The Role of Communication Systems in the Fundamental Functions of Indonesian Air Force

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Abstract

This research employs a qualitative method with a phenomenological approach to study social and cultural phenomena related to the implementation of communication systems in the primary duties of the Indonesian Air Force.Through in-depth interviews and data analysis, the study aims to understand how communication systems are currently being utilized and what strategies can be implemented to enhance the effectiveness of the Indonesian Air Force.The findings suggest the need for well-defined policies, comprehensive strategies, and dedicated efforts to address the challenges faced in communication system implementation.The study aims to provide insights into improving communication system capabilities to assist the Indonesian Air Force in executing its duties efficiently and preserving national stability.

Keywords: Indonesian Air Force, communication system, data modeling, strategic measures, national stability

Introduction

The Indonesian Air Force plays a crucial role within the Indonesian National Armed Forces, serving as the nation's air defense force. Its responsibilities include conducting air force operations for defense, law enforcement, and security maintenance within the country's airspace. It is tasked with executing National Armed Forces missions to enhance air force capabilities, fortify air defense zones, and safeguard the airspace against violations (Law Number 34 of 2004 on the Indonesian National Armed Forces).

Situated between two continents, Indonesia's airspace and maritime territories face substantial cross-continental traffic, leading to increased risks of territorial infringements. Limited monitoring capabilities across Indonesia's extensive land areas compound the challenges, heightening vulnerability to unauthorized flights, maritime transgressions, and various illicit activities such as illegal fishing, human trafficking, and smuggling operations..

Given Indonesia's vast territorial expanse and archipelagic nature, effective surveillance is essential to mitigate threats to airspace and maritime security. A comprehensive monitoring system is imperative to safeguard the nation's integrity and respond proactively to potential violations.

To fulfill its duties effectively, the Indonesian Air Force must optimize its air power potential in both peacetime and wartime scenarios (Decision of the Commander of the Indonesian National Armed Forces

Number KEP/545/V/2019 regarding the Doctrine of the Indonesian Air Force Swa Bhuwana Paksa). It is essential to ensure adequate resources to protect national assets dispersed throughout the country. Despite being a primary entity in national defense, the Indonesian Air Force faces challenges due to escalating operational demands and evolving strategic environments, posing uncertainties regarding future operations. The communication system is a pivotal component in national defense management, supporting decision-making processes and ensuring efficient national defense operations. The Ministry of Defense designs and constructs the Indonesian Air Force's communication system in conjunction with the national information system to enhance information technology infrastructure for national defense purposes.. It serves to provide essential data and information services for defense operations, contributing to internal service enhancements and facilitating bureaucratic reforms to uphold good governance and public service standards within the Ministry of Defense and the Indonesian National Armed Forces.

Table 1. Communication System Indonesian National Armed Force

Branch	Information
Air Force	The Indonesian Air Force's Information System has positioned the Air Force's information and data processing department as a pioneer in the development of their information systems.
Navy	The communication system within the Indonesian Navy utilizes satellite communication technology.
Army	The operational concept of the Indonesian Army is based on the Kartika Eka Paksi doctrine. The use of web-based systems within the lower units is an effort towards modernizing Command and Control (C2). In other words, data link interoperability is developed based on territorial management.

Source: Processed Data, 2024

Nevertheless, the ongoing deployment of communication systems within the Indonesian National Armed Forces faces a range of intricate challenges, with data interoperability emerging as a critical issue. This concern is closely linked to the organization of communication protocols among the Service Command and Control Centers of the Indonesian National Armed Forces. Presently, these centers utilize distinct communication systems, leading to significant interoperability challenges. However, the communication system plays a foundational role in enhancing military capabilities by leveraging electronic tools to achieve military operational goals, encompassing Command and Control (C2) and Communications, Computers, Surveillance, and Reconnaissance (C4ISR) functions, as indicated in Table 1.

Table 1 highlights that the Indonesian Air Force, Navy, and Army operate diverse communication systems, each lacking integrated systems. This absence of integration poses distinct challenges for each force in fulfilling its responsibilities. Furthermore, systemic issues like insufficiently qualified personnel, unconnected communication equipment between units, and software requiring updates necessitate immediate attention. Addressing these concerns is crucial for ensuring seamless command and control operations and supporting the Indonesian Air Force's functions effectively. Strategic measures are imperative to enhance the communication system capabilities of the Indonesian Air Force and assist in executing its duties efficiently.

The Indonesian Air Force requires well-defined policies, comprehensive strategies, and dedicated efforts to address these challenges effectively. Therefore, the study entitled "Implementation of the Communication

System in the Main Duties of the Indonesian Air Force" is proposed to enhance and optimize the communication system in preserving national stability. This study aims to address two key research questions: How is the Communication System implemented to support the primary duties of the Indonesian Air Force? And what strategies should be established to implement the communication system effectively within the Indonesian Air Force's core responsibilities?
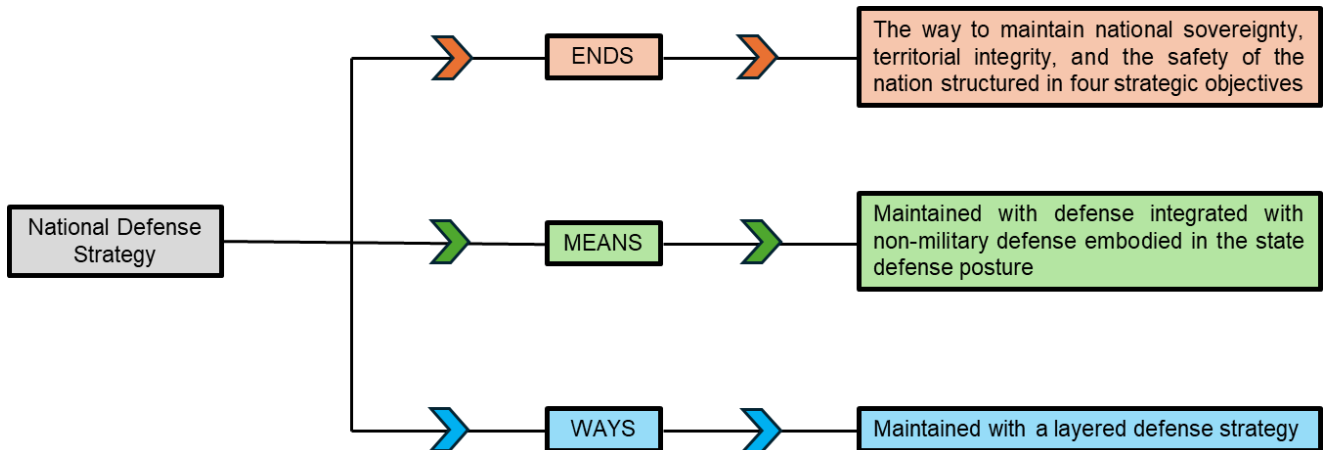

Figure 1. National Defense Strategy

According to Wahab (2008), implementation involves the process of moving towards policy goals through administrative and political steps. In simpler terms, implementation can be interpreted as execution or application. According to Nurdin (2003), implementation is the expansion of mutually adjusting activities. In this context, implementation theory is used to analyze the implementation of the communication system in the main duties of the Indonesian Air Force and the factors that influence its implementation. This implementation is crucial considering the important role of the communication system in maintaining national stability. The implementation of this communication system requires a strategy to realize it. The term strategy can be interpreted as "The art of the employment of battles as means to gain the object of war," which means that the art of battle is the way and means to obtain the object of war (Hart, 1991). This means that, in realizing or winning something, a way and means as a force for implementation are needed. Furthermore, according to Mintzberg (2013), strategy is a planned program or step (a directed course of action) to achieve a series of predetermined goals or ideals, similar to the concept of strategic planning.

In this context, strategy contains three important elements: the goal or objective to be achieved (ends), which is to maintain and protect the sovereignty of the state, the territorial integrity of the Unitary State of the Republic of Indonesia, and the safety of the nation, which is elaborated into four strategic objectives. The resources used (means), the national resources desired to maintain and achieve the goals and objectives to be achieved, namely mobilizing an integrated and synergized Military Defense with Non-military Defense, and the way to achieve the goal (ways), how to use national resources to achieve the defended goal or objective, namely by planning, preparing, and implementing a robust national defense system.

Based on the above description, it can be seen that the Implementation of the Communication System aimed at the Main Duties of the Indonesian Air Force is part of a strategy or way to produce a comprehensive problem-solving solution by considering various existing aspects (resources) and through

rational approaches. Referring to Law Number 3 of 2002 on State Defense, it explains that the universal state defense system involves all citizens, territories, and other national resources. The government prepares it early and implements it in a total, integrated, directed, and continuous manner to uphold state sovereignty, territorial integrity, and the safety of the entire nation from all threats. Referring to this explanation, it can be understood that the term defense cannot possibly be applied without the presence of other scientific disciplines; therefore, the position of defense science is limited to grand strategy, thus requiring other scientific disciplines (Tippe, 2016). This is because defense science is a field of study that is multidisciplinary, interdisciplinary, and transdisciplinary in nature.

Given the broad scope of the national defense system, in this context, it will be focused on air defense. Government Regulation of the Republic of Indonesia Number 4 of 2018 concerning the Security of the Republic of Indonesia's Airspace, 2018 explains that what is meant by air defense is all planned efforts and actions to cancel, repel, destroy and reduce the success and overcome the consequences of enemy air strikes. Therefore, in this context, the Indonesian Air Force as an integral part of the Indonesian National Armed Forces is a state air defense tool that has the duty to uphold the sovereignty and territorial integrity of the Unitary State of the Republic of Indonesia and protect the honor and safety of the nation from any threats coming from both abroad and domestically. In an effort to defend the sovereignty of the state, the Indonesian Air Force must be able to maximize the entire potential of air power, both during wartime and peacetime. With such a vast area and vital objects scattered throughout the country, adequate strength is needed to defend and utilize all available resources. One way is by developing an integrated communication system to enhance Indonesia's defense system. A communication system can be defined as a unity consisting of elements within it, where activities of exchanging messages or information occur between the sender and receiver of the message (Cangara, 2013). The communication system plays a very important role in human life all over the world because by communicating, all one's intentions and goals can be achieved.

According to Soreno (1975), one of the understandings of the communication framework is the activity of interpreting other people's behavior. There is a process of encoding and decoding both verbal and non-verbal messages. The more participants involved in communication, the more complex the transaction becomes. The advantage of this concept is that communication is understood as a concept that is not limited to intentional communication only. In this context, the communication system in the Indonesian Air Force environment is directed as an arrangement of hardware, software, and personnel that are interconnected and related in such a way that they form a unified whole as a means of conveying information from one communicator to another for the smooth implementation of command, control, and other Indonesian Air Force activities conducted directly or indirectly with speed, accuracy, and security (Guidelines for the Implementation by the Chief of Staff of the Indonesian Air Force Number KEP/450/XII/2022 regarding Communication Systems).

Considering various aspects, one of which is threats, we develop a defense system. Snyder (2007) states that threats can be viewed from two different perspectives, namely military threats and non-military threats. Suryohadiprojo (2005) states military threats originate from the military forces of other countries with the intention of weakening or destroying the military defense facilities of a country considered as an adversary. Conversely, non-military threats or non-kinetic threats utilize non-military factors that have the potential to endanger the sovereignty of the state, territorial integrity, and national safety. Non-military threats can include ideological, political, economic, socio-cultural, technological, and informational, and public safety dimensions (Suryokusumo et al., 2016).

Based on the above explanation, it can be understood that the current world developments are very dynamic and support the evolving nature of threats. This situation serves as a warning for every country to build and develop its defense system across all sectors, including land, sea, and air. In developing the defense system across all these sectors, the synergy among various branches of the armed forces is required. Synergy is a combination or coordination of elements or parts that can produce better and greater outputs compared to being done individually; moreover, the integration of several elements will result in a superior product (Covey & Sanjaya, 1997). Furthermore, the understanding of synergy will be easily achieved if the existing components are able to think synergistically, reach a common outlook, and respect each other. According to Mulyana, synergy is a form of working together to achieve goals optimally (Mulyana, 2007).

The main conditions to create synergy are: trust, effective communication, quick feedback, and creativity. Therefore, all existing components need to foster unity so that the set goals can be achieved. Generally, the C2 (Command and Control) and the Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) defense systems are integral information systems to support military capabilities. Military organizations, following their system, utilize electronic devices to achieve military operational objectives. Initially, within the military, there are superiors and subordinates; superiors have the right and responsibility to give commands and control the extent to which commands are executed. Over time, as the organization expands and personnel increase, communication becomes an additional element. Similarly, after communication, computers are integrated as technology to support C2 (Triharjanto et al., 2016). Next, the role of intelligence, monitoring, and reconnaissance becomes a fundamental capability of military organizations.

In this context, to enhance the function of C4ISR in supporting C2 or leadership decisions, Supartono (2017) identifies two issues: enhancing cross-community communication and encouraging public involvement in addressing these issues across various fields such as education, politics, the economy, culture, etc. These two segments are developing, but in practice, the enhancement of C4ISR can be hindered by various issues, including cultural, organizational, process-related, tools, research and development, data, and others. Related to this, the development of a C4ISR architecture framework can be conducted through:

1. **Operational Viewpoints:** Describing tasks and activities, operational nodes, and the information that flows between these nodes to achieve or support operations. The operational viewpoint depicts the nature of information exchanges in sufficient detail to determine the required level of information exchange interoperability.

2. **System Viewpoints:** Translating the required level of interoperability into a set of necessary system capabilities, identifying current systems used to support operational needs, and facilitating the comparison between existing or hypothesized system implementations and the required capabilities.

3. **Technical Viewpoints:** Articulating the criteria that govern the implementation of the required system capabilities. Consistency and coherence in architectural descriptions should provide explicit relationships between the various viewpoints. The framework product set, briefly described in the following paragraphs, provides several linkage points between views. The development framework for C4ISR can be seen in Figure 2.
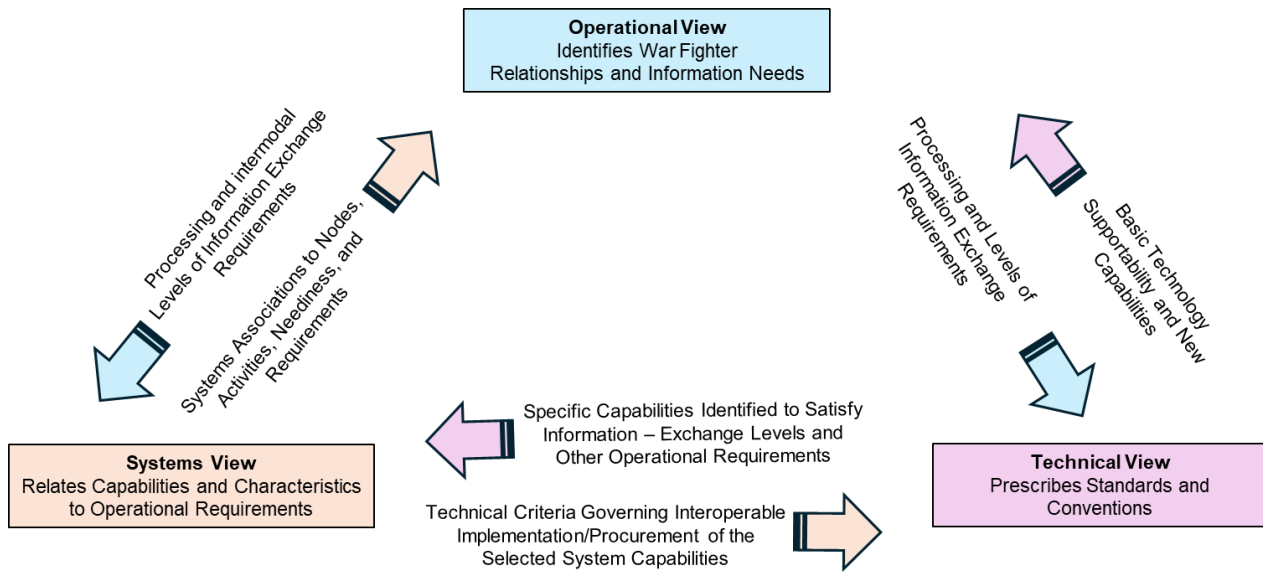
Figure 2. Development Framework C4ISR

Research Methods

This research employs a qualitative method with a phenomenological approach, enabling researchers to study social and cultural phenomena (Lofland et al., 2005). Qualitative research methods are typically associated with non-numerical data and aim to gain a deep understanding of an individual or group's experiences (Creswell & Creswell, 2018). The researchers conducted in-depth interviews through face-to-face interactions with informants at Rindam Jaya to delve into the core issues of the research. Consequently, in line with the qualitative nature of the research, the data sources in this study will continue to develop (snowballing) purposively until the collected data is deemed satisfactory (Usman & Akbar, 2017).

Discussion and Research Results: Implementation of Communication Systems in the Primary Duties of the Indonesian Air Force

To achieve optimal performance in its tasks, the Indonesian Air Force requires modern main weapon systems (alutsista) based on the latest technology, along with reliable operational support systems and equipment that also utilize cutting-edge technology with high operational readiness. An essential operational support system required is an integrated information system that can manage data and information swiftly, accurately, precisely, and securely. A communication system that can offer comprehensive, real-time, and online information is indispensable for both organizational development and the control, deployment, and operation of air forces, as well as in addressing dynamic information developments related to the Indonesian Air Force. In this context, the development of communication, including both operational and logistic support communications, must be accomplished effectively, efficiently, and optimally. This involves the execution of both development and operational communications, as outlined in the Indonesian Air Force Implementation Guidelines on Communication Systems:

1. Organizational Communication Execution in the Indonesian Air Force includes essential activities relating to the implementation and execution of communication for the development of the Indonesian Air Force, encompassing various interactions and interrelations between communicators. This involves:

a. **Command Development Communication:** Direct communication between command holders within the vertical organizational structure

b. **Logistics and Operational Communication:** Communication system related to disseminating logistics and operational administrative information and written command products within the vertical organizational structure.

c. **Coordination Communication:** Focused on disseminating coordination information between units within the Indonesian Air Force and with other Indonesian National Armed Force units or civilian agencies related to Indonesian Air Force development tasks.

d. **Data Communication:** Emphasizing computer-to-computer exchange necessary for Indonesian Air Force development.

e. **Aviation Communication:** Disseminating aviation-related information to support the smooth and safe flight operations of the Indonesian Air Force and other military or civilian flights under the Indonesian Air Force's jurisdiction.

f. **Training Communication:** Supporting the execution of Indonesian Air Force training exercises across various areas.

2. Operational Communication Execution in the Indonesian Air Force involves activities that must be considered and executed in the context of Indonesian Air Force operations and related Indonesian National Armed Force operations, including:

a. **Command Communication:** Direct, specific communication via a hotline network connecting Air Force Senior leaders with operational command personnel and base commanders overseeing air units.

b. **Control Communication:** Communication related to the direct control of Indonesian Air Force operational implementation conducted by operational commanders within the Indonesian Air Force.

c. **Coordination Communication:** Focused on disseminating operational coordination information between executing Indonesian Air Force units and other Indonesian National Armed Force units related to Indonesian Air Force operations.

d. **Data Communication:** Involving computer-to-computer exchange necessary for Indonesian Air Force operations.

e. **Air Operation Communication:** Controlling the execution of air operations by Indonesian Air Force operational units..

It should be understood that the Indonesian Air Force communication system is a framework of interconnected hardware, software, and personnel forming a unified means for conveying information from one communicator to another to support command control and other Indonesian Air Force activities, both directly and indirectly, with speed, accuracy, and security.

Communication System Implementation Strategy for the Primary Duties of the Indonesian Air Force

The strategy to establish a good communication system essentially comprises three critical elements: ends-means-ways, all aimed at achieving objectives. The strategies include preparing information system devices by transitioning the Executive Information System (EIS) from a desktop application to a web-based application, gradually enhancing the information system capabilities, solidifying applications in intelligence, operations, logistics, personnel, and management, and developing a more independent information system network using wireless and wired communication means built by the Indonesian Air Force as the backbone of the information system. Further applications to support information operations,

information warfare, and cyber defense (Rahman et al., 2015), as well as supporting the concept of an Executive Support System (ESS), will also be developed.

If the Indonesian Air Force's information system can be developed with a comprehensive and integrated plan, the Indonesian Air Force will eventually have an integrated information system capable of presenting rapid, accurate, precise, and secure information accessible by leaders in real-time and online, both effectively and efficiently in operation and maintenance within a relatively short period and with relatively low costs.

A good communication system implementation strategy, capable of being carried out gradually by considering priority scales and organizational needs, is required to support the primary duties of the Indonesian Air Force. The strategies include:

1. **Establishing Communication System Preparation:** This will provide integrated information to the leadership to support decision-making by transitioning the EIS application from a desktop to a web-based application, automating data updates and access, and developing core applications for intelligence (security), operations (aircraft readiness data, radar, weather, and navigation data), logistics (simtelog), personnel (personnel integration), and management (budget planning and control).

2. **Building and Developing the Information System:** This aims to gradually enhance the information system capabilities by developing necessary applications in intelligence, operations, logistics, personnel, and management for supporting leadership elements and other elements under them as a continuation of the first phase of development.

3. **Solidifying Information System Applications:** This involves applications in intelligence, operations, logistics, personnel, and management, including developing a more independent information system network using wireless and wired communication means built by the Indonesian National Armed Forces /Indonesian Air Force as the backbone of the information system. Further development of applications needed for information operations, information warfare, and cyber defense while supporting the ESS concept is also part of this phase.

4. **Grand Design of Communication and Information System Support:** Further steps in the communication system implementation strategy should include the development of a grand design for communication and information systems supporting Indonesian National Armed Forces Command and Control. This design must feature a secure, user-friendly interoperability infrastructure that can accommodate necessary and conveyed information. This design aims to cater to rapid advancements in technology fields and impact military systems to achieve battlefield superiority. The integration of communication and information technology adjusts the Indonesian Air Force communication and information system grand design to stay relevant to the era.

The grand design of the Indonesian Air Force communication and information system should be an integrated system implemented into more advanced systems such as K4IPP or C4ISR. This basic interoperability concept supports command and control within the Indonesian Air Force. It aims to facilitate effective, accurate, and real-time operational command and control processes in both peace and conflict. Additionally, this system will enable effective and efficient monitoring, command, and control processes through centralized data integration in a unified computer network displayed on a situation display for real-time monitoring by multiple observers. Data displayed can be analyzed for current situational assessments, allowing immediate command and control actions when necessary.

The Indonesian Air Force's information system should be applicable in state defense information operations interoperability data links, albeit comprehensive regulations are required. Such regulations should be formulated in data models and process models within information warfare contexts, enabling application through semantic web structures. Data from external and internal units within the Indonesian Air Force should be classified according to confidentiality levels specific to each branch. Ensuring data transfer support for Indonesian National Armed Forces leadership decisions involves three possible interoperability models: (1) Conditional Interoperability based on situational needs; (2) Urgency-based Interoperability; and (3) Operational and Non-Structural Tactical Data Integration.

Conclusion

Based on the above explanation, the conclusions are:

1. The construction of the communication system in integrated development has not been comprehensively implemented. It is often partial by main commands or work units, resulting in duplication, lack of an integrated database, and standalone network devices. These issues lead to inefficiencies and ineffectiveness, high costs, and requiring more personnel for maintaining diverse applications and networks while failing to provide integrated information.

2. Strategic Role of Communication Systems: The Indonesian Air Force has implemented several strategies, particularly regarding communication system implementation, deemed essential due to their strategic role in supporting primary duties and maintaining national sovereignty, including collaborations for enhanced communication systems. However, these strategies have not completely addressed the Indonesian Air Force's challenges in its tasks and responsibilities as the primary national defense component.

Recommendations

Considering the issues faced, several suggested actions include::

1. The Chiefs of Staff from each branch of the military and the Commander of the Indonesian National Armed Forces should advocate for the House of Representatives and the President to establish clearer and more measurable communication system regulations. This could include forming a specialized agency under the coordination of the Coordinating Ministry for Political, Legal, and Security Affairs, in collaboration with the Ministry of Defense, the Ministry of Communication and Informatics, and the Ministry of Home Affairs.

2. The Head of the Air Force Communications and Electronics Directorate (Kadiskomlekau) should develop human resources that can keep pace with technological advancements and evolving trends in information and communication warfare. This preparation will enable the successful implementation of reliable communication systems to support the Indonesian Air Force's primary objectives through various strategic measures, such as training and development programs.

3. Further comprehensive research and development are needed regarding the communication systems, covering everything from planning to evaluation. This effort should be supported by adequate resources, including budget allocations, to achieve the goal of supporting the Indonesian Air Force's primary mission of maintaining national stability.

4. Cooperation with other entities, both governmental and private, is necessary to foster synergistic coordination. This will enhance the Indonesian Air Force's ability to fully utilize the communication systems to effectively carry out its missions.

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