categorizations then this collection of categorizations will be narrated and presented thematically. It is better if the researcher builds a visualization of the concept or theme building that is poured into charts so that it is easier to understand the dynamics of categorization encounters that form a concept and theoretical picture of research findings (Usman, 2017).

Table 2. Example of Data Analysis and Display

Field Data Observation, Interview Documentation	Topic	Category (Emic, Ethic)	Patterns or Themes or Concepts	New questions arise for further data collection until saturation
1.	1.			
2.		1.		
3.	2.			
	3.			
	4.	2.	1.	1.
	5.			
	6.			
	7.	3.		
	8.		2.	2.
	9.			

C. Result and Discussions

Muhammad Taufiq Kiemas Airport is based on the Decree of the Minister of Transportation number KP.811 of 2016 concerning the Change of Name of Pekon Serai Airport in West Pesisir Regency, Lampung Province to Muhammad Taufiq Kiemas Airport. This Airport Name Change is based on the aspirations of the people of West Pesisir Regency and by the West Pesisir Regency People's Representative Council, so the Regent of West Pesisir proposed a change in the name of the airport, from Pekon Serai Airport to Muhammad Taufiq Kiemas Airport. Initially, this airport was Pekon Serai Airport which was built by the Ministry of Transportation as a natural disaster mitigation and flight navigation airport, which was stipulated in the Decree of the Minister of Transportation Number KP. 475/09 of 2009 concerning the Determination of the Location of a New Airport in Pekon Serai, West Lampung Regency, Lampung Province.

Based on the Decree of the Minister of Transportation PM 40 of 2014 concerning the Organization and Work Procedures of the Airport Operator Unit Office, it is explained that the Airport Service Unit is an airport service implementation unit that is under and responsible to the Head of the Airport Operator Unit Office. Currently, Muhammad Taufiq Kiemas Airport is under the guidance of UPBU Silampari Lubuk Linggau Office. The Silampari UPBU Office is currently a class III airport based on the Decree of the Minister of Transportation Number PM 118 of 2021 concerning the Fifth Amendment to the Regulation of the Minister of Transportation Number PM 40 of 2014 concerning the Organisation and Work Procedures of the Airport Operator Unit Office. Muhammad Taufiq Kiemas Airport has air-side facilities consisting of a runway 1300 meters x 30 meters, a Taxiway 97 meters x 18 meters, and an Apron 90 meters x 80 meters. The land side has a passenger terminal with an area of 1,116 m2 and this terminal can accommodate 279 passengers per day or around 50,000 passengers per year. Currently, the aircraft that can be served is the ATR - 500/600 type where the operating airline is Susi Air with the Bengkulu - Krui - Bandarlampung flight route through the pioneer flight program.

Figure 1. Flights at Muhammad Taufiq Kiemas Airport

From the results of the preliminary survey, it was concluded that the personnel of the Muhammad Taufiq Kiemas airport already knew that there was wildlife still

roaming the airport. So, for this reason, we conducted deepening research by visiting the location directly to interview several sources who knew exactly about the existence of these wildlife.

Inhibiting Factors in Controlling Wildlife Hazards

The control of wildlife at an aerodrome is regulated by the Director General of Transportation Number Skep / 42 / III / 2010 concerning Guidelines and Procedures for Civil Aviation Safety Regulations Part 139-03 Wildlife Hazard Management at Airports and Their Environments. Wildlife Control (Advisory Circular CASR 139-03 Wildlife Hazard Management On or In the Vicinity Of An Aerodrome), in this regulation it is explained that to anticipate and overcome the dangers posed by the existence of birds and wildlife at airports and surrounding areas to aircraft operations, It is also known that this regulation is a follow-up to the implementation of the Minister of Transportation Regulation No. KM 24 of 2009 concerning the Implementation of Civil Aviation Safety (PKPS) section 139 concerning Airports (CASR 139 Aerodrome) which regulates the implementation of airport safety supervision, it is necessary to make guidelines for reporting the supervision of the presence of wildlife hazards at airports.

In this regulation, what is meant by Wildlife is animals located in the Airport operating area that interfere with/potentially cause danger to aircraft operations. Several other references explain that wildlife or wildlife are various vertebrates that live wild, associate with their environment, or live in a natural ecosystem. At the airport, there is an ecosystem that is still natural, namely the presence of wildlife, namely monkeys or monkeys and wild dogs. The same thing was conveyed by informant AJ from AirNav Lampung: "Indeed, our current obstacle, especially in the rainy season, is that the animals are on the loose, which indeed exist such as dogs sleeping on the runway, where after a rainy night, the morning is hot, the runway is warm, so the wildlife comes out and swarm on the runway". On another occasion he said, "...and the third, yes, the obstacle is like that when we provide runway clear information sometimes, we encounter like now it's monkey season, well the obstacle of our friend's during coordination is that they ask for equipment to ward off that (monkey animals) even though we throw anything, they are not afraid of us, instead we are like nyek-nyek (mocking)". Here informant AJ explains that wildlife, namely dogs, will linger on the runway in the morning because the runway surface is gradually heated by the sun, able to warm the dog's body which can unwittingly interfere with flight operations. The number of monkeys that appear when in season, raises the opinion that manual eviction cannot eliminate the threat and sometimes officers are mocked by them.

From various information collected from informants, the wildlife at Muhammad Taufiq Kiemas airport is (1) Ape/Monkey. Apes or long-tailed monkeys are vertebrate animals (vertebrate animals) which are a type of primate mammal from the Cercopithecidae family(Jack & Kulick, 2023). Specifically, macaques or macaques have the Latin name Macaca nemetrina, while long-tailed monkeys have the Latin name Macaca Fascicularis. The distribution of this animal is on the islands of Borneo and

Sumatra with the habit of living in the lowlands or hills of primary rainforests. The main food of this animal is fruit while also eating various types of leaves, young shoots, seeds flowers, and insects (Diva, 2022), (2) Dog. In this study, the dogs that often appear are the type of garden guard dogs from the gardens of residents around the airport commonly called mongrels(Diepens et al., 2023). This dog is a type of terrier where the dog is good at hunting small animals. In addition to a keen sense of smell, this dog can dig the ground for him so that he can get his game(*No Title*, n.d.), (3) Wild Boar (Labadessa & Ancillotto, 2023)or pigs are wildlife that often disturb the gardens of residents around the airport, with the Latin name sus scrofa, wild boars are considered pests by some communities. In order not to disturb community land, efforts are made to guard gardens with guard dogs. Meanwhile, the airport installed a perimeter fence to prevent wildlife from entering and disrupting airport operations, (4) Snakes Wild (Keskin et al., 2023) as snakes appear quite often in the air side area of an airport, but the most common are ground snakes. Ground snakes are aggressive and quite venomous with the Latin name being Calloselasma rhodostoma. The ground snake is an ambush predator. It is usually seen passively coiled on the ground or in leaf litter waiting for its prey to pass nearby. It also rarely moves. The ecosystem of this snake is forests, bushes, and so on. It preys on small rodents, birds, lizards, and toads. Ground snakes are mainly nocturnal. It reproduces by laying eggs (oviparous). The eggs are guarded by the female snake until they hatch.

Their color patterns and behavior provide good camouflage, so they are not easily spotted and are often overlooked. (1) Punai Bird (Sabziyan Varnousfaderani & Shihab, 2023) One type of punai bird, the ivory punai, is a member of the Columbidae family with colorful plumage, especially in the males. They like to eat small fruits and help spread plant seeds. This wildlife of the Aves class is a frugivore. Its favorite food is small fruits, such as banyan (Ficus benjamina), kersen (Muntingia), senggani (Melastoma), and sampare (Glochidion). It also enjoys eating the fruits of snow bush (Breynia disticha), legundi (Vitex), mara (Macaranga), nibung (Oncosperma), Hendrik (Bridelia), and fig (Ficus) trees. For this reason, it prefers to nest in large trees such as banyan, especially during the fruiting season. (Setiawan, 2021), (2) Small Turtledove(Athamnia et al., 2023) have the Latin name Geopelia Striata, which is a species of bird in the Columbidae tribe (pigeons) of the genus Geopelia. The body length is about 25 cm (9 inches) and has feather characteristics with a brown-grey base color, grey head, and neck feathers, black and white lines on the chest and neck, and brown back with black edges. (Anonim, 2022), (3) Grouse (Haider et al., 2023) is known as ptarmigan (a common name in North America) is a popular bird with the ability to change color, has a habitat closer to water, its ability to swim in the water is due to the grouse including birds that have webbed feet and rarely to fly. Mobility activities in terrestrial areas are only used to find food and avoid opponents, laying eggs, and other activities. The movement of walking is very slow, but very fast when in the water, so the mobility of this animal is very small for terrestrial areas. Grouse with the scientific name Dendrocygna is a group of birds with flat beaks or Anseriformes. With a flat bill, grouse can make a whistling-like sound. Together with their group, grouse like to hunt for grain that is usually still left in the rice fields.

Grouse are often found in rice fields when the harvest period ends. Grouse are still very closely related to the duck species. So consciously or unconsciously both have a similar body appearance, the grouse body has a medium size, around 41 cm. The eggs of most grouse species are cream-coloured with about 8 to 10 eggs in a single laying. February, March and September, November is the breeding period for grouse. Grouse meat is sold at a higher price than some other types of poultry meat. (Anonim, 2021).

According to informant AR, as a building unit personnel need better equipment, this was revealed in our interview, namely: " ... in controlling the monkeys it is very difficult sir, so we need equipment that can drive them away such as air rifles to drive the monkeys away sir." The presence of wildlife such as wild monkeys, according to AR, can be eliminated with the use of air rifles, but this has not been realized because the use of weapons in the airport area is quite dangerous. After all, the airport is a sterile area according to Aviation Law Number 1 of 2009 concerning Aviation so the use of weapons is considered less effective and will endanger the airport environment itself. This turned out to be not only against the law but also received opposition and protests from residents, this was revealed from information submitted by MS as the Head of Muhammad Taufiq Kiemas Airport. *"...the dogs that enter are owned by residents, where in the past we have taken action against the animals by shooting them with rifles, but the residents protested, so we only chased them away, not put them down..."*

The use of rifles to shoot animals such as dogs is considered a violation of customary law in the villages around the airport because the dogs are pets that are used as garden guards, so the airport only evicts and does not paralyze the animals. This is considered better than killing the animal, but the expulsion of animals such as monkeys or apes needs to be studied further, so as not to damage the animal's ecosystem. More specifically what was conveyed by PJ the runway building coordinator, said, *"…. Muhammad Taufiq Kiemas airport, we still do it manually, if there are animals that enter we evict them, any animals such as dogs, birds. Like that sir. So far there is no structure or SOP at Muhammad Taufiq Kiemas airport sir."*

According to Mr. PJ, the airport does not yet have an organizational structure, so the wildlife control carried out is only corrective in nature so the success and effectiveness of the implementation of this control activity cannot be measured, based on the regulation of the Director General of Civil Aviation Number: SKEP / 42 / III / 2010 concerning Guidelines and Procedures for Civil Aviation Safety Regulations Part 139 - 03 Management of Wildlife Hazards at Airports and Their Environments, a planned and sustainable management is needed in controlling wildlife hazard and birds around the airport. Thus, it can know the handling and procedures for controlling wildlife hazards at the airport.

Meanwhile, according to informant AL "... For the implementation of Wild life hazard at Muhammad Taufiq Kiemas, we have actually taken preventive measures such as when before the flight, 30 minutes before the flight we conduct patrols, patrols that we coordinate with aviation security unit and building units besides that we coordinate with air navigation officer who regulate air traffic, but indeed we do not have a special unit at this airport, but to anticipate the disturbance of wildlife, we prepare personnel specifically assigned to patrol around the runway, apron and

around the access road and perimeter path, to anticipate if there are monkeys that often cross..."in other sentences, he says, "*..., these wild birds in certain seasons enter this area such as grouse and punai, sometimes there are also here there are more parrots, for these actions too, in addition to patrols, we also often put up bird nets, in addition to securing the area for friends there are many who like parrots, so they many put up nets to catch these parrots.*

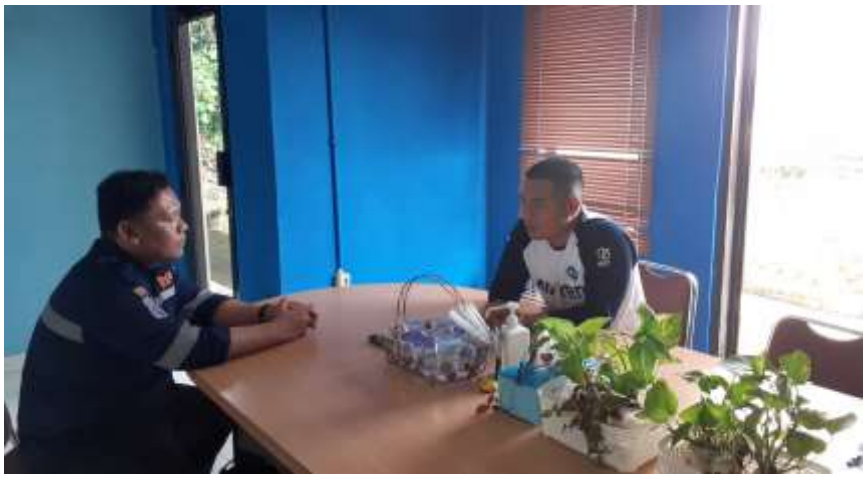

Figure 2. Interview with information AZ

In controlling wildlife at Muhammad Taufiq Kiemas airport, according to AL, the activity has been carried out regularly where when the flight is about to start, personnel consisting of Aviation security and building unit personnel, provide routine patrol services around the airport for 30 minutes to look for Foreign Object Debris (FOD) or wildlife roaming inside the airport. This activity is greatly assisted by the perimeter fence that prevents wildlife such as wild boar from entering the airport, but monkeys and dogs can still enter through the top of the perimeter fence.

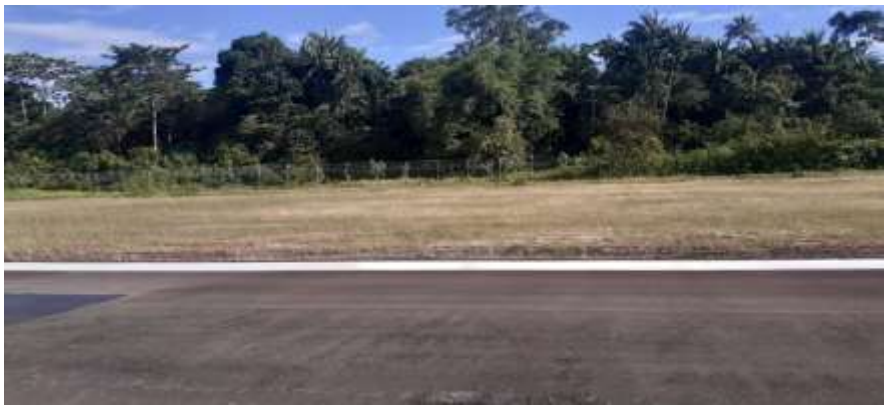

Figure 3. Airport Perimeter

To deal with the danger of other wildlife such as birds, bird-catching nets are routinely installed, but this cannot be used as a guideline for control, because birds will come. After all, it is migration season. For this reason, attention is needed regarding the peculiarities of animal migration patterns. Handling animals like this,

then, requires coordination from other parties such as those who are more competent in handling this problem. Furthermore, a similar statement was made by MS as the head of Muhammad Taufiq Kiemas airport, "...It is only limited to expelling the animal out of the airport area, more than that is not or has not been implemented optimally..."

According to MS, only animal eviction activities can be carried out by personnel at the airport during routine patrols, due to lack of equipment and personnel. The equipment used during the implementation of this activity is chasing the animal with a patrol vehicle while driving away using the car horn and honking. Other supporting facilities are only temporary in expelling animals, because after patrolling wildlife is likely to return. The organizational structure of wildlife hazard management at the Muhammad Taufiq Kiemas airport, at the time of this research, had not yet been formed. This was conveyed in interviews conducted by several informants such as SA, as the operational coordinator, said: "...Of course, at this airport, there are still many shortcomings, Neither personnel nor we have not formed the control unit, namely the SMS unit, so far we have conducted socialization with residents around Muhammad Taufiq Kiemas airport, for information only our airport already has a perimeter fence that meets the standards..."

According to SA, the Safety Management System unit as the controller of the safety system at the airport, needs to be established immediately to be able to carry out safety supervision for pioneer air transport operations (Prof.Dr.HK Martono SH., 2011) held at the Muhammad Taufiq Kiemas airport so far. Socialization to the community around the airport regarding the dangers of wildlife can be done by inviting regulators and practitioners. This is done because facilities such as perimeter fences are already available to measure the level of safety and security in the airport area. In the process of controlling wildlife, some kind of equipment and resources are needed, because the wildlife in Muhammad Taufiq Kiemas Airport are domesticated animals that become wild such as monkeys and stray dogs where these animals can spread rabies, so coordination is needed with the local health department to find out about the procedures for handling this wildlife so that they are not dangerous to surrounding humans.

Controlling wildlife such as forest monkeys cannot be done with air guns because there are strict regulations on the use of air guns. This is stated in the Regulation of the Indonesian National Police Number 1 of 2022 concerning Licensing, Supervision and Control of Standard Firearms of the Indonesian National Police, Non-Organic Firearms of the Indonesian National Police / Indonesian National Army, and Security Equipment Classified as Firearms in Article 46, that describes the rules for the use of Non-Organic Weapons of the Indonesian National Police / Indonesian National Army for hunting, and other regulations where the use of non-organic weapons by the public is regulated in the regulation of the Chief of Police of the Republic of Indonesia Number 8 of 2012 concerning Supervision and Control of Firearms for Sports Purposes where there are very strict rules about the use of air weapons such as the use of weapons that must be in a predetermined location, have a permit issued by Indonesian Shooters Association (Perbakin) and so on. This means

that if there are violations that cause casualties, then the perpetrators will get sanctions from the Indonesian National Police. For this reason, it is very clear that the use of air guns to shoot wildlife at the Muhammad Taufiq Kiemas airport is prohibited and must have a permit. For this reason, officers must be careful in controlling wildlife at the airport.

Currently, the perimeter fence installed at the airport is very useful in preventing monkeys or apes from entering the runway. However, the height of the fence may need to be adjusted to prevent wildlife from entering and congregating in the airside area of the airport. Another obstacle is the absence of a special unit that handles wildlife control, this was said by informant AZ, "Organizationally because it is still a Service Unit (satpel) so there is no unit, but we divide the burden and responsibility to the existing units to monitor the presence of these animals, because this airport is still in the form of a Service Unit (satpel) which is not well organized." The current condition where the Muhammad Taufiq Kiemas airport is still a Service Unit is an obstacle for airport officials there, this can happen because of the required budget related to wildlife control, where planning proposals are needed by related units, but this control activity has been carried out because the budget for these activities is superimposed with other activities, so that with the formation of a wildlife control unit, it is hoped that there will be a control unit that has competent personnel prepared for the job and supporting equipment in daily operations.

The same thing was also expressed by another informant, PJ, "So the factors that become obstacles are that we do not know the procedures and how to evict these animals, sir, based on the type of animal sir. So far, the expulsion carried out is by using horns, and manual expulsion. While there is no special equipment, we hope that in the future there will be special equipment provided sir." It is said here that there is a lack of knowledge about the procedures for handling wildlife that have the risk of being handled incorrectly.

(Darmawi, 2010) It is stated that there is a relationship between risk management and engineering or maintenance because the need for adequate personnel and equipment will certainly minimize the severity and reduce the frequency of the same event. Many experts have defined risk as stated by Vaughan in 1978 who stated that Risk is the Chance of loss (Risk is The Chance of loss) this is used to indicate that there is a situation that has the opportunity to experience a loss of something. Another definition is another statement that Risk is a possibility of loss, in this sense, it is explained that risk has a meaning that is very close to everyday life, but this understanding cannot be used in quantitative analysis, because the definition is very loose. From some of these definitions, it can be concluded that risk is the degree of deviation of a value around a central position or an average point. Risk is associated with the possibility of unwanted or unexpected adverse consequences (losses). In other words, "possibility" implies uncertainty. Uncertainty is a condition that causes the growth of risk, this arises because: there is a time interval from the start of planning for the activity until the activity ends. The longer the time interval, the greater the uncertainty. Limited information required by personnel or organization. Limited knowledge and skills that personnel have in making decisions. In wildlife control

efforts, there is a risk of limited information knowledge, and skills of personnel in managing wildlife that appear at airports. With the establishment of the wildlife hazard management unit, it is expected to be able to bridge information and knowledge on how to handle wildlife control.

Supporting Factors for Controlling Wildlife Hazards

After knowing the inhibiting factors in the efforts of wildlife control activities at Muhammad Taufiq Kiemas Airport, there are supporting factors. In the interview by informant AZ, who is an Air Navigation Indonesia personnel, he said, "...we will also coordinate with the Palembang branch office of Air navigation as well, God willing if it can be fulfilled." Here, informant AZ, who is personnel of the Lampung branch of Air navigation, said that he will try to get assistance related to navigation and safety services, in this case, he will try to get assistance related to the management of wildlife control from Indonesia Air navigation. We as interviewers did not intend to interfere, but to be sure, by asking about the assistance that would be provided, we also asked, "This means that in this activity supporting equipment will be needed, and Air navigation will also provide equipment, sir?", he replied "Yes."

The next supporting factor is the formation of the organization. We also listened to information from Mr. MS, who has now changed to Chief Officer of the Service Unit. Mr MS as Head of the Muhammad Taufiq Kiemas Service Unit said:

"*Because it has not been formed, God willing, it will be formed soon*". This means that as a leader of an organization, the airport will soon create a Cocurricular Organization Structure. Hopefully the formation of a wildlife control unit (wildlife management) along with appointing personnel. Furthermore, informant SA said, "*What supports the control activities is that we need a car, weapons such as air rifles, limited personnel, also we need training - training related to hazard control*."

The sentence above considers that personnel need operational vehicles, wildlife repellent equipment, and personnel who will follow the development of wildlife control, and most importantly a collection of Standard Operating Procedures (SOP) on wildlife control, where with the establishment of the Wildlife Control Unit (wildlife hazard management) will be coordinated in an integrated and systematic documentation of existing wildlife and interfere with flight operations and handling.

According to Mr. PJ, one of the informants, the fences and horns that are available to prevent wildlife from entering the airport are very useful if they are controlled on a scheduled and regular basis by the wildlife control unit that will be set up by the leadership, not just because there will be flights. So according to informant AR, who said that ".... we are equipped with an official motorbike, HT, and assisted by other friends...". If it becomes a separate unit, it must have patrol vehicles such as patrol cars and other supporting equipment. For this reason, making wildlife control a special unit means that the airport can already make a work program on how to prevent wildlife coming from outside the airport from re-entering. If it has been planned, then the implementation time will be monitored, and then the work program can be ascertained that the Safety Management System at Muhammad Taufiq Kiemas Airport has been implemented. Continuous quality improvement will make the

wildlife control handling program better in the future. To realize this, it takes the enthusiasm and cooperation of all parties, both internal and external to the airport.

Expected Condition

In this study, it is known that Muhammad Taufiq Kiemas Airport does not yet have a Wildlife Control unit, whose job is to create and collect data related to the presence of wildlife entering or around the airport. If it is known then manage the data to be able to map the level of risk and mitigate. Once knows, that wildlife is entering the airport, the steps to handle them are to establish a wildlife hazard management unit. The purpose of establishing this unit is to give responsibility to designated personnel to make reports and studies. (1) Prepare a supervision report on wildlife hazard management activities, (2) Operate wildlife hazard control, here controlling and controlling the presence of wildlife using repellent devices at the airport. Every activity is reported and documented, (3) wildlife hazard management activities, this is done to assess the effectiveness of the handling that has been done, (4) To expect maximum results, discipline in handling is needed as well as cooperation with parties outside the airport so that the right formula for controlling wildlife is found and mutually supports the surrounding community. (Muksin, 2017).
The desired conditions are as follows:

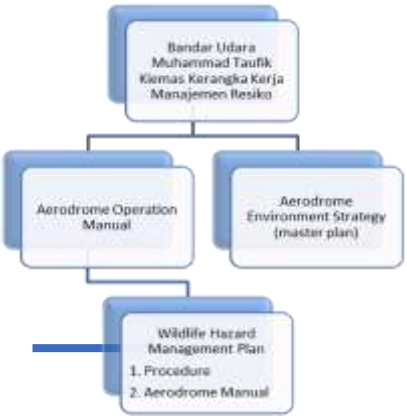

Figure 4. Expected conditions for controlling the dangers of wild animals

We know that in the Safety Management System, there are 4 (four) pillars, namely: Safety Policy, Safety Risk Management, Safety Assurance, and Safety Promotion (Opoku et al., 2023)(Chan & Li, 2023). In terms of controlling the dangers of wildlife, it refers to the regulations that have been set, namely: Indonesian Constitution of Aviation (Constitution No. 1 Year 2009), the Minister of Transportation issues regulation, Directorate General of Civil Aviation Regulation No. 40/2010 on the instructions and procedures of civil aviation safety regulations section 139-03 of the danger management of wildlife (Wijaya et al., 2023). In addition, there are restrictions regarding wildlife and firearms control issued by the Indonesian Chief of Police. The airport manager's dedication to ensuring both the safety of aircraft operating at Muhammad Taufiq Kiemas Airport—that is, the absence of bird strikes—and the airport's safety from the threat of wildlife hazards is known as safety risk management of wildlife hazard control. The fact that the airport still has wildlife

habitats on land and in the operational area, which is an aquatic environment, means that the risk and potential threat needs to be estimated and evaluated.

Airports (Sheikholeslami et al., 2023) are required to periodically count the presence of wildlife around airport facilities and then rank the species of wildlife around the airport. These data include Native animal populations and the annual migration of animals, included in the report, Size and shape of birds or other animals that could potentially cause harm, Location of observations around and inside the airport, and history of bird attacks (if any). Methods used by applicable regulations in Indonesia. Safety Assurance in this case is an activity carried out in the form of daily and weekly monitoring which is reported regularly to the person in charge of airport operations. Non-periodic monitoring is carried out in the event of a sudden spike or occurrence of wildlife attacks. Monitoring activities must be documented both audio and visual (Tong Wtm, 2017). Another activity is safety promotion, while the form of this activity is in the form of training and counseling (socialization). In addition, another activity is communication which is expressed in hazard reports submitted periodically through the aeronautical information system(Opoku et al., 2023). From all of them, the next action is evaluation, which includes key performance indicators and review (audit) where the purpose of this activity is to determine the level of success in controlling wildlife hazards. (Airport, 2020).

In order for the wildlife hazard management unit to carry out its functions more effectively, it is necessary for it to have the following functions. These functions include information sharing, risk identification, and ensuring that all relevant parties are involved in the risk management of wildlife presence at the airport. Secondly, hold frequent meetings at least twice a year. Third, talk about problems pertaining to animal threats and how to mitigate them. Fourth, go over and talk about the control report and wildlife hazard management strategy. Fifth, go over bird strike reports, the outcomes of countermeasures, and the growing list of bird handling techniques and how they were put into practice. Sixth, Evaluate the Enhancement of Wildlife Control Handling Performance Indicators. Seventh, Discuss the Management Strategy of wildlife control at neighboring airports. Together with institutions outside the Ministry of Transportation that are interrelated with wildlife control, such as the environmental agency, Bukit Barisan Tourism Park, other parties such as ground handling, airlines, and other agencies gather to discuss wildlife control.

D. Conclusions

The government has issued Director General of Civil Aviation Regulation No. SKEP /42/III/2010 concerning Guidelines and Procedures for Civil Aviation Safety Regulations Part 139-03, but the lack of a wildlife hazard control unit at the airport is one of the factors impeding the control of wildlife hazards at the airport. Advisory Circular CASR 139-03, Wildlife Hazard Management on Or in The Vicinity of An Aerodrome, addresses wildlife hazards at airports and their environs. However, financial management and equipment handling are still done manually and simply due to a lack of staff. Pets of residents that are allowed to roam freely within the owner's garden but nevertheless contribute to its perimeter, like dogs, are considered

wildlife that enters the airport airside area. Therefore, socialization in the surrounding community regarding stray animals is needed.

Another factor is the handling procedures for other wildlife that need attention from regulators such as the Directorate General of Civil Aviation, to provide socialization and training on manual procedures for the airport officer and standard operating procedures for handling wildlife when they are entering the airport, so after that officer can carry out procedures in a planned and sustainable manner. Supporting Factors to control wildlife hazards are that operational officers know the types and things that cause wildlife to gather and they also know the danger effects they pose to aviation, so surveillance activities and security patrols at airside facilities are routinely carried out. Perimeter fencing prevents and restricts wildlife from entering the airport such as wild boars, monkeys, and apes. Bird trapping using simple nets has slightly reduced the number of incoming birds. Coordination and communication between the airport and Air navigation are well established so until now there have been no incidents caused by wildlife. The airport management is very supportive of immediately fixing this problem by forming a wildlife hazard management unit at Muhammad Taufiq Kiemas Airport. Wildlife hazard management as a unit work organization at Muhammad Taufiq Kiemas airport is not available yet, so airport management must be immediately created and coordinated with Silampari Lubuk Linggau airport as the airport coordinator. It can be proven that the safety management system at the airport can be implemented and managed effectively and sustainably.

E. Acknowledgement

The author would like to thank the Director of the Palembang Aviation Polytechnic and the management for providing opportunities and support in this research, not forgetting to thank the Head of the Silampari Airport Operator Unit Office and M Taufiq Kiemas Airport for helping in this research, hopefully, it will be a deed of worship for all of us. Hopefully what we convey in this research will add to the repertoire of science, especially in the field of aviation safety, and be of benefit to all of us. Ameen ya Robbal alamiin.

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