

The Concept of Stealth UAV to Support Air Defense System in Indonesia's New Capital City



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ABSTRACT: The phenomenon of moving the new capital city in Indonesia creates a new geostrategic perspective. Where in the process must be prepared carefully, especially in the aspect of defense and security systems. This study aims to provide an analysis concept of stealth Unmanned Aerial Vehicle (UAV) to support the air defense system in Indonesia's new capital city area. The research method used is a qualitative approach by conducting a literature study. The results of the study reveal that the air defense system for Indonesia's new capital city is in accordance with the concept of a smart defense, the need for a platform/ air vehicle that can be used to carry out intelligence, surveillance, reconnaissance and even be able to carry out attacks in maintaining security in the Indonesian new capital city area by minimizing enemy detection. . And one platform is to use UAV with stealth which can provide advantages in terms of flexibility, reach, minimized operational risk, and the ability to perform operations that are not detected by enemy defense radar sensors.

KEYWORDS: New capital city,threat of defense system, air defense system, UAV, technology stealth.

I. INTRODUCTION

The capital city is a city designed as the center of government of a country, physically the state capital generally functions as an office center and a gathering place for government leaders (Yahya, 2018). The President of the Republic of Indonesia, Joko Widodo, plans to move the capital city from Jakarta to Kalimantan. The relocation of the capital city is stated in the National Medium-Term Development Plan (RPJMN) for 2020-2024. Even according to Wandy Tuturoong as the Main Expert Staff of the Presidential Staff Office (KSP), President Joko Widodo has signed the State Capital Law Number 3 of 2022 on February 15, 2022 (kominfo.go.id). The relocation of Indonesia's new capital city from Jakarta to Kalimantan aims to distribute development evenly and establish a bureaucratic system that reaches all regions in Indonesia (Andjarwati, 2019). To achieve this goal, the new capital city must have ideal characteristics, at least better than the old capital city. One of these characteristics is having a safe environment, both safe from disasters and threats that endanger national security and defense (Potter, 2017).

From a security perspective, a capital city must consider the social and cultural characteristics of the residents of the prospective new capital city, so that they do not have resistance and potential conflicts to the dynamics of moving the capital city. The indicators related to the security perspective are the Indonesian democracy index, the religious harmony index, and the human development index. Meanwhile, from a defense perspective, a capital city must consider the geographical position and defense infrastructure of the new capital so that it is not vulnerable to external attacks or natural disasters. The indicators that measure defense are the disaster-prone index, the global firepower index, and global cybersecurity index as well as other threats that can endanger the security of the capital city.

The relocation of the capital city also creates a new geostrategic perspective. However, the strategic location of the capital city cannot be separated from the threat of defense and security disturbances carried out by state actors, non-, and hybrids. From these various threats, an ideal defense concept is needed. The concept of the new capital city defense and security system, especially for airspace, refers to the national defense and security system. Furthermore, the National Planning and Development Agency (Bappenas) or the Ministry of National Development Planning disclosed the defense and security system design for Indonesia's new capital city. And the defense and security system at new capital city is called smart defense which is a combination of hard defense and soft defense. hard defense is technological deepening, meaning that the country's defense uses high-tech Main Weapon Systems (*Alutsista*). Meanwhile, soft defense empowers the strengths of local wisdom or local wisdom.

In terms of air defense for Indonesia's new capital city in accordance with the concept of a smart defense defense system, a platform/ air vehicle is needed that can be used to carry out intelligence, surveillance, reconnaissance and even be able to carry out attacks in maintaining security in the Indonesian new capital city area by minimizing enemy detection. And one suitable platform

The Concept of Stealth UAV to Support Air Defense System in Indonesia's New Capital City

is to use unmanned aerial vehicle or UAV with stealth which can provide advantages in terms of flexibility, reach, minimized operational risk, and the ability to perform operations that are not detected by enemy defense radar sensors.

II. METHOD

This study uses qualitative research methods that are subjective from the participant's point of view descriptively so that the results cannot be generalized. This means that this method is more about providing a clear picture of a problem in accordance with the facts on the ground. An activity that is systematic and objective in studying a problem to reach an understanding with basic and general principles about a problem. Where the research carried out adheres to information (which materializes as theories) through previous studies whose purpose is to add to and refine existing theories about the problem that is the target of the study (Nazir, 2012).

III. RESULT AND DISCUSSION

3.1 The Phenomenon of Relocation of the Nation's Capital

The phenomenon of the relocation of the new capital city in Indonesia creates a new geostrategic perspective. Moving the capital city in Indonesia is very possible because there is no law that regulates it. In the law there is no article that mentions where and how to regulate the capital city. This means that there is flexibility in managing the capital city, including moving it. However, in the context of relocating a capital city, there must be a clear reason and urgency as to why the capital must be moved. Therefore, the government is obliged to prepare a legal basis related to the plan to relocate the state capital and prepare environmental safeguards starting from the planning stage to the implementation of infrastructure development activities for the state capital in the field.

Several countries have previously moved their capital cities for different reasons. For example, Brazil moved its capital city from Rio de Janeiro to Brasilia and Australia moved its capital from Sydney to Canberra. The main reason for relocating the national capital in the two countries is to share the burden of the city as a business center and government center while reducing population density (Silalahi, 2019). Some countries that have moved their capital cities are as follows:

Table 1. Countries that have moved their capital cities

Name	Year	Nation Capital Old - new
Brazil	1960	Rio de Janeiro – Brasilia
Myanmar	2005	Yangon – Naypyidaw
Nigeria	1991	Lagos – Abuja
Pakistan	1959	Karachi – Islamabad
Rusia	1918	St. Petersburg – Moscow
Malaysia	1999	Kuala Lumpur – Putrajaya
Australia	1913	Melbourne – Canberra

Source: (Silalahi, 2019).

The plan to move the capital city to be carried out by Indonesia aims to distribute development evenly and establish a bureaucratic system that reaches all regions in Indonesia (Andjarwati, 2019). According to Bapenas (2021), the reasons for the relocation of the national capital are as follows:

1. Around 57% of Indonesia's population is concentrated on the island of Java;
2. The economic contribution of the island of Java is 59% of the National GDP;
3. The crisis of water availability in Java, especially in DKI Jakarta and East Java;
4. The largest land conversion occurred in Java;
5. The growth of urbanization in Java is very high so that it has the impact of high traffic jams and unhealthy air quality;
6. Decreasing the carrying capacity of Jakarta's environment;
7. The threat of floods, earthquakes and landslides in Jakarta.

The Concept of Stealth UAV to Support Air Defense System in Indonesia's New Capital City

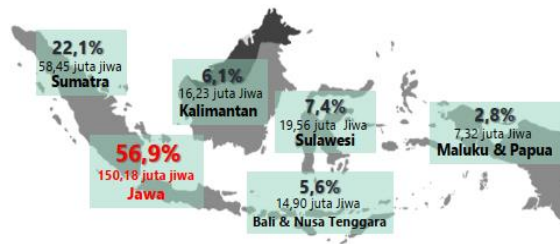


Figure 1. Projected Distribution of Indonesian Population
Source: (Bappenas, 2021).

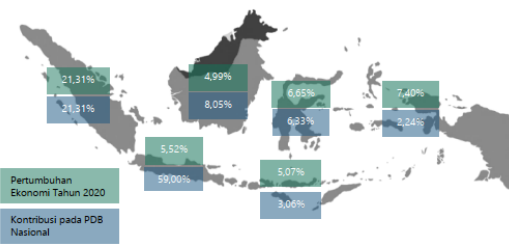


Figure 2. Projected Economic Contribution
Source: (Bappenas, 2021).

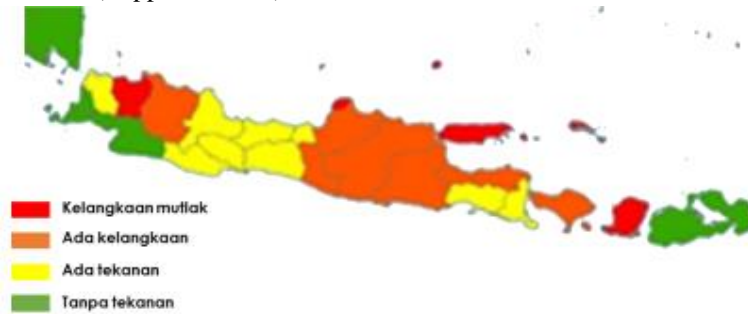


Figure 3. Projection of Water Availability in Java
Source: (Bappenas, 2021).

So to achieve these goals, the new capital city must have ideal characteristics, at least better than the old capital city. A national capital city can be said to be ideal if it has the following characteristics. The first characteristic is that the location of the capital city must be strategic, this criterion is intended to represent equity and accelerate regional development. Second, the availability of large land owned by the government or State-Owned Enterprises (BUMN) to reduce investment costs. Third, have a safe environment, both safe from disasters, pollution, and other environmental problems. Fourth, the potential for social conflict is low, locating the capital outside of the largest urban centers can reduce civil conflict by limiting the ability of any single faction to dominate the government (Potter, 2017). And the choice of Kalimantan as the location of the capital city of the new state of Indonesia is one of them because the location of Kalimantan is strategically located in the middle of the territory of Indonesia which makes Kalimantan the epicenter of the Unitary State of the Republic of Indonesia (NKRI).

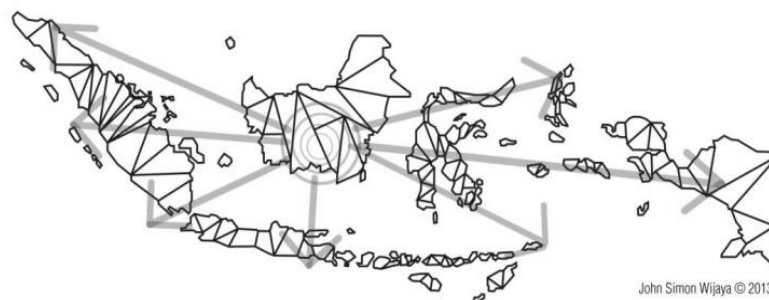


Figure 4. Kalimantan Epicenter of the Republic of Indonesia. Source: (Potter, 2017).

In addition, each of the provinces in Kalimantan which have their respective strengths are sufficient to make it the capital of the country.

The Concept of Stealth UAV to Support Air Defense System in Indonesia's New Capital City

Table 2. General Position of Strengths of Each Province of Kalimantan

No	Provinsi Kalimantan	Ibu Kota	Posisi Umum Kekuatan Ibukota Negara
1	Kalimantan Selatan	Banjarmasin	<ul style="list-style-type: none"> - Provinsi yang lebih awal terbentuk di Pulau Kalimantan - Infrastruktur telah berkembang (++) - Aspek Sosial Budaya (SDM dan bahasa tersebar 60% ke wilayah Pulau Kalimantan)
2	Kalimantan Tengah	Palangkaraya	<ul style="list-style-type: none"> - Diajukan Presiden RI Ir. Soekarno 1957 - Secara geografis terletak ditengah-tengah Pulau Kalimantan dan NKRI - Wilayah Luas
3	Kalimantan Timur	Samarinda	<ul style="list-style-type: none"> - Aspek historis (Kerajaan tertua Hindu Indonesia) - Infrastruktur telah berkembang (+++)
4	Kalimantan Barat	Pontianak	<ul style="list-style-type: none"> - Wilayah luas - Infrastruktur telah berkembang (++) - Beranda depan NKRI
5	Kalimantan Utara	Tanjung Selor	<ul style="list-style-type: none"> - Wilayah luas - Beranda depan NKRI

Source: (Nasruddin, 2013).

3.2 The Concept of a Defense and Security System in Indonesia's National Capital

The National Planning and Development Agency (Bappenas) or the Ministry of National Development Planning (PPN) has unveiled a defense and security system design for Indonesia's new state capital, Kalimantan. The concept of the new state capital defense and security system refers to the national defense and security system. Whatever the doctrine of the state defense and security system, Indonesia adheres to the universal people's defense and security system (sishankamrata), which is a state defense and security system that involves all the people and all national resources, national facilities and infrastructure, as well as the entire territory of the country which constitutes a single defense unit. intact.

Furthermore, the National Planning and Development Agency (Bappenas) or the Ministry of National Development Planning disclosed the defense and security system design for Indonesia's new state capital. In the defense and security system architecture, it consists of four components, the first component is intelligence, the second is defense, the third is security including domestic and public security, and the fourth is cyber. The preparation of the master plan system is based on the principles cost effectiveness and quality of spending. master plan is quite efficient and can overcome all kinds of new state capital security and defense disturbances. The defense and security system at new state capital adopts smart defense and dual strategy. This is to deal with defense and security threats in the form of air rides, sea rides, land rides, and cyber rides.

Smart defense is a combination of hard defense and soft defense. Hard defense is technology deepening. This means that the main weapon system or defense equipment will use high technology. Meanwhile, soft defense empowers traditional local wisdom. Meanwhile, dual strategy is the use of total diplomacy and defense. This means that diplomacy and defense must work together to overcome the problems of defense threats and security disturbances. These two components are expected to be able to form a safe new state capital.

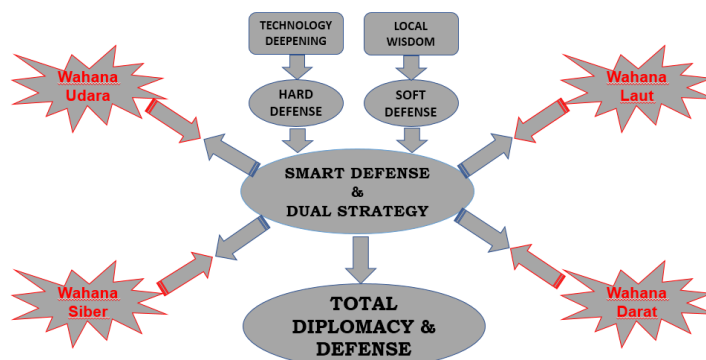


Figure 5. Defense System Concept Chart at New State Capital. Source: (Bappenas, 2021).

3.3 Threat Analysis of the Air Defense System in the National Capital of Indonesia

In the development of the national capital, the stability of defense and national security is the main variable that must be considered. Therefore, it is important for the Indonesian government to anticipate various threats that target the capital city as the center of government. Figure 6 illustrates various developments in real threats to Indonesia which do not rule out the possibility of threatening the stability of moving the capital city of Indonesia from Jakarta to Kalimantan.

The Concept of Stealth UAV to Support Air Defense System in Indonesia's New Capital City



Figure 6. Threat Development in Indonesia. Source: (Sefriani, 2019).

First, the South China Sea conflict, which is a regional security issue that has not yet reached the point of completion, and is prone to disrupting the stability of the Indonesian new capital city region in the future. The problem of Indonesia's conflict with China is related to the South China Sea issue, the Natuna Block is a conflict related to geopolitics, international law and maritime issues (Arifianto, 2018). Second, The border conflict between Indonesia and Malaysia in Ambalat is a waters conflict where there is a dispute over territorial claims that hold quite large oil and gas wealth. The sea block covering an area of 15,235 square kilometers located in the Makassar Strait holds the potential for extraordinary marine wealth (Serpín, et al, 2018). Finally, the case of rebellion in the Papua region which often results in victims is closely related to the term Papuan KKB. KKB is an abbreviation of armed criminal group for a group in the Papua region that spreads terror to both civilians and the TNI and Polri (Chairil and Sadi, 2020).

Furthermore, the relocation of the capital city also creates a new geostrategic perspective. However, the strategic location of the new state capital cannot be separated from the threat of defense and security disturbances carried out by state actors, non-, and hybrids. The location of Indonesia's new new state capital in Kalimantan is adjacent to the land border to Malaysia along 2,062 km, and this is a doorway for defense threats and security disturbances. In addition, the location of new state capital also coincides with the Indonesian Archipelagic Sea Lane (ALKI) II and choke point or the narrow point of the world.

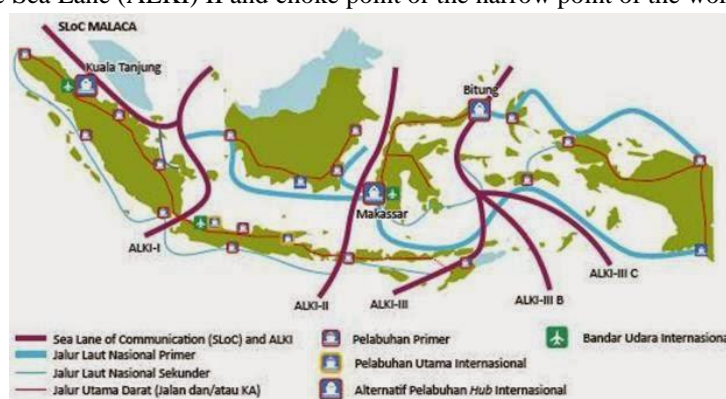


Figure 7. Indonesian Archipelago Sea Lane (ALKI). Source: (Sefriani, 2019)

While on the air side, the location of new state capital is close to the Flight Information Region (FIR) belonging to neighboring countries, such as Singapore, Kinabalu Malaysia, and Manila, the Philippines. Indonesia's new new state capital is also within the cruising radius of ICBMs (intercontinental ballistic missiles) and hypersonic of certain countries. Another threat is that currently the island of Borneo is a trans-nation crime, such as people smuggling, drugs, and so on. new state capital is also with the terrorist transit triangle in Sulu, Sabah, and Poso. And lastly, the new new state capital position is surrounded by defense alliances, such as FPDA (Five Power Defense Arrangements), AUKUS (Australia, United Kingdom, United States) and OBOR (One Belt One Road)/BRI (Belt Road Initiative).

The Concept of Stealth UAV to Support Air Defense System in Indonesia's New Capital City



Figure 8. Illustration of New State Capital Air Defense Threats. Source: (Sefriani, 2019)

These threats are the center of attention for the security and defense of Indonesia's new state capital. Where the strategic potential of Indonesia's new state capital as one of the axis of international traffic makes this new state capital vulnerable to various threats, especially air security. Air security issues with potential threats in the future include threats of violence (air piracy, sabotage of vital objects, terror), threats of air violations (illegal flights and reconnaissance against Indonesian territory), resource threats (utilization of airspace by other countries), and threats lawlessness through air media (illegal migration and people smuggling).

Commander of the National Air Defense Command (Pangkohanudnas) Marsda TNI Novyan Samyoga said there were 498 violations of air space by foreign military aircraft as of May 17, 2021. Some of these cases were in 2015, the US military jet Dornier Do-328 110 made by Fairchild Aircraft, United States, landed without security clearance at Sultan Iskandar Muda Airport, Banda Aceh. Malaysia was also recorded to have violated Indonesia's air space in 2016, when a foreign fighter jet belonging to Malaysia was caught on radar flying without a permit over Karang Unarang, Ambalat Waters, East Kalimantan (Sefriani, 2019). Then the hot case related to the Flight Information Region (FIR) around the Riau and Natuna Islands was under the authority of Singapore for 76 years since 1946 before being taken over by Indonesia and reaching an agreement in early 2022. From various cases and the need for a strong air defense system.

3.4 The Use of Stealth UAV in Supporting the Air Defense System at the National Capital of Indonesia

Based on the analysis of various threats that may occur in new state capital, it has the potential to cause threats whose patterns and forms are increasingly complex and multidimensional. The air defense system for Indonesia's new state capital is in accordance with the concept of a smart defense, requiring a platform/ air vehicle that can be used to conduct intelligence, surveillance, reconnaissance and even be able to carry out attacks in maintaining security in the Indonesian new state capital area by minimizing enemy detection. And one of platforms is to use stealth Unmanned Aerial Vehicle (UAV) which can provide advantages in terms of flexibility, reach, minimized operational risk, and the ability to carry out operations that are not detected by enemy defense radar sensors.

The use of the UAV can basically be an appropriate alternative to overcome existing problems, as well as a response to the influence of rapid technological advances, as well as in line with the implementation of Revolution in Military Affairs (RMA), which is aimed at achieving the capability of Network Centric Operation or Network Centric Warfare. In the future, the development of the UAV system will prioritize technology, integration and interoperability, so that it is hoped that it will be an effective and efficient solution to carry out supervision in Indonesia's new state capital areas in order to avoid all forms of threats.

a. Unmanned Aerial Vehicle (UAV)

Based on the Regulation of the Minister of Defense of the Republic of Indonesia number 26 year 2016 concerning Unmanned Aerial Vehicle for State Defense and Security Tasks, where Unmanned Aircraft, hereinafter abbreviated as UAV, are types of aircraft which are categorized as defense equipment and security in which flight operations are not manned by humans, and controlled remotely either manually or automatically. The UAV system is an unmanned aircraft flight system, which is controlled remotely, either manually or automatically, consisting of UAV, payload, human resources, control systems, data networks, and supporting elements.

The Concept of Stealth UAV to Support Air Defense System in Indonesia's New Capital City

Table 3. UAV Classification Based on Minister of Defense Regulation No. 26 Year 2016

No	Klasifikasi	Berat (Kg)	Ketinggian Operasi (ft)	Radius Operasi (Km)	Waktu Operasi (Jam)	Satuan Pengguna	Misi Operasi Militer
1	Micro	<2	< 200	< 5 LOS	< 5	Perorangan - Peleton	
2	Mini	2 - 20	< 3 000	< 20 LOS	< 10	Batalion taktis	Pemotretan; Pengumpulan Data; Inspeksi; Alat Peluncur, Transportasi Kargo, Stasiun Relay, Mitigasi, Penangkalan, Pengamanan, Pengintaian, dan Pengawasan
3	Kecil	20 - 150	< 5 000	< 50 LOS	< 24	Brigade Taktis	
4	Sedang	150 -600	< 10 000	< 200 LOS	< 48	Formasi Taktis	
5	1. MALE	> 600	< 45 000	Tidak Terbatas BLOS	> 120	Teater Operasional	
	2. HALE	> 600	< 65 000	Tidak Terbatas BLOS	> 120	STRATEGIS / NASIONAL	
	3. STRIKE / COMBAT	> 600	< 65 000	Tidak Terbatas BLOS	> 120	STRATEGIS / NASIONAL	

Source: Draft Minister of Defense No. 26 Year 2016

The Defense Industry Policy Committee (KKIP) which was formed through Law Number 16 of 2012 concerning the Defense Industry has compiled seven national programs for the independence of the main defense system equipment (alutsista), namely the development of the KFX/IFX jet program, the submarine development program, the propellant industry development program, the development of the national rocket, the development of the national missile, the development of the national radar, and the development of the medium tank. Then the government has also set policy on priority programs for technology and industrial development guided by the Presidential Regulation of the Republic of Indonesia Number 8 of 2021 concerning General Policy of State Defense for 2020-2024 (Jakumhanneg). So that three other priority programs were added, namely the development of military satellites, the development of underwater sensing, and UAV development program (Lesmana, et al, 2021).

Unmanned aerial vehicle is known by many names and acronyms throughout history, namely; Drones, RPV (Remotely Piloted Vehicle), UCAV (Uninhabited Combat Aerial Vehicle), FVO (Organic Aerial Vehicle), UCAV/S (Uninhabited Combat Aircraft Vehicles/ System), RPA (Remotely Piloted Aircraft), RPH (Remotely Piloted Helicopter), Aerial Robotics, and MAV (Micro Aerial Vehicle) (Noor, 2020). UAV technology is one of the technologies that can be used as supporting equipment or equipped with weapons to support military operations. Military UAV being one of the newest technologies that have been used in war for the last few years, the technology increases effectiveness in warfare (Gupta, et al, 2016). The effectiveness of UAV has also been widely studied, one of which is the research conducted by Ristanto, et al (2020) analyzing the effectiveness of the use of UAV in combating Maritime Transnational Organized Crime where the research results give positive results and the UAV system can have a fairly good influence in maintaining defense and security in terms of overcoming Maritime Transnational Organized Crime.

In Indonesia UAV which is owned by the Indonesian National Army (TNI) is a type of CH-4 product from China whose use is more towards reconnaissance. In addition to CH4, the TNI also has 4 UAV Aerostar which are used for mapping the Poso mountainous area, securing and observing from the air the 212 action in the capital Jakarta in September 2016, identifying the presence of the Santoso group, in November 2017 securing vulnerable areas in the Timika Papua region. In addition, there is a domestically made UAV Wulung which is used for the task of observing border areas and handling forest fires. And finally, there is an UAV of the Medium Altitude Long Endurance (MALE) type with the name Elang Hitam which is still being developed not only for reconnaissance but also for carrying out attacks (Utama and Anwar, 2021).

The Concept of Stealth UAV to Support Air Defense System in Indonesia's New Capital City



Figure 9. UAV CH-4

Source: (Main and Anwar, 2021).



Figure 10. UAV Aerostar

Source: (Main and Anwar, 2021)



Figure 11. UAV Wulung

Source: (Utama and Anwar, 2021)



Figure 12. UAV MALE Black Eagle

Source: (Main and Anwar, 2021)

b. Concept of Stealth Technology

The emergence of stealth is caused by the emergence of major changes in the scope of warfare that bring the application of technological inventions combined with fundamental changes in doctrine, operations and concepts of military organization, which are fundamentally related to the character and way of conducting military operations. This change is generally known as Revolution in Military Affairs (RMA) (Sloan, 2003). Therefore, major countries are trying to develop weapons as a product of their defense industry by prioritizing the application of advanced technology. Aircraft with stealth or so-called silent aircraft are aircraft designed with stealth to absorb and deflect radar electromagnetic waves, thus making the aircraft more difficult to detect. In general, the purpose of using this technology is to launch attacks using aircraft in enemy areas without being detected by the air defense radar (Noor, 2019).

To meet the stealth of the aircraft, there are three things that can be minimized, namely:

1. Visual aspects, such as eliminating smoke trails, repainting or repainting the aircraft to resemble environment in which the mission is carried out.
2. Aspect Infrared, which reduces the use of after burner.
3. Radar aspect, namely reducing the radar cross section (RCS) of the plane itself. fighter aircraft low surveillance is felt to be able to increase the probability of a fighter aircraft's success in carrying out its mission because it is able to provide an element of surprise in the opponent's area. In addition, with the existence of low surveillance combat aircraft, it is hoped that the aircraft will be able to have life cycle than combat aircraft that have a higher RCS.

(Purnomo and Bura, 2018).

Radar Cross Section (RCS) is the ability of an object to reflect the radar signal back to the transmitter source. The smaller the RCS value of an object, the more difficult it is for the object to be detected by enemy radar. The advantages of reducing RCS are as follows:

1. Reduction of the detection distance from the target or aircraft.
2. A reduction in the search area or search volume of enemy radar will take longer to scan than for the same amount of space .
3. Radar or electromagnetic signature the reflected enemy or the opposing party will not be able to detect what objects are approaching.

(Purnomo and Bura, 2018).

Therefore, stealth in aircraft is currently being developed with various methods, one of which is by modifying the shape of the aircraft (shaping) and with material technology that can absorb and deflect radar electromagnetic waves or commonly known as

The Concept of Stealth UAV to Support Air Defense System in Indonesia's New Capital City

the Radar Absorbing Material (RAM) method (Noor,2019). The following is a graphic illustration of the difference in RCS values on conventional aircraft with aircraft that have stealth.

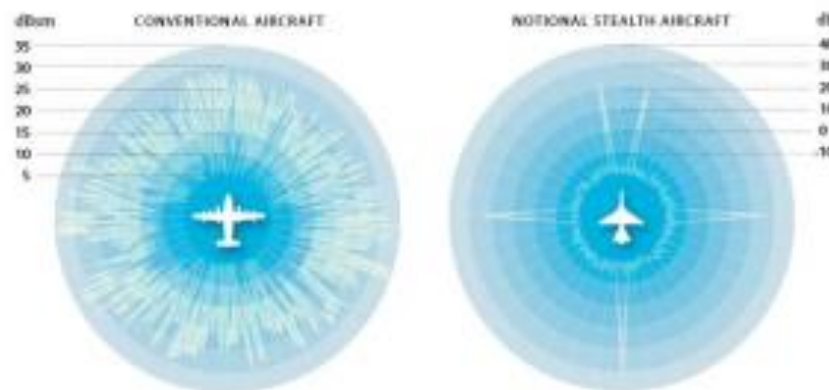


Figure 13. Graph of comparison of RCS values between conventional aircraft (20 dB) and stealth (-10 dB). Source: (Noor, 2019).

It can be seen in the image above that by modifying the shape of the aircraft using stealth technology, the RCS value is much smaller than ordinary conventional aircraft, meaning that the aircraft with stealth technology is able to provide superiority to the effect of enemy radar monitoring range so that it is suitable for use on UAV for military missions or in this case for surveillance missions, reconnaissance and even attacks in the new state capital area.

IV. CONCLUSION

The phenomenon of moving the capital city of Indonesia creates a new geostrategic perspective. Where in the process must be prepared carefully, especially in terms of handling in terms of maintaining defense and security in the new capital city area. The defense and security system in the new state capital area adopts *smart defense* and *dual strategy*. This is to deal with defense and security threats in the form of air rides, sea rides, land rides, and cyber rides. Especially for the air defense system for the new state capital of Indonesia in accordance with the concept of a *smart defense*, a *platform* or air vehicle is needed that can be used to carry out intelligence, surveillance, reconnaissance and even be able to carry out attacks in maintaining security in Indonesia's new new state capital area. by minimizing enemy detection. And one suitable platform is to use stealth Unmanned Aerial Vehicle (UAV) which provides advantages in terms of altitude, flexibility and range, minimized operational risks, and the ability to perform operations that are not detected by enemy defense radar sensors. .

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The Concept of Stealth UAV to Support Air Defense System in Indonesia's New Capital City

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