RES MILITARIS
REVUE EUROPEENNE D ETUDES EUROPEAN JOURNAL OF MILITARY STUDIES
Social Science Journal

The Contemporary Airspace Threat and Their Impact on Sovereignty Over Air Space

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Abstract

The principle of sovereignty in air space has a very close relationship with the sovereignty that applies in the sea and land areas of a country. Sovereignty over the airspace of a country needs to be safeguarded from various threats, especially in the current era of rapidly developing technology, where airspace plays a very significant role. It is to consider that the airspace is the used in three (3) different categories, namely as a means of aviation and aerospace, satellites and space infrastructures and transmission, telecommunications, information and cyber. The research was conducted to identify and formulate the concurrent types of threats to sovereignty in the airspace in order to build an effective air defense system. A neatly categorization of air space threats based on types dan media and their impact on sovereignty over air space will support the right strategy of air defense. This study uses a quasi-qualitative method with a phenomenological approach. A research method that uses network analysis and intelligence analysis to describe the relationship between actors and for the impact of threats on various aspects of the state related to air defense. Both analyzes are supported by studies using 4 PEST factors, namely Political, Economic, Social, and Technological factors. The result of this study is an extracted nine (9) forms of air threats in their correlation with the objective of any potential attacks.

Keywords: Territory, Air space, Air threat, sovereignty

Introduction

The international law of the Paris Convention 1919 [1] and which was later confirmed in the Chicago Convention of 1944 [2] defined that air space is the space that is above the land space or ocean space around the territory of the state and attached to the earth in the territory of a sovereign state and has the right to exercise sovereignty, sovereign rights and jurisdiction, that implies that every country has full sovereignty over the airspace above its territory. According to Prof. DR. Priyatna Abdurrasyid [3] the territory of the Unitary State of the Republic of Indonesia consists of one third of land, two thirds of water and three thirds of air. The constellation of the proportions of the area actually gives proportional attention priority to the airspace in the context of the state's sovereign territory. KASAU gave an explanation regarding the state's sovereign territory in Air and Space on the occasion of the SESKOAU National Seminar on April 22, 2021 [4]. It is stated that the Indonesian Air Sovereignty

Territory and Space as an Area of Interest in relation to the Sea Area in accordance with UNCLOS 1982 [5] which is illustrated in the form of a cone with a three-dimensional geometric shape that tapers smoothly from a flat base to a point called the peak, at where the apex is the earth's core (Figure 1). In Figure 1 it can be seen that this horizontal air space is above the land area and sea area of the Republic of Indonesia based on the provisions of UNCLOS 1982. And the vertical limit is set up to a height of 110 km from the configuration of the surface height of the Indonesian state, as stated in the Law of the Republic of Indonesia. Number 23 of 2013 concerning Space. The altitude exceeding 110 km is already a space area and is an area of interest, where technically aerospace is also the limit of the surface aerodynamic function.

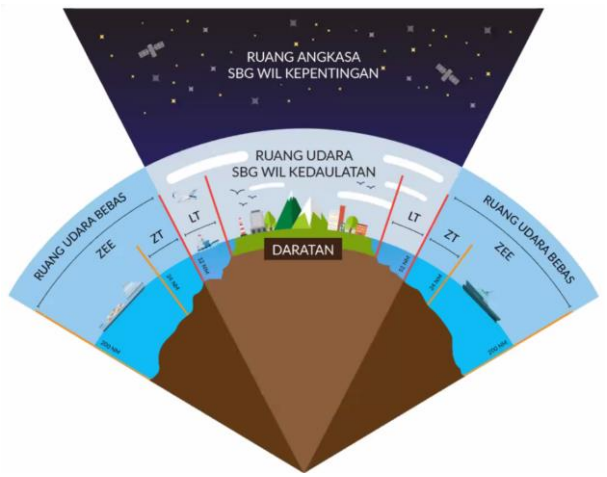

Figure 1: *Definition of Airspace and Area of Interest*

Looking from today's strategic functions, air space and outer space, which are the sovereign territory of a country, are valuable national assets, not only for the military and state security interests, but also for various interests related to politics, economy, social and others, both for the military and the private sector. Dependence directly or indirectly on air space and outer space and the resources contained therein for the benefit of human life involves various aspects, including the development of transmission and telecommunications technology, laser technology, electronics, electrical, skyscrapers, flyovers, frequency transmission to guide safety and security of flight paths that apply globally, periodic bird migration routes between regions or continents, aerial mapping, empowerment of wind energy, and others.

In general, the use of air space can be divided into 3 categories of facilities and infrastructure [6]:

1. Aviation and Aerospace Potential
2. Satellite and Space (supervision and others)
3. Transmission, Telecommunications, Information and Cyber

This has been proven and recorded in the development of aviation history and aerospace potential in airspace since the beginning of aerospace development in the 19th century, where airline facilities and infrastructure at that time were used as logistical support and mail delivery [7]. During the First World War, the function of aircraft and aviation as logistical support shifted to a reconnaissance mission function, taking aerial photographs to create a map of the strength of each belligerent party, as the main support for ground artillery with the help of aerial fire, providing air cover, conducting air strikes to air combat and strategic and tactical bombing, and others.

It is noted the existence of several air threat events in the past involving two or more hostile countries. It should be noted that not all air threats are carried out by the state, because there are so many independent non-state actors operating on the basis of various political, economic, social and cultural based motivations. Several air threats that have occurred have not only triggered public unrest from the countries involved, but have increased tensions between a number of parties and in the past it was mostly triggered by situations, conditions, or events that occurred due to the national interest of a country.

After the Word War I, the rapid technology development has enhanced the use of air space and also recorded some incidents involving attacks in various countries through airspace that make it a form of airspace threat, among others:

1. Bombing of Pearl Harbor during World War II. A sudden attack by the Imperial Japanese Navy against the Pacific Fleet Headquarters of the United States Navy on December 7, 1941 which resulted in the destruction of various battleships, 188 aircrafts and the death of 2,403 US servicemen. In addition to ravaging American military bases, it also dragged involvement in the Pacific war.
2. Bombing of Hiroshima and Nagasaki during World War II. On August 6, 1945, the American B-29 Enola Gay dropped a 4.4 Ton Uranium bomb on Hiroshima and continued on August 9, 1945 Nagasaki, resulting in the deaths of hundreds of thousands of people, which later marked the end of the Pacific war.
3. Air piracy. On March 28, 1981, there was a hijacking by five terrorists led by Imran against the Garunda DC-9 plane that departed from Jakarta-Medan. And the operation to free piracy is known as Operation Woyla which was carried out the day after the hijacking. This incident is a terrorist incident that occurred in Indonesia.
4. Gulf War I. With desert storm operations or Operation Desert Storm carried out to liberate Kuwait for the Iraqi invasion of the country and occurred on January 17, 1991. Attacks in the form of massive air attacks on Baghdad and several other Iraqi areas. In these air operations it was seen that the use of fighter aircraft and missiles was very dominant and even the role of repelling missile attacks such as the Patriot became a mainstay in winning the war.
5. The 911 Terrorist Attack. The September 11, 2001 attacks called the 9/11 attacks were a series of suicide attacks resulting from the hijacking of a passenger jet that accidentally crashed into the twin towers of the World Trade Center / WTC in New York City. The impact of this attack in addition to collapsing the WTC building also killed 3,000 civilians and became the highest number of terror attacks in history.
6. Cyber Attack in Estonia. On 27 April 2007 there was a cyber attack that targeted the websites of Estonian organizations, including the parliament, as well as banks that harmed various parties, especially economic players, M-banking facilities and other public facilities were not functioning causing huge losses to the state.
7. The Armenian-Azerbaijan War. This war took place on September 27, 2020 against the backdrop of the seizure of the Nagorno Karabakh area. In the war, the role of the Turkish-made Bayraktar TB2 Drone was able to destroy the Armenian anti-aircraft weapon system. Drones became a key asset in winning the war by Azerbaijan.
8. Drone Attack. A drone attack occurred on March 7, 2021, at the Saudi Aramco Refinery facility resulting in a fire and huge losses. Similarly, the American MQ-9 drone attack that killed Iranian General Soleiman against Iranian Generals occurred on January 3, 2020. From these events it proves that drone technology is increasingly being used in military operations.

9. The fall of space junk. On July 30, 2022, the National Research and Innovation Agency (BRIN) reported that a rocket used to launch a space station module belonging to the People's Republic of China crashed in the Indian Ocean. The waste weighs about 20 tons with a diameter of 30 meters if there is a plain with a dense population, it will cause enormous losses.

Theoretical Framework

The framework used in this research method are the network analysis, the intelligence analysis to describe the relationship between actors and for the impact of threats on various aspects of the state related to air defense. Both analyzes are supported by studies using 4 PEST factors to analyze external factors for the research subject.

Network Analysis

Due to the complexity of the interconnection and -relation in the air space and its threats, it is important to draw the connection between one another by the network analysis methods to analyze and optimize the possibilities in order to get a clear picture about the concurrent situation.

Intelligent Analysis

The intelligence analysis is the commonly used method to make decisions about threats since the characteristics of the information gathered as well as their credibility have a great impact. The information gathered about adversaries is used to answer tactical questions about current operations or to predict future behavior and will be tabulated and then processed using descriptive, comparative, and associative statistics.

PEST (Political, Economic, Social and Technology)

This method was developed by Prof. Francis Aguilar from Harvard University in 1967 to analyze external factors for a research subject, in this case related to the threats faced, with the analysis of PEST factors (Political, Economic, Social and Technology) (Jennifer Post, 2021). Each factor is described as follows: P - Political Environment, is an analysis of the impact of politics on research subjects, such as politics on the business world, policy making, threats to national security and others; E - Economy, that examine external economic problems that can play a role in the research subject; S - Social, an analysis of a certain socioeconomic environment can be carried out to understand how research subjects can adhere to social conditions, such as the impact on demographics, population growth, age distribution, attitudes towards work and others, and T - Technology, that plays a big role these days, and can have a negative or positive impact. With the introduction of new technologies and services, the form of threats can shift and it is necessary to study technology from all angles. Specific matters to look at include, but are not limited to, government spending on technology research, the current technology life cycle, the role of the internet and how it is changing, and the potential impact of information technology.

Research Methodology

This study uses a quasi-qualitative method with a phenomenological approach. A research method that uses network analysis and intelligence analysis to describe the relationship between actors and for the impact of threats on various aspects of the state related to air defense.

Results and Discussion

The air space technology developed rapidly after the period of World War I, since every country try to bring the best solution for their own defence purpose to protect their countries. At the other side, this rapid development can lead to an offence mechanism, in the event that disputes occurred. As sown in the below figure that in line with the technology development, the trend of air threat mode media is also evolving very quickly. The ancient air threat medium was "attack with hot air balloons which was then followed by a series of attacks using Airplanes. These attacks are getting more and more complex, because in addition to involving sophisticated scenarios, the attackers use high-tech computing resources until Drones are born.

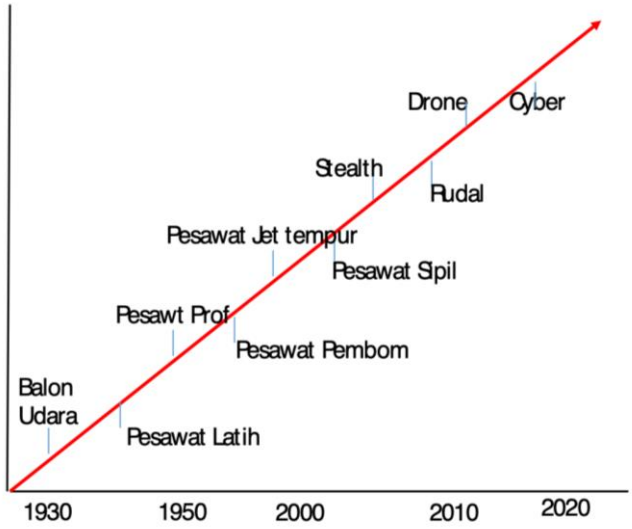

Figure 2 *The Evolution and Complexity of Air Threat Media*

The study shows that the air threat to the defense sector is real, and not a hypothetical fiction. The collection of data, information, and content collected during the study can be interpreted as follows:

The seriousness of a country in facing and responding to air threats varies. Although this phenomenon has been discussed and debated by various developed countries since the 911 attack on the WTC in USA, the drone attack on Iranian General Qasem Soleimani and the Saudi Arabian Aramco oil refinery attack, became a turning point for various countries to pay attention to this seriously. As a wake-up call, the first countries to react to this event that almost paralyzed America were the NATO members, and therefore, the level of NATO Countries urgency is increasing rapidly in building air defense. Each country is trying hard to develop its own strategy, including they agreed to cooperate closely through the strategic defense initiative "Star Wars" in maintaining its air defense. Various efforts were made collectively to avoid the latest air threats, such as: espionage, air attacks, and acts of terrorism through air media, and so on. Indonesia can learn by building a collective air defense with ASEAN countries or the G-20, for example, because it is a member of a consortium of these countries.

The air threat that occurs is an external factor that cannot be fully controlled, where its existence still exists today. A country that does not have the independence of its defense industry will be in a weak position, considering that the majority of the components that make up airspace come from technology made by developed countries. It is this fact that underlies China's decision to build its own air defense, which is "apart" from foreign domination by

western countries. They assume that air strikes can never be stopped as long as dependence on western technology is still high. The rapid progress of giant corporations in China, apart from making the United States military industry hot, has also succeeded in shifting the pendulum of world military power to Asia. Indonesia must strive to build a military industry so that it can produce various military technologies for domestic needs. In addition to increasing the country's independence and sovereignty, Indonesia can begin to improve its air defense performance slowly but surely. In addition to these two important components, Indonesia also needs to develop various other tangible and intangible assets such as encryption/decryption algorithms, air defence posture, competent air defence human resources, defense and security standards, etc.

Each country has a diverse and different air threat posture. The variety of these threats is highly dependent on the characteristics of the country and the strategic environment around it. The USA which has many enemies will always be faced with air threats from various countries that have had a bleak history with it. China will always face threats from alliances of western countries, especially from the United States. Meanwhile, Middle Eastern countries often attack each other because of their different positions in the global political constellation. Meanwhile, other developing countries in Asia and Africa mostly face many airspace violations due to the country's geographical conditions. This means that Indonesia must properly understand the strategic environmental conditions in the region that affect it, because basically air threats do not only exist in air space, but are highly dependent on the situation, conditions, and the multi-dimensional context that surrounds them, whether they have political, economic, or political nuances. social, cultural, ideological, and so on. At the policy level, the strategic position of this air threat must be seriously discussed in the national defense doctrine adopted and adopted. The defense doctrine of a country greatly determines the strategic and operational policy steps that are taken and implemented. Basically, this doctrine becomes the main guide in carrying out various air defense actions in the field. Every developed country in the world has its own views on the air defense doctrine that it develops and adopts. A strong air defense doctrine is seen when it is at the state or national level, and explicitly mentions the word "Air Defense" in it. While the doctrine of weak air defense is not explicitly seen in the national doctrine and related national defense doctrine, because it is a small part of certain domains, such as: threats, attacks, phenomena, trends, technology, and so on. Between the two extremes, there are various variations in the positions of the air defense and state sovereignty doctrines that are designed in accordance with the philosophy of the country that adheres to them. Indonesia as a sovereign country needs to think about the existence and position of the air defense doctrine and the sovereignty of this country in its mindset and state structure. By adhering to the effectiveness of top-down state policies, it can be said that the existence of an air defense doctrine is mandatory. Only awareness and strong political will can develop the most appropriate doctrine for a maritime country like Indonesia. Based on the existing doctrine, the main principles that must be adhered to in the life of the state in relation to air defense are determined. There are at least three things that are interrelated with each other which are derived based on established doctrines must be defined and determined, namely:

1. Principles, which are values that will be held firmly as a guide in thinking, behaving, and behaving.
2. Paradigm, which describes a mindset that is in accordance with the characteristics and posture of air defense.
3. Policy framework, concerning the conceptualization of policies that need to be prepared and developed in the field of air defense.

The above grouping is based on several events in the past, which have been well recorded in various scientific publications through a case study approach. In addition to studying various real cases that afflict various countries in the world, related literature is also used as a source of researchers in conducting the clustering process.

The results of data processing carried out, it is shown how an air threat can potentially cause disturbances that threaten state sovereignty, territorial integrity, and national safety. The results of this study and research categorize the classification of air threats against national defence based on the impact of the hazard posed into 9 (nine) major groups as shown in Figure 3 below. Further analysis of those 9 (nine) types of air threats that are allegedly going to occur in the next 5-10 years, indicates that there are 4 (four) major air threats that definitely need to be observed further by the national air defence sector in Indonesia. Those 4 (four) major air threats are

1. a violation of national airspace
2. air attacks
3. espionage and
4. cyber threats.

Figure 3 *Nine Forms of Air Threats on National Defense*

Table 1 *Mapping of Air Vehicles against Air Threat Forms*

Form \ Vehicle	Fighter A/C	Civil A/C	Rudal	UAV	Cyber Space	Space Alien
Airspace Violations	■	■		■		
Air Strike	■	■	■	■		
Espionage	■	■		■		
Sabotage		■		■	■	
Terrorists		■		■	■	
Smuggling		■				
Piracy		■				
Satellite waste						■
Cyber Threat					■	

The various types of air threats as described have different ultimate goals and objectives. The results of the study regarding relevant various airborne threats launched is tabulated as below.

Table 2 *Forms and Objectives of Air Threats in the Defense Sector*

No	Forms of Air Threats	Objective
1	Airspace Violations	Reduce operational costs for civil aviation, cut lanes for savings
2	Air Strike	To destroy strategic vital objects of a country
3	Espionage	Obtaining strategic data through aerial vehicles
4	Sabotage	To destroy objects that are considered to interfere with certain interests
5	Terrorists	Create a sense of terror for human life
6	Smuggling	Profit from illegal goods
7	Piracy	As an attempt to realize the interests of certain groups
8	Satellite waste	The impact of lack of control and control of the satellites that have been launched
9	Cyber Threat	Damages the main network of defense system tools and digital facilities and infrastructure

Shall the final goals and objectives be achieved, the potential disturbances that will occur to the attacked country are as follows:

1. The paralysis of critical and vital infrastructure that controls the lives of many people, such as vital national objects, military installations, electricity, water, transportation, distribution, banking/finance networks, and others that have the potential to cause chaos in society;
2. Disruption of the management of the national defence system due to the large number of uncontrolled military resources and malfunctioning national defence centres;
3. It is vulnerable to repeated attacks from other countries as well as from enemies in the country due to the weakness of the air defence system; and
4. The weakening of the state defence situation and condition because there are so many air threats that cannot be controlled which in the end the sovereignty of the country is disturbed, and the safety of all citizens is not guaranteed.

The four situations above are very dangerous for the safety, integrity, and sovereignty of the country because they have a direct impact on society. And this situation and conditions has hit a number of major countries in the world that have experienced air threats directly, as described earlier.

Conclusion

Based on the results of the research that has been done, a conclusion can be formulated regarding the evaluation of Disaster Resilient Village program in Tanjung Benoa Village using the CIPP method. The conclusions drawn are:

a. The air threat that looms over Indonesia has drastically increased from time to time amid the increasing number of flights crossing the national airspace. Of the 9 (nine) types of air threats that are allegedly going to occur in the next 5-10 years, there are 4 (four) types of air threats that need to be observed by the national air defense sector in Indonesia, each of which is a violation of national airspace, air attacks , espionage and cyber threats.

b. The impact of air threats that occur has the potential to endanger state sovereignty, especially in the context of air sovereignty, national integrity, public safety, and national security. These dangerous threats are as follows: (i) attacks on vital/critical national infrastructure in order to stop the operation of vital infrastructure that affects the lives of many people such as government centers, military installations, electricity, water, energy, transportation, etc.; (ii) violations of airspace besides being able to interfere with state sovereignty can also interfere with flight safety, (iii) air espionage through aerial observations can detect secret activities and activities in the defense and military sectors, both those that have been and will be carried out; (iv) Cyber threats can cause the inoperability of the technology-based Air Defence System and may even take over the Military Command System.

c. With the increase of complexity and actors in the air space, the potential threats are also increasing and affecting not only military but also civillians. Therefore the country's air defense ecosystem needs to be formed and developed collectively by various stakeholders within the territory of the Republic of Indonesia, so that its existence gets support from all parties so that coordination, collaboration and cooperation can be carried out easily.

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