Multi-Agent Drone as Loitering Munition System to Support Military Operations Carrying Out Policy Mandate

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ABSTRACT: *Unmanned Aerial Vehicle (UAV) also known as drones is a part of the integration of hardware, software and computerized systems to support defense. The use of drones, especially to support military operations, will be more powerful if used massively and equipped with certain explosives as target destroyers. The target in question can be designated for point targets or target areas that are quite large in accordance with the integrated explosive composition texture. The attack or combat drone technology that is currently being considered in carrying out operational missions is the Loitering Munition System (LMS). LMS is a drone that is used as a weapon equipped with certain explosives and commits suicide (kamikaze) in groups or swarms. PT. "EnrolSistem Indonesia" is one of the drone technology activists in Indonesia that has made hardware, software and computerized systems that are able to fly 3 MiniBe drones together. In this paper, we will develop a swarm-based kamikaze drone or suicide drone based on MiniBe. Drones will be flown 3 units at once and will commit "suicide" on a predetermined target location in the form of a point or area. Drones will be used to paralyze operational targets including operational support in the form of enemy command posts, enemy or terrorist hideouts including radar antenna equipment, telecommunication antennas, surveillance centers and so on with more devastating power if drones equipped with certain explosives are used in swarms. This innovation will be encouraged as a domestic capability, especially local content in the drone sector to support military operations in Indonesia and is also a mandate from Law 16/2012 concerning the Defense Industry, along with its implementing regulations, namely Government Regulation No. 76/2014 on the implementation of countertrade, local content and offsets and Minister of Defense Rule 39/2016 Development of Defense Industrial Technology. It is hoped that this LMS innovation can support the fulfillment of one of the Defense and Security Equipment Tools independently.*

KEYWORDS -*Loitering Munition System, Defense Equipment Tools, Local Content, Law 16/2012 and its derivatives*

I.   INTRODUCTION

With the enactment of Law 16/2012 concerning the Defense Industry and its implementing regulations, namely Presidential Decree 76/2014 concerning the countertrade mechanism in the procurement of Defense and security equipment from abroad, Minister of Defense Rule 30/2015 concerning Implementation of Local Content and Offsets in the procurement of Defense and security equipment from abroad and Minister of Defense Rule 39/2016 concerning the Defense Industry's technological development has brought a significant changes, especially for Defense and security equipment stakeholders in Indonesia. It is aligned with the interest of

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domestic defense and security equipment products which developed innovation and passion for research and development aimed at the Indonesian Armed Forces as users.

The Ministry of Defense's (MoD) budget incentives for domestic defense industry products demonstrate that the government is dedicated to a policy of supporting domestic defense industry products. Selection and evaluation are the necessary mandate that came from the proposals of Defense Industry, considering that limited budge. In addition, the selection was carried out to obtain programs that were important for the Indonesian Armed Forces, including the latest technology, not the obsolete technology. Article 34 of Law 16/2012 states that the users are obliged to use domestic defense industry products for defense and security equipment products that have been able to be produced by local producers. It includes the countertrade, local content, and/or offset mechanism which has been applied to the acquisition or procurement process from abroad. It was forced to be carried out due to Defense Industry's limited ability and with the permission of Defense Industry Policy Committee to obtain returns from money that has been spent by the principle or Original Engineering Manufacturer (OEM).

The intended feedback is countertrade, local content, and offset of at least 85% with a minimum offset of 45% with an increase of 10% every 5 years. This indicates that the fulfillment of defense and security equipment is owned by the domestic defense industry. Purchases from abroad are also carried out to restore part of the contract value through countertrade, local content, and/or offset. The aim is to increase the capability of defense-related industries and to increase non-oil and gas export commodities. This also contributes to the procurement process, including increasing local content significantly.

This consequence demands that policy makers must actively look at the potential and capabilities of defense industry, including those who have not yet become defense industry, to fill local content slots according to the mandate of the law or policy. One of the implementations of innovation aimed at increasing local content and its independence is the innovation of drones with integrated computerized system to support the operations of the Indonesian National Armed Forces's elite troops in the field. Technological advances in drones or UAVs have received special attention by the Indonesian National Armed Forces and the Ministry of Defense. The successful military operations using drones for operations in the Middle East and other conflict areas have "opened" the eyes of stakeholders so that drones can be used massively to support operations. It is the perfect timing for the Indonesian National Armed Forces troops to be equipped with modern equipment to support modern warfare.

On March 7th 2019, there was an attack from an Armed Criminal Group which resulted in the death of 3 Indonesian National Armed Forces soldiers in Nduga, Papua (https://news.detik.com/berita/4458104/3-prajurit-tni-gugur-ditembak-ketua-dpr-tambah-pasukan-di-nduga)[1]. The geographical position of Nduga is surrounded by tropical forests and hills which makes it difficult for the Indonesian National Armed Forces troops to conduct sweeping and pacification. Of course, this limitation can be reduced if the the Indonesian National Armed Forces has capable tools for conducting surveillance without having direct contact with the Armed Criminal Group. What happened recently was the shooting of the Indonesian National Armed Forces general, the head of the Papuan Regional Intelligence Agency, was by an Armed Criminal Group in Dambet Village, Beoga District, Puncak Regency, Papua, on Sunday (25/4/2021) (CNN Indonesia article "*Kabinda Papua BerkarierMoncer, Gugur Ditembak KKB*")[2].

Fig. 1. Location of Shooting of the Indonesian National Armed Forces Soldiers by Armed Criminal Group

The tools that are possible to use are drones or tactical UAVs. Its small size and convenience deployment make this drone very suitable for use. However, one drone unit is meaningless because it will require several flights to cover a large coverage area. Therefore, it would take many of these tactical drones or UAVs flying at one time to cover such a very large area. To make tactical drones fly in groups at a time, it requires a special data telecommunications infrastructure. This infrastructure is useful to ensure that the drones can fly on their trajectory and do not collide with one another. This infrastructure is a data telecommunications system in the form of a radio modem that is installed on each drone and in a GCS (Ground Control Station). Each drone will also carry a camera that will transmit its video online to the GCS. Therefore, the required telecommunications system must have an adequate networking capability. By flying together, carrying cameras, and warheads, the drones' abilities will become a very strong threat to the enemy.

If the the Indonesian National Armed Forces troops use this kind of equipment, then we will see their ability to increase as the front line in overcoming the movement of security threats. The problem that occurs in policy implementation sometimes is the lack of data and facts on the ground obtained by policy makers because the bottom-up input of information on industrial capabilities is rarely done or occurs slightly. This happens because the industry sometimes has a reluctance to do it and defense industries leaders are also reluctant to do it or even don't know the capabilities and existence of the industry itself. Therefore, there is a need for strong cooperation between policy makers, industry, and users in a set of triangle for implementing the policies that have been set.

To realizing a drone LMS is based on the following below:
1. The need/use of UAV/Drone for border area surveillance is very high.
2. UAV/Drone operations still use the old method, for example using remote control, determining waypoints, taking data offline and then sending reports.
3. Requires special skills that often make pilots hesitate when carrying out operations.
4. Operation costs for large UAV/Drones are more expensive and have limitations having to use a large runway and open area.
5. The landscape condition of the border area is mostly covered with trees, making it difficult to fly a large UAV/Drone.
6. Massive use of small UAVs/Drones to reach/cover large areas requires modern technology, namely swarm technology.
7. Turning drones into weapons by carrying warheads and crashing themselves into targets.

The purpose of this writing is to produce LMS (Loitering Munition System) products based on Minibe Tactical Drones that have the ability to fly in a swarming manner to be used by the Indonesian National Armed Forces troops in the context of surveillance (surveillance drones) and enforcement (kamikaze drones) which is the mandate of Law 16/2012 and its derivative regulations in particular related to local content with the following targets:
1. Manufacturing Minibe Tactical Drone Airframe.
2. Integrating autopilot system.
3. Develop swarm software.
4. Develop GCS (Ground Control Station) software for kamikaze drones.

The ultimate goal of the developed technology can produce 3 units of MiniBe tactical drones that are kamikaze-capable, produce 3 units of autopilot system (autotakeoff-mission-autolanding) generate swarm software and produce multi-drone GCS software which is carried out independently by PT "Enrol" to increase local content in fulfilling defense and security equipment. It is aligned with the mandate of the law or policies that have been set by the government towards the independence of drone technology to support defense.

II.   METHODOLOGY

This paper uses a literature review method related to policy and LMS development to obtain data and condense them. The qualitative data obtained was analyzed using policy theory in a descriptive analysis to get an overall picture of the results related to inputs for policy implementation as outlined in the conclusions and suggestions.

III.   THEORETICAL BASIS

The term policy is usually associated with government decisions because the government has the authority to direct the community and is responsible for serving the public interest. Policies can also mean a series of concepts and principles that become the lines of carrying out a job, leadership, and ways of acting.Policies can also be interpreted as a political, financial, management, or administrative to achieve a goal. Policy can also refer to the process of making important decisions in the organization, including the identification of various alternatives such as program priorities. Therefore, policy is a set of decisions taken by political actors to choose goals and how to achieve them.

According to Carter V. Good (1959), policy is a consideration based on a value and some assessment of situational factors, to carry out general planning and provide guidance in decision making to achieve goals.Government policy is whatever the government decides to do or not to do[3]. The definition is based on many problems that must be overcome, there are many wishes and desires of the people that must be fulfilled (Thomas R. Dye in Soenarko, 2003:41).Policy is a combination and crystallization of the opinions and desires of many people and groups in society (Dimock in Soenarko, 2003:43). It is also the relationship of a government agency to its environment (Robert Eyestone in Soenarko, 2003:42).A direction of action proposed to a person, group, or government in an environment with its obstacles and opportunities, which are expected to fulfill and overcome these obstacles to achieve an ideal or realize a will and a certain goal (Carl J. Friedrich in Soenarko, 2003:42)[4].

Fig. 2. Policy Process

TAHAPAN
PENETAPAN KEBIJAKAN

Sumber Kompas: Daeng M.Nazier,2004
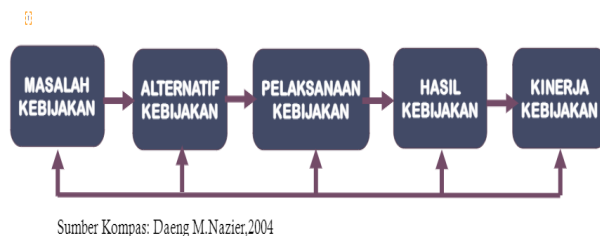
Picture 3. Stages of Policymaking

1. POLICY PROBLEM: There is a problem with the current policy. Existing opportunities need to be identified appropriately. The ability to overcome existing problems requires information about the conditions that need to be anticipated.
2. POLICY ALTERNATIVES: Potential courses of action. Accurate and timely information will be very helpful in determining alternative policies to be carried out.
3. POLICY ACTION; A series of steps that are selected and determined to be carried out based on alternative policies. For the determination and implementation of this policy, the need for information is absolute.
4. POLICY OUTCOMES: The results obtained from the implementation of policies. Information obtained as a result of policy implementation and after the policy results will help analysts to analyze existing policy outcomes.
5. POLICY PERFORMANCE is the degree to which policy outcomes contribute to achieving the value achieved. Analysts will be able to determine whether the policy problem has been solved or whether it is necessary to reformulate the policy problem.

According to Pound (1969) and Dunn (2003), problems occur when the difference between the situation at hand and the desired situation, or in certain cases is expected to occur[5]. Efforts to solve problems using various alternative solutions are generally "policy" (HariadiKartodihardjo, 2017)[6].The main problem that is usually encountered is who determines the "policy". It is necessary to know with what approach the "problem" is determined, then it is also necessary to know "what interests" behind the problem-setting and policymaking, as well as "with whom" or "using the network in which the policy" is encouraged to be realized (IDS, 2006)[7].

In general, terms of policy and policy implementation have been explained above. Furthermore, according to Suharno (2008: 187) implementation of public policy is the government's effort to carry out one of its main tasks, namely providing public services to the community[8]. According to Wibawa (in Hessel et al., 2008: 7) policy implementation is the implementation of decisions regarding basic policies, usually contained in a law, but can also take the form of important executive instructions or statutory decisions [9].The success of policy implementation is closely related to the aspects that support it such as considerations and recommendations for policy makers and product makers, unity of vision, mission, goals and commitment and consistency of the triangle in defense industry's development, namely policy makers, or the government, defense industry, and thr users.

The implementation of the policies that we will discuss here is an effort to foster the potential of domestic industries engaged in the defense and security affairs sector. With the enactment of Law No. 16/2012 concerning Defense Industry [10]and its derivative rules such as Presidential Decree 76/2014 concerning the mechanism of countertrade on local content and offsets [11]and Minister of Defense Rule 39/2016 concerning the development of defense industry technology[12]. Therefore, the parties related to the policy must be in line with the commitment to implement the policy of siding with the domestic Defense Industry such as research and development activities and mass production for procurement.

Along with the times, efforts to achieve technology through a concept that we often know is Transfer of Technology, which is now known as offset, is not easy things to be achieved. Easier to said than done is the right term to pay attention to. To comprehend the value of Intellectual Property Rights in the defense sector, it will protect from other parties to steal the property. The strategy carried out by defense and security equipment providers or principles, especially from abroad, currently does not provide its single products, but a collaborative configuration that hides technology in the Original Equipment Manufaturer (OEM). A supporting system is a problem that often complicates the offset negotiation team at the Ministry of Defense.

For example, in the purchase of the U-209 Submarine from DSME, South Korea, the submarine platform system from South Korea was for units from DSME but the provision of technology consulting from DWL. The weapon system in the form of a torpedo launcher and SEWACO is supported by the French Thalles and the black shark torpedo system from leonardi Italy. Imagine how difficult it is to reach the key technology. Likewise, the implementation of offset negotiations at the Ministry of Defense to support Defense Industry's improvement is currently still only fulfilling the procurement contract.

The evaluation of the offset implementation has not yet been fully implemented in the research and development process, especially in institutions of defense industry. It is important to continue to narrow the research and development program and improve local content. Returning to the policy implementation of this paper will encourage the ability of domestic industries to support the Loitering Munition System (LMS) which will be described in the analysis. The concept of design and manufacture to proper designation is supported as a concept of industrial development in supporting defense and security equipment for the benefit. It is also supports the implementation of policies in the form of developing defense industry technology and increasing local content to support the independence of the the Indonesian National Armed Forces'sDefense and security equipment needs. According to the theory of George C. Edwards III (in Riant Nugroho, 2009: 636), policy implementation is influenced by four variables, namely:

1. communication
2. resources
3. disposition and
4. bureaucratic structure.

The four variables are related to each other[13].

IV.   ANALYSIS

The concept of technology development as follows: The following are some examples of LMS originating from other countries

Fig. 4. Foreign Drone
The following is a picture of the LMS that will be encouraged as policy implementation.

Fig. 5. MiniBe Drone (LMS)

The product that will be produced and is expected to be used by the the Indonesian National Armed Forces is the MiniBe tactical drone which flies in swarm. In 2019, 3 MiniBe drones have been developed which already have the ability to fly in groups. To fly this MiniBe drone does not require special skills such as the ability of an RC pilot. It only need to be activated by shaking the drone in a longitudinal direction and the MiniBe propeller motor will spin. The drone is then released to follow the waypoint programmed into the GCS. The following is an illustration of the MiniBe tactical drone product.

Fig. 6. MiniBe Tactical Drone

Some of the MiniBe specifications are:
1. Total weight: 2.1 Kg
2. Wingspan: 1.2 m
3. Flying radius: 30 Km
4. Flight time: 60 Minutes
5. Propulsion System: Electric
6. Airframe: Composite

The MiniBe operation process includes several steps:

1.   Assembling the MiniBe

MiniBe airframe consists of 4 main parts, namely the fuselage, right wing, left wing, and propeller. Combining the wings with the fuselage is very easy, using rods and connecting them with neodymium magnets.

Fig. 7. Assembled MiniBe

2.   Programming the waypoint/flying path

Waypoint/flying path is entered by clicking on the desired point into the GCS software. The flight altitude can also be edited at that point.

GCS EnrolMS for MiniBe operation:

Picture 8. Programming the MiniBe flight path

3.   Activating and launching MiniBe

MiniBe is activated by shaking the MiniBe forward. The accelerometer sensor will detect and activate the propeller motor. Shortly after, the MiniBe can be released.

Fig. 9. Launching multiple drones using the Auto-takeoff feature

4.   Landing the MiniBe

MiniBe lands automatically without having to use the remote control. Landing points are predefined in the MiniBe waypoints in the GCS.

Fig. 10. MiniBe landing process

This MiniBe tactical drone has the ability to fly in a swarm. The autopilot system uses EnrolPilot and is self-developed.

Currently, the EnrolPilot autopilot system has reached version 1.3. One of the advantages is regarding to its features which can be customized according to the specifics of the drone. The EnrolPilot V1.3 autopilot system has a serial communication port that can be connected to a 4.5 G Broadband Modem developed by the STEI ITB Microelectronic Expertise Group. By doing so, the modem is expected to be able to become the backbone of MiniBe's swarm data telecommunications. The autopilot system on EnrolPilot V1.3 inMiniBe. The following is a picture of the EnrolPilot V1.3 autopilot system.

Figure 11. EnrolPilot V1.3 Autopilot System

Currently EnrolPilot has been used on the Target Drone and MiniBe. EnrolPilot has features including:
1.   Can receive commands from RC in the form of PWM input.
2.   Can receive navigation/waypoint commands via mavlink protocol.
3.   Can be customized according to the mission it carries through EnrolCC and specific firmware.

EnrolPilot specifications are as follows:
1.   Plastic casing: 8.5 cm x 6.5 cm x 2.3 cm
2.   Connector: DB44 male
3.   Power Input: 4.5 – 5.5 V @1 A
4.   2 layers resin PCB
5.   Controller: 8 Bit microcontroller, 256 Kbyte Flash
6.   Sensors:
•   3 axis 16-bit accelerometer
•   3 axis 16-bit gyro
•   12-bit pressure sensor
•   12-bit magnetometer
•   5 Hz GPS rate
7.   Memory: 16 Mbyte Flash

Mini Be swarm concept
The image below shows the desired topology of the drone swarm system. Each relay post can connect with 5-10 units of drones. All relay posts are connected to a command post. This command post can then be accessed online via a private network or the internet.
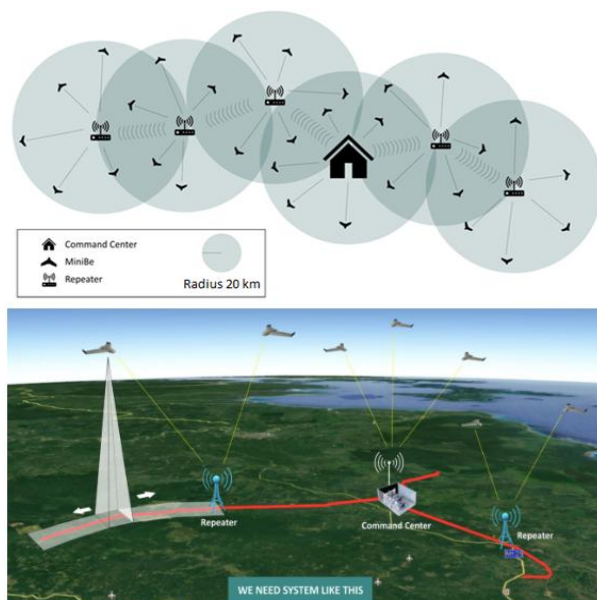
Picture 12. Hierarchy of "swarm" mechanisms for MiniBe tactical drones

The data of each drone can be accessed from a centralized control center via the internet. The process of uploading and downloading data can be done using mobile devices or PCs. This is realized by a web server that is made to mimic the functionality of a GCS. So, there is a gateway through which every drone data will go through. Here is an image of the gateway which is referred to as EnrolCC.
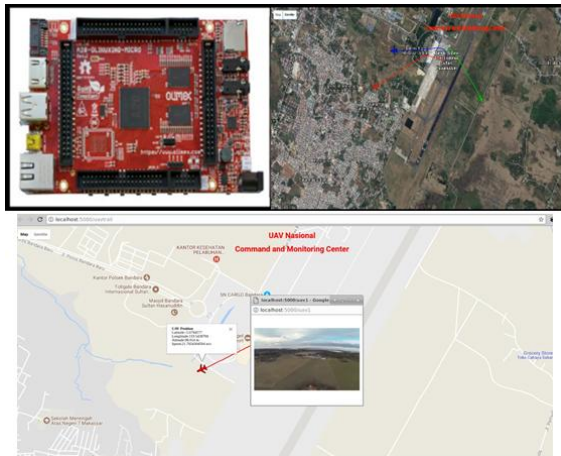
Picture 13. Multidrone data gateway, EnrolCC and Web View Online Monitoring

By using a web browser, each drone can be monitored and controlled by an authorized person wherever he is as long as it is still connected to the network.

Target Tracking Ability:

Besides being able to fly in groups, MiniBe has also been tested to perform Target Tracking. An HD camera and a Mini PC are attached to the MiniBe for image processing. Here is an image of the Target Tracking test on the MiniBe.
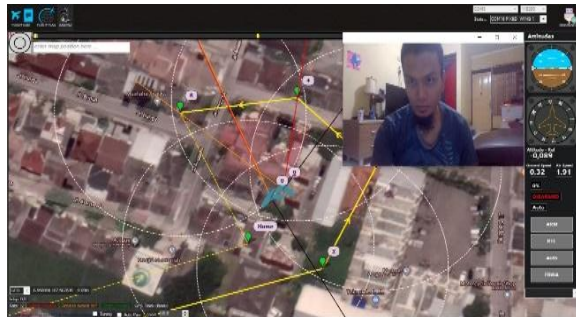

Picture 14. Target Tracking Testing on MiniBe

This Target Tracking capability is also known as the seeker system, which is a system used to find the desired target. This system is also being developed to provide stabilization using a two-axis gimbal (roll and pitch). Below is a picture of the seeker system under development.
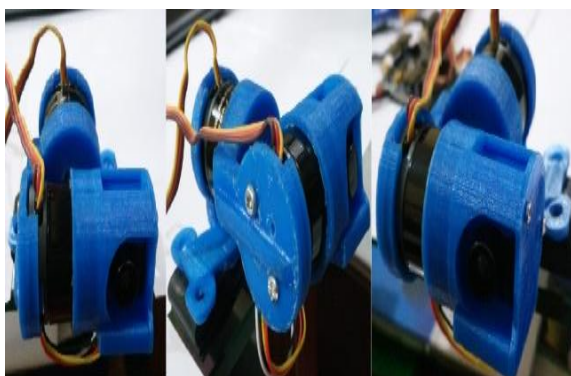

Picture 15. Seeker System *Gimbal*

Picture 16. Display of Video Streaming on EnrolMS

As stated earlier, tactical drones require data telecommunications infrastructure to fly in groups.
In 2018, PT. EnrolSistem Indonesia has partnered with the STEI ITB Microelectronic Expertise Group chaired by Dr. Ir. Basuki RachmatulAlam who developed a 4.5 – 5G Broadband communication modem. In 2019, the prototype product for the 4.5 – 5G Broadband Communication Modem is expected to be realized. Here is a picture of the design.
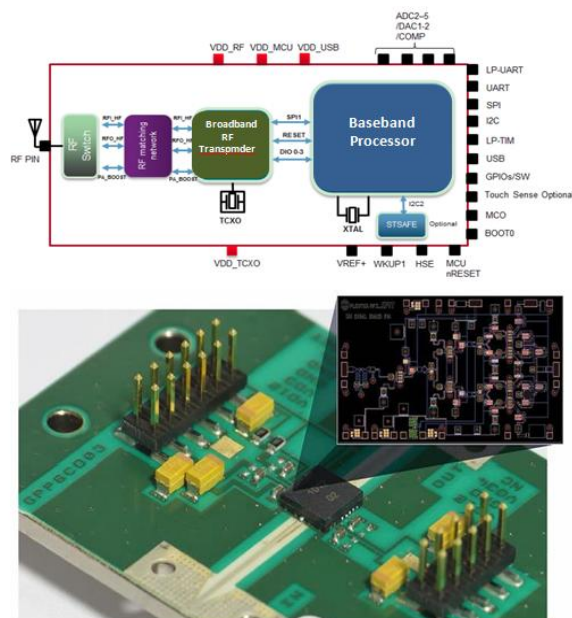
Picture 17. Broadband Communication Modem 4.5 – 5G
Policy implementation:

Policy implementation is a concept, plan, activity, or activity carried out by a person, agency or agency to convey information to other parties related to policies.
In this case the Loitering Munition System (LMS) innovation concept can be said as a process of delivering information to individuals or entities as part of government to higher policy makers to provide input for program development at the Ministry of Defense.

A. Communication.

The communication referred to the Ministry of Defense's as a bottom-up government provides data and facts related to industrial activities that can be used to support the defense system, especially LMS innovations to be included in the defense industry coaching program. This needs to be done by defense industry's supervisors to be able to find information and activities in the field which are sometimes reluctant to convey by defense technology activists. Therefore, what is done is not only for registered defense industries which

sometimes there are no sustainable activities because many defense industries who are registered have trade permits. The series of communication carried out are LMS technology innovation activities with the parties involved, namely the Ministry of Defense, defense industry and the users as the golden triangle. This stage is carried out to provide clear information to the stakeholders to be able to produce superior programs that are more useful.

1. Transmission:

The communication carried out above by looking for facts and data in the field related to the LMS and is communicated in the triangle. It is an effort to prevent misunderstandings, misperceptions, misinterpretation, miscommunication, and avoiding biasing the intent of the vocal points intended by the policy-related parties. It can also be intended to prevent distortion.

2. Clarity

The content of the communication submitted to the parties related to the policy must be clear with detailed explanations and strong supporting data related to the LMS. It aims to make it easier for the parties to understand the meaning clearly which affects the implementation of the policy or program.

3. Consistency.

The understanding that has been agreed by each party related to policies related to LMS needs to be stated in the minutes with each policy maker, namely the Ministry of Defense, defense industry and the user or sser affixing their signature along with their full name, position, and agency along with a description of the time. It is validated by the highest leadership of Defense Industry development policy makers at the Ministry of Defense.

B. Resource Variables.

Resources are also an important part of implementing policies related to LMS. Human resources must be manned by committed and consistent parties who understand the aims and objectives of the policy and its expert team. Other supporting resources are needed to support the implementation of policies related to LMS in its effectiveness, efficiency, precise target and on time.

1. Information

Information in implementing policies related to LMS which has two forms. First, information related to how to implement policies, the parties involved in implementing policies, especially LMS, must understand their duties and responsibilities if the duties of each party or parties have been determined in a formal legal or contract clause and other legal products. It is related to matters that bind the parties to focus on their responsibilities. Second, information on compliance data from implementers to government regulations and regulations that have been set to support LMS innovation is a flagship program.

2. Authority

In general, authority must be a formal order to be carried out which list the tasks of the parties in supporting the LMS innovation program. The warrant made in the form of a working group will reflect the involvement and contribution of each party in supporting the activities as well as facilitating the delegation of tasks and authorities to related parties.

3. Facilities

Physical facilitation is an important factor in implementing policies related to LMS innovation which includes production lines, testing facilities if possible related to laboratories and clear SOPs for their operations.

C.   Disposition variable

In implementing the policy, the unity of commitment and views and goals in realizing LMS innovation are very important prerequisites. The disposition flow is part of the delegation of authority which aims to support the success of the program in a structured manner. The understanding of policy makers continues to the

program implementers in the field, it must not be broken in the context of the success of the program. It takes coordination supported by administrative completeness to ensure the smooth flow of disposition. Important things that need to be observed on the disposition variable are:

1. Appointment of bureaucrats
    The process of selecting personnel to support the flow of disposition and compliance with the LMS innovation program is a part of defense industry's development. It would be necessary if directed to a personnel who understand policy objectives and are experienced in coaching defense industry. Integrity and experience are expected to improvise on program implementation which is sometimes constrained by something that requires advice or strengthening decisions.

2. Incentives
    Budget incentives to support the development of industries that carry out defense and security equipment innovation activities such as LMS must go through a longstages. Starting from preparation, planning and implementation. Supporting data in the form of technical design, performance offered is including the desire of the user for defense and security equipment of the same type. The incentive is to increase the ability of defense industry and related industries to the ability to support the fulfillment of defense and security equipment, especially LMS independently.

D.   Bureaucratic structure
        Bureaucratic structure related to the bureaucratic organization of implementation of defense industry's policies. It has a challenge to prevent bureaucratic fragmentation or the separation of functions that carry out the implementation of policies related to LMS. The coordination unit that is run by a separate bureaucratic structure in the defense industry regarding the triangle form must be carried out in harmony and harmoniously connected to one another towards one goal in realizing LMS innovations that are useful for users for defense forces and the fulfillment of defense and security equipment independently. To builtindependent control, it must avoid fragmentation in the organization. The Ministry of Defense as the supervisor of defense industry is expected to become a fair and good integrator and referee for cooperation. It also have to unite the finalization goals that are interrelated and integrated towards a production system that is well controlled.According to the theory of Merilee S. Grindle (In HarbaniPaslong 2009:645) The success of policy implementation is influenced by two major variables, namely content of policy and context of implementation(14).

a. Content of policy according to Grindle are:
1.   The extent to which the interests of the target group or target groups are contained in the content of the policy. It can be stated that the implementation of policies related to LMS must be understood by each relevant party including policy makers as well as the activities carried out and supported by budget incentives are in line or in line and in line with policies, especially Law 16/2012 and its derivative rules. It also considering how the solution if the commitment in the policy is not carried out, namely the need for an action in the form of punishment as policy enforcement. This is done for the authority of the government and the deterrence effect of the policies that have been formulated.

2.   Type of benefits received by target groups e.g. defense industry gets the opportunity and budget incentives for LMS design and manufacturing including testing activities in the context of certification. The users will receive benefits, namely learning to determine technical specifications according to the concept of operation and outcome, namely LMS products that can be used to support military operations to maintain national sovereignty and defense. The Ministry of Defense as an authoritative and valuable policy maker in the context of fostering Defense Industry that supports the independence of the defense and security field, especially LMS technology.

3.   Extent of change envision.

The fulfillment of defense and security equipment with material supply chain and after sales service as well as operation, maintenance, repair, and overhaul is guaranteed to be carried out and supported by domestic defense industry related to LMS technology which is intended to support military operations in Indonesia. If possible, it can be destined for export with a level of confidentiality of the technology and intellectual property rights which retained by the Ministry of Defense.

4.   Site of decision making. The location of decision making related to LMS development can be done bottom-up and top-down, and adjusted to the reality of the domestic industry's ability to support the needs of Defense and security equipment based on the results of a careful search and have gone through studies and analyzes involving parties related to policy implementation in the Triangle, namely Ministry of Defense, Defense Industry and Users.

5.   Program implementer

A policy should contain who, what, how, when and where for the effectiveness of policy products in their implementation, especially in LMS development or innovation to support defense.

6.   Resources committed.

If the LMS is designated as a Ministry of Defense program, it has taken into account the availability of resources to support the completion of the LMS program.

b. Context of implementation according to Grindle is:
1.   Power, interest, and strategy of actor involved. It can be interpreted as ends, means and ways that have been analyzed and decided to realize the goals or ends using the tools or means and the methods specified as ways in completing the LMS program until it is certified. Unity of determination and goals of the parties related to the policy is very important and decisive.
2.   Institution and regime characteristic.
This becomes important, especially the culture that characterizes policy implementation in Indonesia. Sometimes the purpose of the program becomes like a slalom test and can even disappear suddenly by the policies of the ruling party at that time, especially those related to policy implementation.
Encouraging the realization of the LMS innovation program as one of the flagship programs at the Ministry of Defense is to provide leadership and confidence in the ability of the LMS industry to support and strengthen the defense system.
3.   Compliance and responsiveness.
The level of compliance of parties related to policies is also a very important thing that can achieve efficiency and effectiveness. It is a consistent of agreement from the beginning and in the end. What often happens is that user sometimes like to deny the commitments made at the beginning of the program or policy implementation, even though the product, for example, the LMS product, is completed and certified, with the next step being a mass product to be purchased and used by the user.
From top to bottom, as part of the policy makers, we will bind the commitments that have been submitted with official notes or jointly signed minutes including, if necessary, a statement of commitment from the user to continue mass products when completed and type certified (TC).

From several analysis it can be stated that policy implementation involves at least three things, namely:
1.   The existence of policy goals and objectives. The objectives and goals set forth in the outputs and outcomes of the proposed LMS program,
2.   The existence of activities or activities to achieve goals, which include design, manufacture and testing of LMS activities to support military operations.
3.   The existence of activity results. What is expected is that the First Article is tested and type-certified (TC) and the LMS is ready to be used to support the Indonesian National Armed Forces military operations.

Conclusion

Based on the above analysis it can be concluded that:

1. Based on the competence and ability in the LMS field, PT. EnrolSistem Indonesia should be supported in terms of budgetary incentives to realize a certified First Article LMS, which also underlies the development of the previous MiniBe drones.

2. Assignment to PT. EnrolSistem Indonesia is based on its ability to support the current trend of strategic defense systems, namely the Loitering Munition System.

3. Encouragement of PT. EnrolSistem Indonesia is in line with the policy of fostering Defense Industry Law 16/2016 and its derivative rules to improve LMS local content to support the independence of Defense and security equipment.

4. Checking the ability of PT. EnrolSistem Indonesia needs to be carried out by the Ministry of Defense and users as part of the Triangle for synergy before LMS is confirmed to be the flagship program at the Ministry of Defense to support users.

Suggestions

1. Based on its capabilities, PT. EnrolSistem Indonesia needs to be gradually supported to become Defense Industry if it successfully completes the LMS until it is certified.

2. There has been a foreign approach to PT. EnrolSistem Indonesia related to LMS as an indication of the technology being developed is a trend that is being sought after at this time. Therefore, serious steps to encourage LMS mastery in Indonesia need to be considered as to not lose momentum and PT. Enrol is wooed by a foreign party.

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