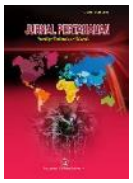

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Fortification of Civil-Military Cooperation Through Utilization of Geospatial Intelligence Concepts in Dealing with Armed Criminal Groups in Papua

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Abstract

Acts of violence in Papua tend to increase and still occur today, although since 2001 the Indonesian government has attempted to implement a special autonomy policy. This research aims to find out why violence continues to occur even though development efforts are quite intensive. The special conditions in Papua require new alternatives to solving problems by utilizing the geospatial intelligence concept. This research was conducted using interpretive analytical-qualitative methods in Jakarta and Papua from January 2022 to October 2023. This research finds that there is a close relationship between topographic conditions with high levels of violence in Papua. This research shows the need to develop appropriate steps based on the principle of counterinsurgency operation, namely information about the population and unity of efforts through several steps. First by improving the legal status of Armed Criminal Groups, followed by fortifying cooperation between several related institutions, both civil and military, and supported by the use of advanced technology. So that these steps can produce accurate and comprehensive information that is very useful for the government or military command to be able to develop appropriate strategies to reduce the violence rate. Accurate and comprehensive information will make it easier to prepare strategic planning for military operations that are more effective, efficient, and with minimal casualties.

INTRODUCTION

The classic functions of intelligence are closely related to intelligence activities including information gathering, analysis, counterintelligence, and covert actions/special operations (Law of the Republic of Indonesia No. 17 of 2011 concerning State Intelligence). Geospatial is a spatial aspect that shows the location and position of an object or event that is below, on the surface, or above the surface of the earth expressed in a certain coordinate system (Law of the Republic of Indonesia Number 4 of 2011 concerning Geospatial Information). Meanwhile, geospatial intelligence is a development of Imagery Intelligence (IMINT) in the collection and processing of information in the form of images (Bacastow et al., 2016). In Indonesia, the concept of geospatial intelligence is relatively new and its role is still carried out separately by several institutions, both civil and military. There is no special institution that fully uses the concept of geospatial intelligence.

The rapidly changing 21st-century battlefield demands dynamic mapping solutions. Commercial Geographic Information Systems (GIS) software for military-specific applications is now being developed and used with digital databases to provide digital maps for military needs. So the need to understand the terrain has always been an important requirement for military commanders. Developing paper maps in digital format is a requirement in military applications. The primary need for maps is to support situational awareness, in short, all commanders and their staff need to understand the battlefield (Fleming, Jordan, Madden, & Usery, 2021).

Papua has never been free from demands to separate itself from the Republic of Indonesia. Even after Indonesia entered the reform era in 1998 which was marked by the fall of the New Order regime, leadership was continued by several successor presidents. However, demands for Papua to separate from Indonesia still arise. The increase in violence and armed action was also followed by diplomatic movements in the international world with the same demands. This movement began with the rejection of the results of Pepera (*Penentuan Pendapat Rakyat*) in 1969 or Determination of People's Opinion known as the Act of Free Choice. There was a general election held on July 14–August 2, 1969, to determine the status of the western part of Papua, between independence or integration with Indonesia. There were 1,025 men and women selected by the Indonesian military unanimously chose to join Indonesia. This event was considered a political engineering by the military government in the New Order era (Nainggolan, 2014). Implementation of the Pepera went smoothly with the US support at that time. This is in line with the success of the American multinational mining company, Freeport, in obtaining consensus in the form of rights from the Indonesian government to exploit copper and gold mines in Papua since 1967 (Nainggolan, 2014).

Entering the era of President Joko Widodo's leadership in 2014, Papua has new hopes. After a long time in the international spotlight for cases of violence and post-reform disintegration efforts. In this era, Papua received more attention than other provinces. The President said that the commitment to develop the land of Papua has been realized in the last few years in various sectors. Starting from the construction of Trans Papua road infrastructure along 3,462 km, border roads along 1,098 km, bridges along 1.3 km, construction of airports in several areas, and construction of cross-border posts (Benshlomo, 2023). This confirmation was conveyed by the Head of State when inaugurating the Papua Youth Creative Hub (PYCH) in Jayapura City, on Tuesday, March 21, 2023. According to information quoted from the Papua Regional Government website

(2023), Papua's total budget for development at each level of regional government reaches Rp1,036 trillion (Benshlomo, 2023).

Behind the success of Papua's development, there are still threats to the success and harmony that President Joko Widodo began to pioneer in 2014. Data on acts of violence in Papua was compiled by the Papua Task Force at Gajah Mada University (2022), as cited in Lele, Ruhyanto, Indonesia, El Nur, & Nugroho (2022), recorded from January 2010 to August 2022 as many as 2,165 victims of violence as shown in Figure 1 and Table 1. The actual number of victims is estimated to be much higher than recorded data. Because not all events are published. Additionally, many victims died or were seriously injured or fell ill in shelters.

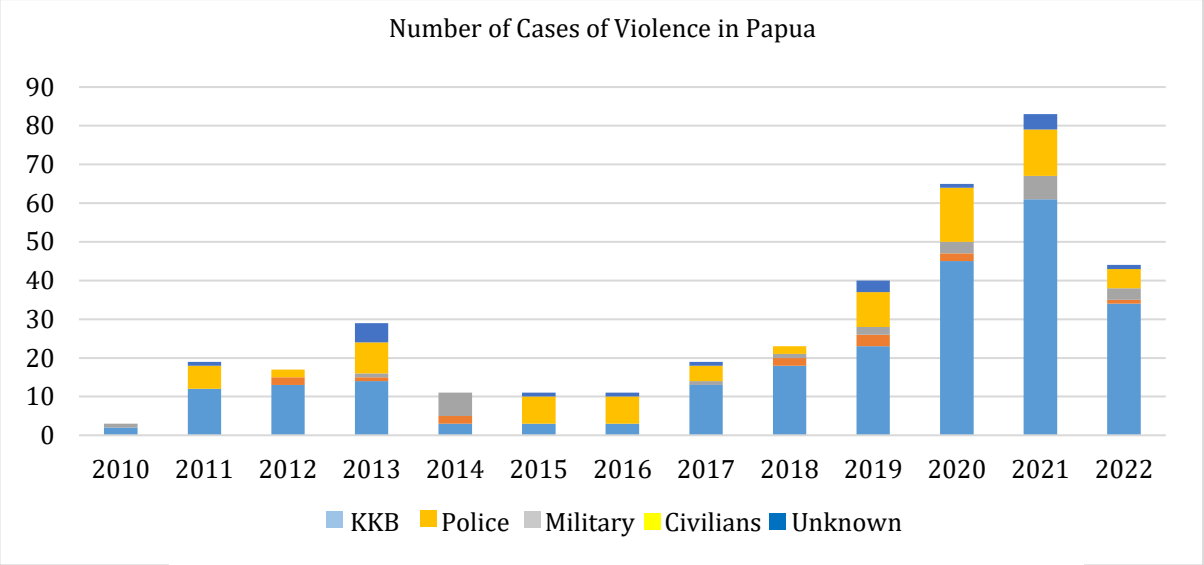

Figure 1. Graphic of Number Violence in Papua (Lele et al., 2022)

Table 1. Data of Number Violence in Papua (Lele et al., 2022)

Perpetrators	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
KKB	2	12	13	14	3	3	3	13	18	23	45	61	34
Police	0	0	2	1	2	0	0	0	2	3	2	0	1
Military	1	0	0	1	6	0	0	1	1	2	3	6	3
Civilians	0	6	2	8	0	7	7	4	2	9	14	12	5
Unknown	0	1	0	5	0	1	1	1	0	3	1	4	1

According to the Regional Police Chief or *Kapolda* Papua (2022), 90 cases of violence were recorded with 53 fatalities due to attacks by Armed Criminal Groups or *Kelompok Kriminal Bersenjata* (KKB) consisting of 39 civilians, 10 Indonesian military (TNI) personnel, and 4 Police personnel. Meanwhile, there were 27 injured victims, namely 14 military personnel, 10 residents, and 3 police personnel (Maria & Costa, 2022). During the first six months, January–June 2023, 17 people, both civilians, TNI, and police officers, died as a result of KKB attacks. In January-July 2023, as many as 75 cases were related to KKB actions—an increase of 24 cases compared to the first semester of 2022, namely 51 cases (Intan, 2023).

Paying attention to the description above, until the end of President Joko Widodo's leadership, the government has continued to make efforts to overcome the problems occurring in Papua. But the threat of armed violence persists. If left unchecked, Papua will

continue to be in the world's spotlight, development progress will not be felt by all Papuans, and casualties will continue to fall.

This study explores at least five previous studies. The first previous study was conducted by Tippe (2015) entitled "Civil-Military Relations in Empowering Papuan People". This research uses several concepts, including civil society, diplomacy and negotiation, reconciliation, and peacebuilding. The second previous research was conducted by Nainggolan (2014) titled "International Activities of the Papuan Separatist Movement". This research emphasizes the concept of diplomacy and persuasion through international channels. The third previous research was conducted by Harry (2021) titled "Government Strategy in Handling the Papuan Separatist Movement and Its Implications for Indonesian Defense Diplomacy". This research emphasizes the concept of defense diplomacy and infrastructure development in solving problems in Papua. The fourth research was conducted by Hutomo, Gultom, & Purwantoro (2022) entitled "Use of Geoint in Military Operations in Overcoming the Papuan KKB with the Operability of the Command, Control, Communications, Computerization, Intelligence, Observation and Reconnaissance System". The approach used in this research is a modern technological approach in military operations and strategy theory in decision-making. The fifth previous research was conducted by Ashri (2020) titled "Marginalization of Indigenous Papuans, Special Autonomy, and Continuing Conflict". The approach used in this research is a social concept based on ethnicity, and this research is the antithesis of the implementation of Special Autonomy in Papua

Those previous studies emphasize recommendations on several aspects, including the use of diplomatic channels, empowering Papuans, infrastructure development in Papua, and the use of modern technology in every military operation. None of these previous studies have discussed the topographic conditions of Papua as a major obstacle. This study found a correlation between topographic conditions, human development index (HDI), and the frequency of cases of violence. Almost all violence occurs in steep areas in the mountains of Papua, namely areas with low HDI. This study was inspired by a statement in research conducted by Tippe (2015):

> Throughout history, the Indonesian government has planned development in Papua by involving the military on the one hand, but without embracing the Papuan people on the other hand it will only cause tensions between civil and military in this region to grow. (Tippe, 2015)

Based on the explanation aforementioned above, therefore emerges the research problems which are threats of violence by KKB Papua need to be handled by more appropriate parties, then coordination is needed between several related institutions, both civil and military, to overcome difficult terrain conditions, and modern technological support is needed to obtain terrain data information. So far in Indonesia, the ability to collect information related to topography is not only owned by the TNI. In fact, several civil institutions own sophisticated equipment in terms of earth mapping.

This study will show that it is necessary to improve the legal status of the Papuan KKB, which since 2018 has been limited in terms of law enforcement. A new regulation is needed in the form of a law that can regulate the leading sector in handling the Papua KKB to be taken over by the state, then its implementation is followed up by more appropriate parties. This regulation also provides a legal umbrella for cross-sector coordination mechanisms involving civil and military institutions that are competent in their fields. Additional use of advanced technology that has the capability is also needed to overcome the extreme topographic conditions in the Papua Mountains.

METHODS

The research method used is an Interpretive Analysis Qualitative Method, which was carried out through literature and field studies in Jakarta, Nduga Regency, Mountainous Papua Province, and Maybrat Regency, West Papua Province. The research was conducted from January 2022 to October 2023. Primary data was obtained through in-depth interviews with informants at several agencies and institutions in TNI such as the Operations Assistant to the TNI Commander, the State Intelligence Agency, the Strategic Intelligence Agency, the Army Topography Directorate, and the Air Force Air Survey and Photography Service. Meanwhile, secondary data was obtained from trusted sources, several fellow officers who served in Papua, internet news, reports, academic journals, official documents, and books in libraries.

This study uses two theories to analyze research problems, namely the Counterinsurgency Theory by Galula (1964) and the Theory of Strategy by Lykke (2008) as cited in (Jablonsky et al., 2008). Galula (1964) wrote Counterinsurgency Warfare: Theory and Practice in 1964, his postulate stated that there are three key elements in handling insurgency, namely: population, information, and unity of effort. Meanwhile, Lykke stated that there are three elements interrelated and must be considered carefully when formulating a strategy, namely "End" which represents the final goal or target to be achieved, "Ways" which refers to the methods used to achieve goals, and "Means" which are regarding the resources, capabilities, and assets available to implement the chosen means (Jablonsky et al., 2008).

The above two theories have a strong relationship to be used as a reference in dealing with the high number of cases of violence in Papua. Where the lack of in-depth information regarding the situation faced by the Papuan people, due to topographic conditions and the lack of unity from the Government in trying to fulfill the living needs of residents, has caused suffering for some residents. Then we can also apply the above theories in developing strategies to face security threats in Papua. Reducing the number of violence in Papua, which is the “End”, is done by utilizing all available resources, including equipment, technology, natural conditions, institutions, and local communities, this is called the Mean, and using the right approach. Meanwhile, the approach used is to maximize cooperation between all related institutions and the Papuan people to gather as much information as possible about natural and social conditions in Papua. Especially maximizing the function of territorial apparatus in playing a role in winning the hearts of the Papuan people.

This study tries to reveal the facts about the natural and social conditions in Papua which are the cause of violence continuing to occur in several locations in Papua. This study uses triangulation analysis based on data and facts collected and assessed from various points of view to produce conclusions that are close to real conditions.

RESULT AND DISCUSSIONS

In the General Overview of Papua by the Regional People’s Representative Council of Papua Province year 2018, it is stated that the slopes that dominate the Papua province are gentle (0 – 8)% occupying 45.9%, and very steep slopes (>40%) occupying 43.3%, which are spread across several areas (Regional People’s Representative Council of Papua Province, 2019). Figure 2 shows the location in the middle in red which is an area with very steep slopes.

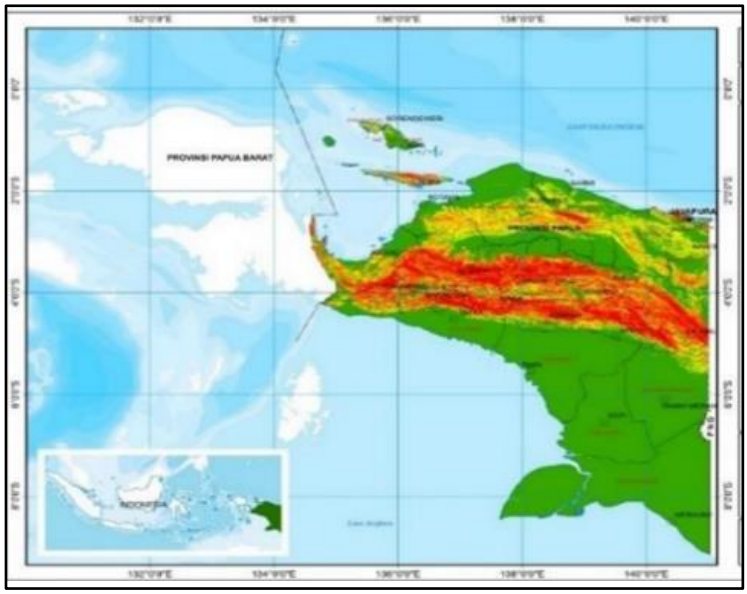

Figure 2. Slopes in Papua (Regional People's Representative Council of Papua Province, 2019)

Papua's extreme topographic conditions make building land transportation networks and public facilities difficult and require large costs. This cannot be handled by local governments alone. Therefore, the role of the central government is very necessary (Regional People's Representative Council of Papua Province, 2019). Extreme natural conditions also cause some people to become isolated residents.

Local governments at the village, sub-district, or district level sometimes do not have sufficient capacity to manage every inch of their territory. So that the development of basic infrastructure for the community, such as clean water, electricity, and sanitation, does not reach the entire region. Meanwhile, some of these areas have been inhabited by residents for generations. Isolated areas commonly do not have adequate medical facilities, health facilities, and services from professional healthcare. So residents have to travel long distances through the forest to get treatment or health services in other villages/districts, even if they are sick. In remote areas, it is also difficult to find schools, educational institutions, or teaching staff who are willing to share knowledge and stay with the residents for a long time. So the level of education of people in isolated areas can be said to be underdeveloped. The lack of job opportunities in isolated areas means that most residents are unemployed. Most of them do not get a steady income and only depend on the goodness of nature.

One of the conditions for achieving progress in civilization is equal distribution of information sources. In this era, information can be obtained easily through internet access. However, this is not the case in isolated areas where there is no internet access there. People in these locations are completely cut off from the latest developments in the world. The very steep conditions, as explained previously, make the process of planning and building roads more difficult and require greater costs. Meanwhile, every time there is a plan to open a new road, it is almost guaranteed to be disrupted. So isolated areas do not have land access. The common transportation in the mountain area of Papua is walking or using an airplane. This will cause high transportation costs which will impact the high prices of goods in the mountainous regions of Papua.

When a disaster occurs it is common in mountainous areas, namely landslides or other disasters. Residents will find it difficult to get emergency disaster aid, due to limited communication and access to locations. Even the existence of disasters in isolated areas

is not known to the government or people in other places. The several negative effects above give an idea of why some isolated residents in Papua find it difficult to accept the presence of residents or government officials from outside the area. An additional aggravating factor is past trauma and agitation from sympathizers of the separatist movement, who chose to live abroad to continue supporting their struggle (Nainggolan, 2014). As shown in Figure 3, the yellow areas are areas with a low Human Development Index or *Indeks Pembangunan Manusia* (IPM) located in locations with steep slopes.

IPM measures human development achievements based on a number of basic components of quality of life. As a measure of quality of life, IPM is built using a basic three-dimensional approach. These dimensions include a long and healthy life; knowledge, and a decent life. These three dimensions have a very broad meaning because they are related to many factors. According to the facts, armed violence often occurs in areas with low IPM figures. The low Human Development Index as shown in Figure 3 is related to Figure 2. Areas with yellow color, are found in mountainous areas that are difficult to access. Figure 4 shows the spread of violence in Papua, occurring in the mountainous areas of Papua which are areas with low IPM.

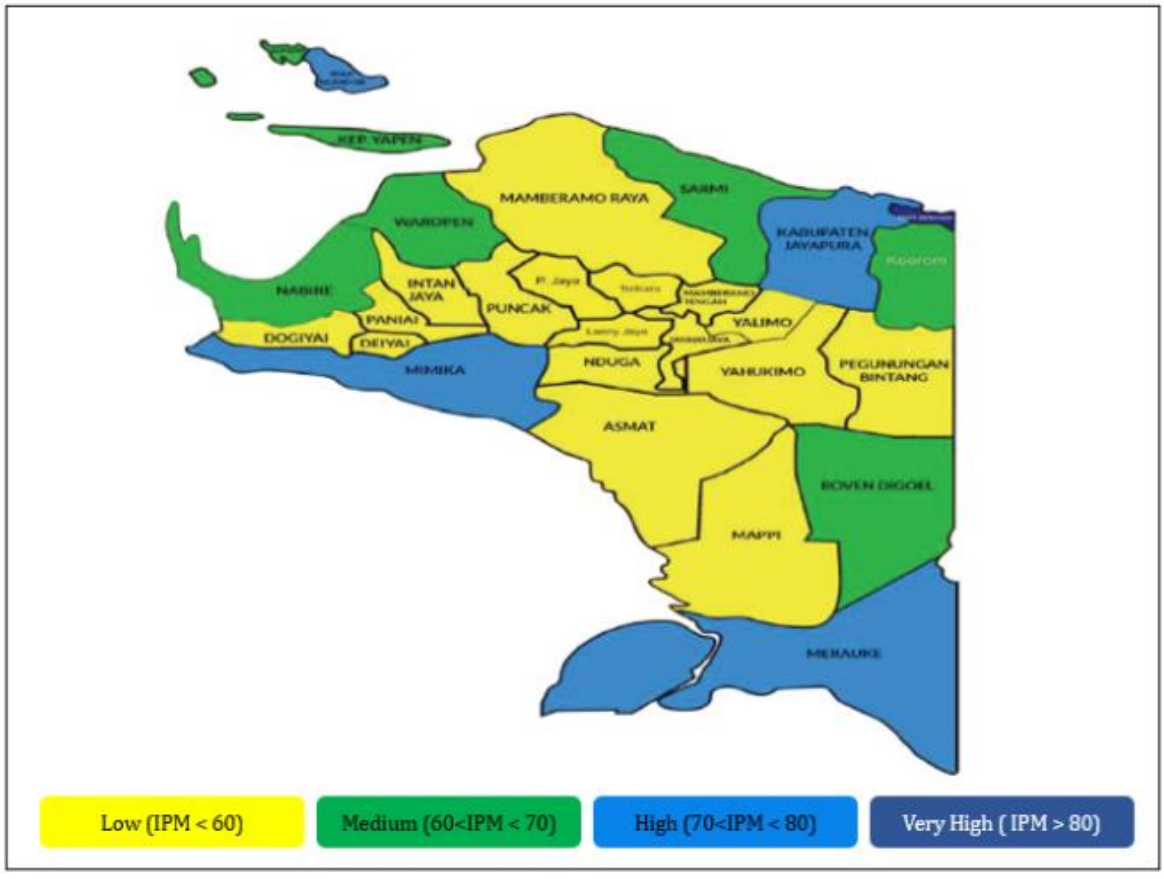

Figure 3. Human Development Index in Papua (Papua Provincial Central Statistics Agency, 2022)

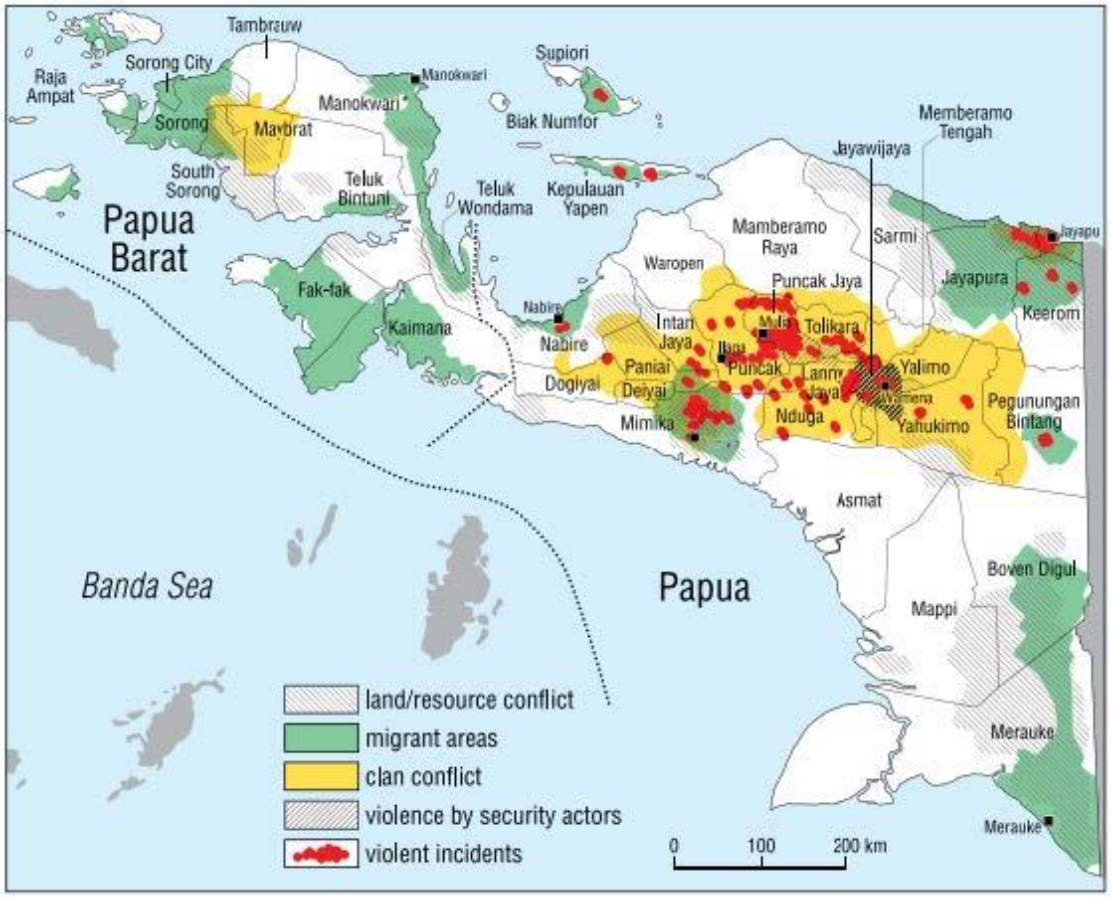

Figure 4. Mapping Regions Affected by Violence (Anderson, 2015)

Based on information from the three figures above, it can be seen that there is a correlation between extreme topographic conditions, with the human development index, and high levels of violence in mountain areas of Papua. On the other hand, there is irony, according to the Ministry of Energy and Mineral Resources (2022) as cited in Mutiara & Hatia (2023), Papua itself has extraordinary mineral wealth which has always been an attraction. Three mineral resources are considered "treasures". First, Papua has the largest gold mine in Indonesia with an area of 229,893.75 ha. The gold mines are spread across six districts, namely the Bintang Mountains, Keerom, Nabire, Dogiyai, Mimika, and Paniai. Second, the Grasberg copper mine in Papua, Indonesia, produced 1.34 billion pounds. Third, Papua also has 1.76 million tons of ore and 1.875 million tons of silver ore reserves. This is a topic from Papua that should be given serious attention, even though it is not discussed in this research.

Determination of the Legal Status of the KKB

Previously, the Papuan KKB was called *Organisasi Papua Merdeka* (OPM) which was founded in 1965. In its activities, the OPM always spoke about a referendum so that Papua could become independent. The movement consisted of three elements: groups of different armed units; several groups in the region holding demonstrations and protests; and a small group of leaders based abroad who raised awareness of issues in the region while fighting for international support for independence (IPAC, 2015).

The government then took the initiative to form a Special Autonomy Policy for Papua in 2001. However, it seems that the budget disbursed is only enjoyed by the elite and is not absorbed by society. This then gave rise to a more massive resistance

movement by carrying out various criminal activities. So far five major Papuan KKB groups have been mapped with their leaders, namely: Lekagak Telenggen, Egianus Kogoya, Jhony Botak, Demianus Magai Yogi, and Sabinus Waker. Of the five groups, two of them are called the most dangerous KKB in Papua, namely Lekagak Telenggen and Egianus Kogoya (Putri, 2023).

After the issuance of Law No. 5 of 2018 concerning Amendments to Law No. 15 of 2003 concerning PERPU No. 1 of 2002 concerning the Eradication of Criminal Acts of Terrorism, and strengthening by statement from Coordinating Minister for Political, Legal and Security Affairs or *Menteri Koordinator Politik Hukum dan Keamanan* in April 29, 2021, OPM received status as an Armed Criminal Group or *Kelompok Kriminal Bersenjata (*KKB). This causes a paradigm shift. Who is more appropriate to be the leading sector in terms of handling the Papuan KKB? In one of the articles of the above law, it is stated that "terrorism is an act that uses violence or threats of violence to create an atmosphere of widespread terror or fear, which can cause mass casualties and damage or destruction to vital strategic objects, the environment, public facilities, or international facilities with ideological, political or security disturbance motives". Referring to the above law, KKB is categorized as a crime, so the effort to overcome it is law enforcement. Thus, the Indonesian police (Polri) became the leading sector. TNI is also involved in developing the mandate of Law No. 34 of 2004, where TNI has duties to assist Polri in dealing with security issues.

However, the actions carried out by the KKB were not ordinary criminal acts but led to a people's resistance movement. From the KKB's perspective, what they are doing is a form of struggle—namely, the struggle to separate from Indonesia. So recently discourse has begun to emerge to change the KKB to KST (*Kelompok Separatis Teroris*). In every action, KKB/KST uses guerrilla warfare tactics. History proves that guerrilla warfare is a strategy utilized by weak military powers by utilizing national resources to fight stronger military powers, as was done by China, Vietnam, and Indonesia (Lebo, Midhio, & Prakoso, 2021). Another reason is that in terms of weapons and training patterns, Polri is not prepared to suppress acts of guerrilla warfare or separatism. It is TNI that actually can carry out counter-insurgency actions known as Guerrilla Counter Operations (Rajab & Supriyatno, 2019) as was done in the face of armed rebellion in the early days of Independence. In guerrilla warfare strategy, whoever knows information about the terrain and people better will be the winner. It must be acknowledged that the KKB/KST have better knowledge of the terrain and social conditions in Papua than the TNI.

The most appropriate reason is that OPM/KKB/KST has a military wing, namely West Papua National Liberation Army or *Tentara Pembebasan Nasional Papua Barat* (TPNPB) which was formed after the Proclamation of West Papua Independence on July 1, 1971 (IPAC, 2015). The statement regarding the proclamation of independence is a strong indication that the OPM is a separatist movement that aims to establish a state, thus it is part of TNI's task to crush it. The Indonesian Army (TNI AD) is an institution that has a special ability and doctrine to handle separatism movements, namely territorial doctrine. The core of the territorial doctrine of the army is the possession of sufficient information about the geography, demography, and psychology of the population and the environment in which the people live (Indonesian Army Headquarters, 2020). However, due to limited equipment in the Army, the Army cannot work alone. It requires support from other institutions. So a broader role is needed by the state to take over the leading sector in handling Papua's KKB. As well, the decision to change the status of KKB to KST,

which is a political decision, is not easy to decide shortly, because it involves several interests and must be studied further.

Cross-Sectoral Coordination

Regarding information, the most appropriate function for collecting, processing, and analyzing is the intelligence agency. The intelligence function is also described at various levels. This is intended to form an official format or structure that specializes in obtaining information that can later be used to provide a basis for reference for political policy decision-makers. So intelligence is divided into three levels of scope, namely at strategic, operational, and tactical levels (Umami, 2015). In overcoming security threats in the Papua Mountains, all levels of intelligence are needed. At the strategic level, intelligence information is needed by the government in planning long-term sustainable development. At the operational level, regional officials at the level of Governor, Regional Police Chief, or Commander of the Regional Military Command are required to be able to plan operations or prepare annual regional development budgets and programs. At the tactical level, unit commanders in the field need accurate field data information, so they can implement the right strategy in overcoming direct technical and tactical threats.

The development of the Total War Doctrine in 1958–1962 coincided with the development of the Territorial Development Doctrine which consisted of the development of Space, Tools, and Combat Conditions (*Ruang, Alat, dan Kondisi* [RAK] *Juang*), to be used as a national strength that could be used as a means of defense. This doctrine on current conditions is still very relevant because space, tools, and fighting conditions are things that are related to each other and cannot be separated. According to Rajab & Supriyatno (2019), Fighting Space, in this case, is the earth where we stand. The space or location where we are must have specific data, which differs from one place to another. The parameters also vary, including latitude and longitude coordinates, elevation to sea level, soil type, vegetation variety, air temperature, air humidity, wind speed, climate, weather, fauna type, and so on. Fighting Tools can be interpreted as vehicles, or can also be called infrastructure. From a defense science perspective, combat equipment can be combat vehicles, transport aircraft, combat aircraft, heavy artillery, light artillery, tactical vehicles, tanks, unmanned aircraft, combat personnel, satellites, radio, communication equipment, support personnel, health personnel, destroyers, patrol ships, submarines, assault rifles, mortars, RPGs, grenade launchers, road facilities, bridges, fortresses, watchtowers, and others. Fighting Condition is a mental or spiritual attitude that is not visible, but is very necessary and supports winning a battle. Fighting Conditions can be an ideology, belief, view of life, life goals, principles, spirit, and motivation.

In this regard, information is needed before planning a military operation, including:

1. Where the enemy is hiding?
2. What are the enemy's personnel numbers and chain of command?
3. What are the terrain conditions leading to the enemy's hiding place?
4. What types and types of weapons are owned and used by the enemy?
5. What are the enemy's ammunition reserves?
6. Where are the enemy's logistics routes and sources?
7. Who are the enemy's logistics, weapons, and ammunition suppliers?
8. When and where the enemy will attack?

If more than one of the questions above cannot be answered accurately and in detail, then this is a big problem in conducting a military operation. Efforts to be able to answer these above questions are the basic concept of geospatial intelligence. In the wise words

of a Chinese war artist, General Sun Tzu, written by Feng (2007), in a book entitled Sun Tzu's Art of War, the meaning is as follows:

> If we know the enemy's strength and our strength, then we don't need to be afraid to face a hundred battles. If we know our strength, but don't know the enemy's strength, with every victory we will also feel suffering. If we do not know our strengths or those of the enemy, we will surely accept defeat in every battle. (Feng, 2007)

Currently, most of the intelligence agencies are within TNI or Polri institutions. Apart from that, information collection can also be carried out by the Geospatial Information Agency (BIG or *Badan Informasi Geospasial*) and the National Innovation Research Agency (BRIN or *Badan Riset dan Inovasi Nasional*), which incidentally are both civil institutions. BIG is a non-ministerial institution under the President and BRIN is under the Ministry of Research and Technology. These two institutions have very adequate resources to carry out their information-gathering role. So a new format of cooperation involving civil and military is needed.

Geospatial-Intelligence Concept

The discipline in intelligence technology has developed rapidly and given birth to several disciplines. This development is supported by the development of various sciences and technologies accompanied by increasing human resource capabilities. According to Rajab & Supriyatno (2019), several intelligence disciplines exist in the world:

1. Technical Intelligence (TECHINT)
2. Signal Intelligence (SIGINT)
3. Imagery Intelligence (IMINT)
4. Open Source Intelligence (OSINT)
5. Measurement & Signature Intelligence (MASINT)
6. Human Intelligence (HUMIT)
7. Geospatial Intelligence (GEOINT)

The concept of geospatial intelligence is relatively new in Indonesia and so far the geospatial intelligence function is carried out by several separate institutions, both civil and military. In essence, geospatial intelligence (GEOINT) is a combination of several disciplines in intelligence, namely Signal Intelligence, Open Source Intelligence, Measurement Intelligence, and Human Intelligence (Rajab & Supriyatno, 2019). The following chart as shown in Figure 5 shows how several intelligence disciplines relate to Geospatial-Intelligence.

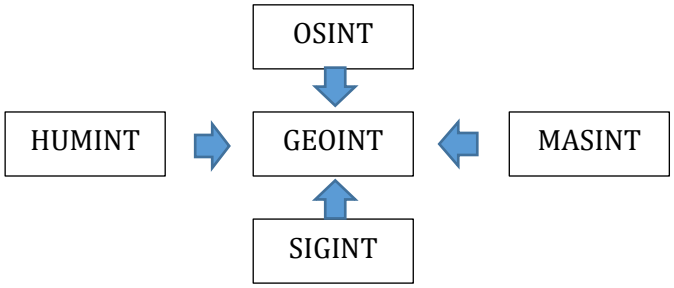

Figure 5. Geospatial-Intelligence Relationship with Other Intelligence (Rajab & Supriyatno, 2019)

1. Open Source Intelligence (OSINT) is a collection of information that is available openly or in the public domain. Sources of open information from the public are obtained from

radio, television, internet news, newspapers, public maps, magazines, academic journals, books, government reports, tourists, business forecasts, expert opinions, testimonials, and reports from officers serving abroad.

2. Human Intelligence (HUMIT) is a process of collecting information from intelligence personnel, namely: spies, agents, informants, enemies who have crossed over, infiltrators, diplomats, and businessmen, the results of prisoner interrogations, and the results of discussions with foreign personnel (during joint exercises with other countries).
3. Measurement and signature Intelligence (MASINT) is a type of intelligence between image intelligence (IMINT) and signals intelligence (SIGINT). The process of collecting information uses invisible light, such as infrared, ultraviolet, and multispectral data. Masint can also exploit physical or magnetic, emission, and reflection of radio waves, lasers, sound waves, and vibrations.
4. Signal Intelligence (SIGINT) is the collection of data/information obtained from intercept, monitoring, radio localization, microwaves, radar, electromagnetic waves, and open information from Klandestin teams, ships, submarines, surveillance aircraft, and drones (UAVs).

So the definition of the concept of GEOINT in Indonesia can be simplified as a combination of information layers that answer various questions. The following information can be provided by GEOINT, including:

1. Locations where TNI troops and enemy troops are located.
2. Locations where civilians are located.
3. Transportation routes in enemy areas.
4. Strength of the enemy's personnel and weapons.
5. Enemy's logistics, weapons, and ammunition suppliers.
6. When is it likely that enemy troops will move to launch an attack?
7. Terrain obstacles at the enemy's location, whether natural or artificial.
8. How to overcome these obstacles?
9. The general condition of the operating area.
10. Ideology and psychology of residents around the enemy's location.
11. How to differentiate between sympathizers and ordinary citizens.
12. The meaning and impact of all conditions on TNI troops, etc.

The information mentioned above cannot be acquired by just one institution, because different expertise specifications are required. This variety of data shows that there is a need for cooperation and collaboration between several institutions with special characteristics and capabilities, both civil and military (Rajab & Supriyatno, 2019) that can:

1. Combine information and intelligence analysis into a single unified aspect and context.
2. Combine multiple geospatial data by adding more dimensions than standard geospatial products, namely 3-D information with better visualization and 4-D information that incorporates time elements.
3. Using more sophisticated devices, which are supported by the use of several types of sensors (sound, radio waves, infrared rays, lasers, satellite, etc.),
4. Absorb information related to community conditions, complaints, needs, and hopes.

Broadly speaking, there are three main elements in geospatial intelligence, namely: Geospatial Community, Intelligence Community, and Territorial Apparatus (Rajab & Supriyatno, 2019).

Geospatial Community

The Geospatial Community is a group of organizations or individuals who have capabilities and professionals who live and interact with each other in the fields of management, technology, and geospatial scientific disciplines. This community organizes data collection activities starting from the planning stage, organizational planning, data collection, processing, and presenting products in the form of analog and digital data. In addition, it provides technical assistance services related to geospatial for various purposes, including defense, security, and development.

In Indonesia, there are already credible institutions that can be categorized as Geospatial Communities from both Civil and Military circles, including:

1. Geospatial Information Agency (BIG or *Badan Informasi Geospatial*), is a non-ministerial government agency at the central level which holds the mandate regarding mapping throughout the territory of the Republic of Indonesia
2. National Research and Innovation Agency (BRIN or *Badan Riset dan Inovasi Nasional*), is under the Ministry of Research and Technology that is tasked with research and innovation.
3. Directorate of Topography of the Indonesian Army (Dittopad or *Direktorat Topografi* TNI AD), an agency within the Indonesian Army (TNI AD) which is responsible for providing military geographic information on land areas to support the main tasks of the TNI AD, both in the form of topographic maps and Geographic Information Systems (GIS) for land defense purposes. *Dittopad* has networking at the level of Regional Military Commands (Kodam or *Komando Daerah Militer*).
4. Indonesian Navy Hydro Oceanographic Center (Pushidrosal or *Pusat Hidro Oceanografi* TNI AL), an agency within the Indonesian Navy (TNI AL) that is responsible for guiding the function and implementation of Hydro-Oceanography activities which include surveying, research, marine mapping, nautical publications, application of the marine environment and shipping navigation safety. Apart from that, it also prepares data & and information on defense areas at sea to support the main tasks of the Indonesian Navy, both in the form of nautical charts and nautical publications for maritime defense and shipping purposes. Pushidrosal is only at the central level and does not have branch offices in the regions.
5. Aerial Survey and Photography Service (Dissupotrudau or *Dinas Survey dan Pemotretan Udara* TNI AU), is an institution within the Indonesian Air Force (TNI AU) that is tasked and responsible for preparing aerial photos throughout the territory of the Republic of Indonesia. Dissupotrudau is only at the central level and has no branches in the regions.

Intelligence Community

The intelligence community is a group of organizations or individuals who have capabilities and professionalism who live and interact in the intelligence field. The Intelligence Community is an organization that is used to carry out intelligence activities according to its function, in the form of investigation, security, or mobilization to achieve intelligence objectives to meet the needs of an organization or government of a country at large (Rajab & Supriyatno, 2019).

In Indonesia, several intelligence agencies have been operating since the Independence era, including:

1. State Intelligence Agency (BIN or *Badan Intelijen Negara*), is an Indonesian non-ministerial government agency under the President whose task is to carry out government duties in the intelligence sector.
2. Strategic Intelligence Agency (BAIS TNI or *Badan Intelijen Strategis* TNI), is an organization that specifically handles military intelligence and is under the command of TNI Headquarters. BAIS is tasked with supplying actual intelligence and strategic analyses as well as future estimates usually called short-term, medium-term, and long-term to the TNI Commander and the Ministry of Defense.
3. Army Intelligence Center (Pusintelas or *Pusat Intelijen* TNI AD), is the Central Executive Agency at the Headquarters level and is located directly under the Army Chief of Staff, tasked with developing and carrying out the Intelligence and security functions of the Army body as well as providing intelligence information to the Army Chief of Staff to support the main tasks of TNI AD.
4. Air Force Security and Crypto Services (Dispamsanau or *Dinas Pengamanan dan Sandi* TNI AU), is the Central Executive Agency at the Indonesian Air Force (TNI AU) headquarters level, tasked with carrying out TNI AU intelligence development which includes air intelligence, TNI AU body security, and coding to support the TNI AU's duties. Dispamsanau is led by the Head of the TNI AU Security and Encryption Service called Kadispamsanau who is located below and is responsible to the Chief of Staff of the Air Force (Kasau or *Kepala Staf Angkatan Udara*), in the implementation of daily tasks it is coordinated by Deputy of Chief of Staff of the Air Force (Wakasau or *Wakil Kepala Staf Angkatan Udara*).
5. Naval Security and Codes Service (Dispamsanal or *Dinas Pengamanan dan Sandi* TNI AL) is the implementing element that is structurally directly under the line of command of the Chief of Naval Staff. The main task of Dispamsanal is to support the TNI AL Navy's intelligence tasks which include the implementation and review of Intelligence Operations activities.
6. National Police Security Intelligence Agency (Baintelkam Polri or *Badan Intelijen Keamanan* Polri), is one of the agencies implementing the main tasks of the Indonesian Police (Polri) in the field of intelligence.

Territorial Apparatus (Apter or *Aparat Territorial*)

Territorial Building (Binter or *Pembinaan Teritorial*) is one of the functions of the Indonesian Army (TNI AD) that aims to realize the elements of geography, demography, and fighting conditions of citizens to obtain universal territorial strength in all corners of the country (Indonesian Army Headquarters, 2020). Territorial Building is also a regional development that is directed at developing defense potential covering national territory in carrying out Military Operations War (MOW) and Military Operations Other War (MOOW) tasks at home and to a limited extent supporting MOOW tasks abroad. In its implementation, Territorial Building is carried out by Territorial Apparatus whose vehicle is the Territorial Command (Koter or *Komando Teritorial*) starting from the Regional Military Command (Kodam or *Komando Daerah Militer*), Military Resort Command (Korem or *Komando Resort Militer*), Military District Command (Kodim or *Komando Distrik Militer*), Military Sub-District Command (Koramil or *Komando Rayon Militer*) and the village supervisor non-commissioned officers (Babinsa or *Bintara Pembina Desa*).

The three elements of Geospatial Intelligence mentioned above must always be coordinated and connected by a sustainable management system by an independent agency or unit under the Indonesian Ministry of Defense. The role of each component is:

1. The Geospatial Community collects data about complete and accurate terrain conditions from the field with the help of more advanced technology,
2. The Intelligence Community gathers additional information, supported by in-depth analysis based on context, and
3. Territorial officials provide regional guidance to citizens, to obtain information about the fighting conditions of all citizens.

The results of information collaboration by these three elements of GEOINT are used as a basis for policy-making and strategic, operational, and tactical scope planning both for military operations and for future national development goals.

Use of Modern Technology

To collect accurate and complete data, GEOINT requires sophisticated technological support, among other things:

1. Information and Computer Technology (ICT) is complete with the internet network with the capability to record, sort, process, and present all data. Be it demographic data, base maps, charts, and thematic maps.
2. Social Media Technology, which is connected to the internet network.
3. Modern optical survey and mapping technology, such as GPS-based Total Station, Geodetic GPS, etc.
4. Remote Sensing Technology, in the form of UAVs and Satellites which produce aerial photography, satellite imagery, and communications interception.
5. Radar (Radio Detection & Ranging), detection and distance measurement using electromagnetic radio waves.
6. LiDAR (Light Detection & Ranging) technology, detection, and distance measurement using laser light.
7. Process & Analysis Technology is technology-supporting software that plays a role in processing, and analyzing geographic data produced by existing equipment.

Currently, several developed countries such as the US, UK, European Union countries, China, and India have utilized GEOINT to maintain national security in a broad sense by forming an independent unit under the highest command of the armed forces in their country (Rajab & Supriyatno, 2019).

Preparing accurate terrain maps in mountainous areas with steep slopes, which is the main task of the Army Topography Directorate, in this case, Military Region Topography (*Topografi Kodam*) XVII/Cendrawasih is not easy. Air support is required, because if it is done by conventional method from the land, it will be very vulnerable. Even though the most accurate results are by using conventional methods from the land. In its implementation, topography personnel are equipped with conventional equipment (theodolite or Total Station with GPS) accompanied by personnel from Raider as shown in Figure 6. This process will take a long time and be high risk because you will be dealing directly with KKB members in the wilderness of Papua.

Figure 6. Conventional Method of Terrain Data Acquisition

The limited availability of UAVs equipped with LiDAR in TNI AD units also affects the success of operations. According to the Head of the Budget Planning Section of the Army Topography Directorate in 2023, stated that advanced equipment, in the form of multirotor UAVs and Fix Wing UAVs equipped with LiDAR cameras, is currently only available at the Army Topography Directorate headquarters in Jakarta and the Army Topography Education Center in Bandung. Meanwhile, for the Topography unit at Regional Military Command, only a lower version is available without a LiDAR camera. Likewise, the Dittopad production map is a small-scale map (1:50.000) (Personal Communication, September 26, 2023).

Another solution is to use the product Satellite Cameras and a Geographic Information System (GIS) with the support of Radar technology on BRIN's satellites. To acquire terrain data in large and difficult-to-reach areas, TNI coordinates with BRIN (National Research and Innovation Agency) and BIG (Geospatial Information Agency), but this is done incidentally for certain purposes and is not a routine agenda refer to Assistant Officer Operations Assistant to the TNI Commander in the field of Survey and Mapping (Personal Communications, February 15, 2023).

In line with information from the Deputy Commander of the Technical Intelligence Unit of the BAIS TNI in 2023, stated that the BAIS TNI Technical Intelligence Unit, currently and in the future, requires the support of additional, more sophisticated, and advanced equipment needed to support tasks that can be operated by unit command independently, without depending on other units (Personal Communication, February 17, 2023). Meanwhile, the map produced by BIG is currently in the form of a DEM (Digital Elevation Model) which only monitors the highest position of a location using radar technology. The radar technology on the BIG satellite cannot yet produce DTM (Digital Terrain Model) maps that describe the contour conditions of the land surface. The technique used in making DEM, DSM, and DTM maps using a LiDAR camera on a drone or UAV is called photogrammetry. The use of LiDAR sensors can provide a 3-D model display. In making Digital Elevation Models (DEM), Digital Surface Models (DSM), Digital Terrain Models (DTM) as shown in Figure 8, or topographic maps, drones equipped with LiDAR cameras are still not widely used. This technique is only commonly used in the mining and plantation industries. These images must be superimposed on one another. The wider the overlapping area, the more accurate the results obtained will be. Processing aerial photos by entering GCP (Ground Control Point) values produces maps with a scale of 1: 1000 with horizontal and vertical accuracy that is in 1st class (Arrofiqoh et al., 2022).

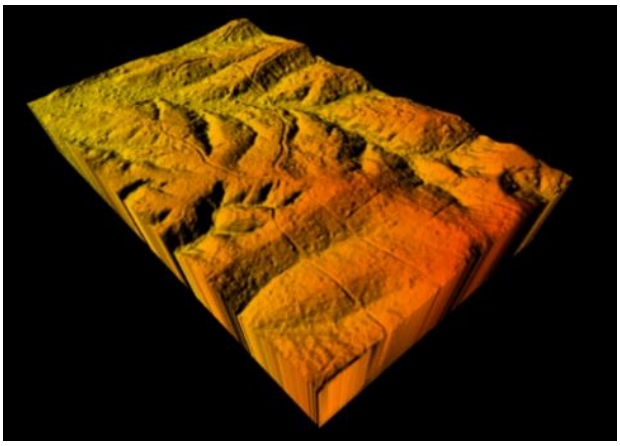

Figure 7. Digital Terrain Models (DTM) LiDAR Acquisition Results (Credent, 2022)

As of April 2023, there are no plans from TNI Headquarters or the Ministry of Defense, specifically to procure LiDAR cameras installed on small aircraft or UAVs with a wide range of up to 1,300 m in one flight as shown in Figure 8.

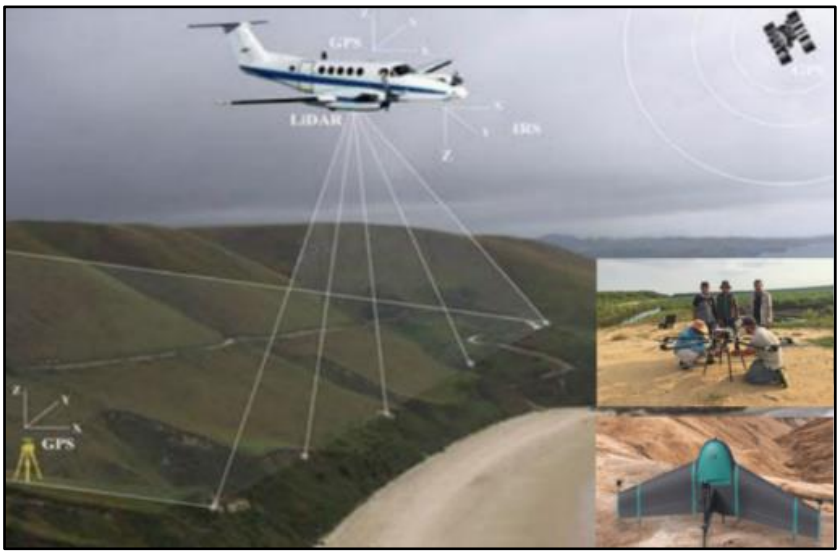

Figure 8. Application of LiDAR Cameras on Light Aircraft (Credent, 2022)

Quoting information from the Director of Army Topography:

> In 2023, the procurement of equipment that has been carried out at the Army Topography Directorate is a UAVs unit equipped with a LiDAR camera with limited capabilities and quantities. (Personal Communication, September 26, 2023)

The use of LiDAR cameras installed on UAVs with a flight range of more than 100 km will be one of the things that need to be considered in the context of data acquisition in areas with a high level of vulnerability. In the tactical level, soldiers in the field play a very vital role in innovating to carry out supporting activities which has proven effective in attracting sympathy from the Papuan mountain residents. However, at the operational and strategic level, TNI Headquarters has not yet made maximum efforts to prepare the required terrain data and other supporting information. A principle adhered to by the Department of the Army Headquarters (2022) is that commanders should determine whether operations should focus on destroying enemy forces, whether there is another reason to secure territory, or a combination of both. Unit commanders should consider

the location and intent of the threat force; critical infrastructure or capabilities of operational or strategic value; geographical location of a region; and the political, economic, or cultural significance of the area. Concern for humanity may require control of territory or operations within it. Commanders are obliged to create operational directives because they provide variable tactical or operational advantages, and consider that not doing so would threaten the larger military campaign.

Application of GEOINT in Papua Mountain Province

Wise words in Javanese say "*ngluruk tanpo bolo, menang tanpo ngasorake, sekti tanpo aji, sugih tanpo bondho*". This wise Javanese sentence means to invade without troops, to win without humiliation, to be great without inheritance, and to be rich without possessions. Not all wars have to involve armies. Sometimes a war can be won by planning tactics**.** History of a famous victory in *Babad Tanah Jawa* where the war that did not involve troops was Raden Wijaya's victory in facing Jayakatwang who used the strength of the Mongolian army (Siswoyo, 2017).

Returning to the context of Papua, the Javanese philosophy above could be applied using modern concepts, namely GEOINT by understanding the root of the problem based on existing records, including where the armed violence occurred; how many KKB members were active in each incident; who is the actor behind the violent incident; what are the events behind each case of violence that occurs; how long did the firefight between TNI or Polri and KKB take place; where did the KKB members run after the firefight; how KKB members can obtain logistics, weapons, and ammunition; and so on. The officers on duty have tried to dig up information about the questions mentioned above. However, due to limited tools and access, the information they collected was lacking and could not be used as a reference in making an analysis. This weakness occurs due to obstacles in the form of Papua's geographical conditions.

According to data published by the Forest Area Monitoring Center (BPKH or *Balai Pemantauan Kawasan Hutan*), it shows that the largest Land Cover Class is for Primary Forest, namely 14,746,788 hectares (Regional People's Representative Council of Papua Province, 2019). Primary forests are forests that have never experienced or experienced little or no human disturbance. Primary forests have complex ecosystems, with various types of flora and fauna that develop under natural conditions. Primary forests often provide refuge for endangered plant and animal species (Yembise, Fernando, & Wanma., 2020). A very suitable place as a hideout for KKB members. But the main factor is the level of slope of the land. 5,163 villages identified through statistical data in 2017, around 79.68% or 4,114 villages are located in mountainous areas and have difficult access, where 70% of these villages are still isolated areas (Regional People's Representative Council of Papua Province, 2018). That's why armed violence only occurs on steep slopes and in isolated areas in several districts, among others Nduga Regency, Puncak Regency, Yahukimo Regency, Mimika Regency, and Intan Jaya Regency.

Several stages will be carried out by Geospatial Intelligence in dealing with Papua, in particular, which Guerrilla Counter Operations (OLG or *Operasi Lawan Gerilya*) will be carried out in stages (Rajab & Supriyatno, 2019), such as:

1. The Regional Classification Determination Stage is the determination and integration of plans and actions between Intelligence, Combat, and Territorial Operation according to the regional classification. GEOINT plays a role in classifying areas into two, namely Type A and Type B areas. Type A areas are the Guerrilla Fighting areas, including areas

of destruction, consolidation, and stabilization areas. Meanwhile, Type B is the base area, buffer, and gray area.

2. The Separation Stage is to separate the KKB/KST members from each other and between the KKB/KST sympathizers and residents who are pro-Indonesia. At this stage, GEOINT plays a role in mapping gap areas and critical points so that they do not expand. Apart from that, GEOINT will help create a map of approaches to road access with the most favorable terrain conditions, so that all operations can focus more on that area. GEOINT also plays a role in finding logistics and ammunition supply lines for KKB members.
3. The localization stage is an effort to bring KKB/KST members to areas that are tight and open terrain so that they cannot get help from friendly units. The role of GEOINT at this stage is to provide input on the conditions and location of areas that are suitable for use as KKB/KST members localization. The consideration is that the area meets certain geographic structures and characteristics, for example: it is a barren area, open, flanked by hills, or has no way out. This step was followed by blockading logistics and ammunition supply lines for a certain time limit and carrying out propaganda efforts and some kind of fake maneuver that would drain the ammunition and resources of KKB members. So localized KKB members experienced a shortage of logistics and ammunition
4. Destruction Stage, this stage is the final stage of physically destroying KKB members in certain predetermined areas. The role of GEOINT at this stage is to ensure the destruction area so that monitoring in the destruction process will be maximized. This stage was launched soon after KKB members experienced a shortage of logistics and ammunition. The destruction was carried out after threats to surrender were ignored.

Benefits of Applying GEOINT Concepts

The benefits that can be received from implementing the Optimization of GEOINT concepts include:

1. Unit commanders can obtain comprehensive information regarding the terrain and people. This is information in the form of a 3 dimensional map which contains several other pieces of information, such as access infrastructure, number of enemy personnel, weapons, logistics routes, group leaders, etc. With complete and accurate information, planning military operations will be more effective (Supriyatno, 2022).
2. Casualties will be reduced because the information presented includes enemy habits. The ambush planning was carried out when the enemy was weak, after experiencing logistical shortages and not having adequate ammunition reserves to carry out resistance.
3. For the government, this can reduce operational costs, considering that operations are planned based on measured enemy strength.
4. Another benefit is that development planning is easier because the information produced includes comprehensive information about the earth's surface and other things needed for development.
5. Another aspect is related to natural disasters. The role of Geospatial Intelligence in this case is to create evacuation routes, which are created based on careful consideration of disaster vulnerability (Wiwaha, Abraham, Rachmawati, & Wulan, 2015).
6. The next advantage is that the victory achieved is a joint victory. Because the end of this effort is diplomacy and reconciliation (Harry, 2021).

7. The final advantage is realizing the government's commitment to developing the Land of Papua in various sectors.

CONCLUSIONS AND RECOMMENDATIONS

In line with the Counterinsurgency Theory, complete and accurate information regarding the natural and psychological conditions of the Papuan people are very important things. Currently in Indonesia, complete and accurate information regarding terrain and population cannot rely solely on military institutions, it requires collaboration with other civilian institutions, namely BIG and BRIN. Based on accurate and complete information, the government can make a unified effort with a more appropriate approach by involving all elements to win the hearts and minds of the people. The government should take over the role as the lead sector, due to the police as the lead sector currently does not have the capability in terms of counter-guerrilla operations, the counter-guerrilla doctrine is only owned by the Army. But this task cannot be done by the Army alone, this requires collaboration between several institutions with various specializations from other civil and military institutions. Following Strategy Theory, the strategy to overcome security threats in Papua is carried out by coordinating between several existing institutions both civil and military to explore comprehensive information as a reference for preparing military operation plans and supported by the use of more modern technology.

Therefore, this study recommends:

1. The first step is a need to improve the legal status of the KKB, from an armed criminal group upgraded to a separatist and terrorist movement group with a new regulation by the government and ratified by the Indonesian Parliament (DPR RI) in the form of Law. This regulation will become a legal umbrella for taking over the leading sector in handling the Papua KKB, and then arranging further handling to more appropriate parties. Handling separatist movements should be the responsibility of the TNI, in this case, the Army which has a territorial doctrine. However, considering that the Indonesian Army has limitations in terms of equipment, support from other institutions is needed. So, the role of the army in this case was taken over by the state.
2. Then the next step is necessary to reactivate the GEOINT Working Group under the command of the Indonesian Ministry of Defense. This institution contains liaison officers from both civil and military institutions who are tasked with collecting information from their parent organizations. Then analyze and correlate them with each other to create comprehensive, complete, and massive information. The three elements of GEOINT (Geospatial Community, Intelligence Community, and Territorial Apparatus) are expected to work together to provide complete and accurate information. This working group was present in 2015 under the Ministry of Transportation, but it is no longer active. Comprehensive and accurate information will make it easier for the TNI Commander to decide on strategic steps for military operations, both Military Operations War and Military Operations Other War.
3. There needs to be support with modern technology, for instance, UAVs equipped with LiDAR or another type of cameras (thermal cameras for example) with a terrain acquisition range of more than 1,000 meters per flight. Mounted on UAVs with the ability to fly more than 100 km. There are several options to overcome budget limitations, namely by making rental agreements with private equipment owners or cross-agency agreements. Currently, several institutions, such as TNI AL and TNI AU, already have UAVs with adequate specifications to reach vulnerable areas in Papua and

the use of SATRIA 1, namely BRIN's satellite technology which has an orbit above Papua to intercept communications between Papuan KKB members.

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