

Indonesian Government's Strategies and Policies in Defense Technology in The Middle of Technology 4.0 Development, VUCA and Disruption

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ABSTRACT : *The development of the strategic environment, both at the global, regional and national levels, is very dynamic, complex and multidimensional, it urges innovation from various aspects of the defense system of each country, including Indonesia. the purpose of this research is to analyze Indonesia's policy strategy in the field of defense technology in the midst of technological developments 4.0, VUCA and Disruption. VUCA is a concept that explains the characteristics of the systemic failure of an organization and behavioral anomalies shown by individuals and groups within the organization. while defense iron triangle (DIT) is a form of strategic relationship that forms the military-industrial complex. The findings in this study are Indonesia needs to improve the quality of defense equipment that can keep pace with the development of information technology in order to maintain national defense and security*

KEYWORDS - *Defense Technology, VUCA, Disruption.*

I. INTRODUCTION

The development of a dynamic strategic environment today affects the implementation of national defense. The dynamics that need to be observed in the next five years include economic growth which has implications for the development of military power, especially in the Asia Pacific region. This dynamic greatly influences the pattern and form of threats that are increasingly complex and multidimensional, in the form of military threats, non-military threats and hybrid threats that can be categorized in the form of real and unreal threats. These threats include terrorism and radicalism, separatism and armed rebellion, natural disasters, violation of border areas, piracy and theft of natural resources, disease outbreaks, cyber attacks and espionage, drug trafficking and abuse as well as open conflict or conventional war. Domestic conditions also cannot be separated from the influence of the strategic environment triggered by ideological, political, economic, socio-cultural and security factors. This development is a challenge that affects the implementation of national defense in Indonesia. [1].

The defense in question includes aspects of defense technology. Achieving the embodiment of professional capabilities and skills, as well as the TNI's power structure that is characterized by technology, naturally requires qualified personnel and the main tools of the weapon system. This defense system requires a certain level of technology that is needed and needs to be mastered, and can be developed for the next 10 to 20 years, so that it can adapt to the demands of operational needs. Facing the challenges of the TNI's tasks in the future, the real manifestation of technological dominance that is very decisive in the TNI system, especially in the form of the weapon system used includes the main equipment and all its supporters, as well as the capabilities and skills of TNI soldiers in a professional manner. This certain level of technology certainly requires a strong and independent national defense industry [2].

Conditions in the 4.0 VUCA and Disruptive era are very influential for defense technology. According to the world's leading consultant Deloitte, Industry 4.0 is able to increase the level of military operational readiness. Advances in Industry 4.0 technology greatly help national defense organizations improve their readiness and effectiveness. Various defense equipment and supporting military infrastructure have now been implemented and supported by Internet of Things (IoT) technology and Big Data technology. The pillar technology of Industry 4.0 is very helpful in planning military tasks, military operations and for the effectiveness of a country's military budget [3].

The development of the strategic environment, both at the global, regional and national levels, is very dynamic, complex and multidimensional, it urges innovation from various aspects of the defense system of each country, including Indonesia. This pressure requires Indonesia to be more adaptive to the development of defense technology, even though Indonesia has PT. PAL, PT. DI and PT. PINDAD, which is the leading company to meet the needs of Indonesia's defense equipment and defense systems. However, the three companies have not been able to accommodate the needs of domestic defense technology on a large scale.

So that Indonesia will not have a balance of power on the development of global defense technology and weapons, especially the involvement of Indonesia's defense technology is still below the value of 1%. This situation is very unfavorable for Indonesia, even though we can do ToT or Transfer of Technology every time we buy defense equipment to other countries, but we still cannot fully get the same technology as that of the country of origin. If Indonesia continues to depend on big countries in terms of fulfilling defense equipment in the long term and with a massive load, it is not impossible that this will weaken Indonesia's defense policies and strategies. As happened during the conflict in East Timor, the United States imposed an embargo on defense equipment spare parts originating from America and owned by Indonesia and did not allow Indonesia to use the defense equipment.

Therefore, if Indonesia cannot adapt to the development of technology 4.0, then Indonesia will have difficulty realizing the strategic goals of national defense, especially in the main policy targets of Indonesia's defense policy in 2020. Among them are the establishment of an integrated and universal People's Defense and Security System, modernization and the Realization of National Resource Management (PSDN) for National Defense which includes:

1. The realization of State Defense awareness for all citizens.
2. Realization of reserve components that are ready to be mobilized and demobilized as well as supporting components that are determined throughout the territory of Indonesia.
3. Realization of National Resources that can be empowered to support national defense.
4. The realization of a strong, independent, and competitive national defense industry to support the needs of national defense [4].

Based on the explanation above, we take a problem that will be the topic of discussion in this paper, namely "What is Indonesia's policy strategy in the field of defense technology in the midst of technological developments 4.0, VUCA and Disruption?"

II. MATERIALS AND METHOD

2.1. VUCA AND VUCA 2.0

VUCA is an acronym describing the state of Volatility, Uncertainty, Complexity, and Ambiguity which was first used in 1987 [5]. The U.S Army War College introduced the concept of VUCA to describe the instability of conditions that occurred after the Cold War. The use of this acronym is often used in military education. The development of this concept is more closely related to strategic leadership in various sciences and organizations [6]. The VUCA concept serves to increase the significance and success of the strategic policies implemented, the behavior of individuals and groups in organizations [7]. This concept also explains the characteristics of the systemic failure of an organization and behavioral anomalies shown by individuals and groups within the organization. The explanation of VUCA can be described below (Bennis & Nanus, 2003) [8].

- Volatility which describes the nature, dynamics, and speed and other things that affect change.
- Uncertainty which states the uncertainty of future predictions, impromptu events, and explains the level of awareness and understanding of a problem or event.

- Complexity which explains the confusion that occurs caused by the unclear cause and effect of a problem, causing confusion in understanding the events that occurred.
- Ambiguity is the ambiguity of reality caused by multiple interpretations of a condition or event that occurs.

The term Disruption cannot be separated from the VUCA concept that has been described previously. Disruption is a term that describes a disturbance that causes the industry not to move according to habits due to the emergence of new competitors that are much more efficient and effective and the discovery of new technologies that change the power of the business that occurs [9]. The VUCA concept is able to help an organization or leader to plan and manage short-term to long-term policies. This concept also helps organizations in capacity building so that they are able to: (1) Anticipate problems that will occur; (2) Understanding the consequences of the problems that occur as well as anticipatory actions taken; (3) Understanding the interdependence relationship between variables that exist in the organization and society; (4) Prepare to face the challenges that will occur; (5) Determine attitudes and actions to maximize opportunities that are tailored to the conditions of the organization and society [10]. VUCA conditions that occur can be overcome using the VUCA 2.0 leadership pattern: Vision, Understanding, Courage, and Adaptability which can be described below [11].

- Vision, which means that a leader must have the ability to see opportunities from the chaos that occurs and have a clear vision in managing and developing the organization. This also means that a leader must remain focused on the vision that is carried out despite negative influences from outside the organization.
- Understanding, which explains that a leader needs to explore and understand the organizational capabilities and strategies applied in order to take advantage of opportunities or even take advantage of drastically changing situations. The vision and strategies implemented are expected to be able to increase the potential and suppress the weaknesses of the organization. Leaders must also be able to look at a problem from another point of view and be able to capture constructive opinions for the betterment of the organization.
- Courage, which states that leaders must have the courage to face the challenges that exist and be able to make firm and risky decisions in unclear conditions.
- Adaptability, which explains that a leader must be more flexible and adaptive to changes that occur quickly without having to change the organization's vision. This is needed in order to adjust the direction of the organization's movement to external changes that occur.

2.1. DEFENCE IRON TRIANGLE

The defense iron triangle (DIT) is a form of strategic relationship that forms the military-industrial complex. Called complex, because it refers to the complexity of the relationship. The complexity in question is related to how far the three parties share the proportion of their roles. If the state (parliament and defense department) has more influence, then sovereignty and independence will be emphasized. If the defense industry has a bigger role, then alliances and cooperation and privatization (commercialization) will play a bigger role. This is called by Ron Matthews as the unholy trinity in defense, because wars between countries will be influenced by the relationship between the three parties. DIT scheme can be seen from the following picture:

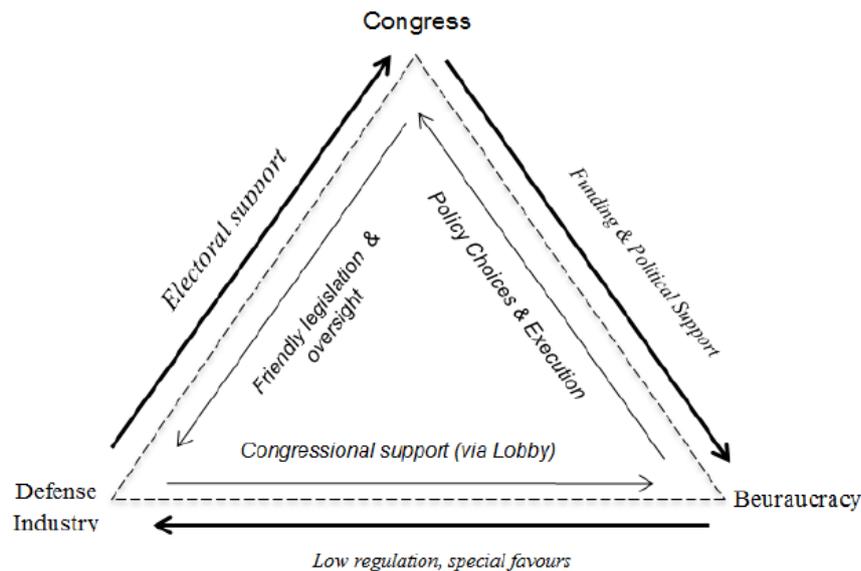


Fig 1. Defense Iron Triangle Illustration

The main logic in DIT, is that industry has constituent relations with legislators (parliament) in order to get legislative support, and on the contrary, parliament has an interest in being re-elected; while the government needs the support of industry and parliament so that the work program can be supported by budget and technology. From the image of the iron triangle, it can be seen that the relationship between the three is very important in realizing the necessary military capabilities, through the defense acquisition process [12].

The dynamics that occur in the three parties are motivated by a process called defense acquisition. The term defense acquisition refers to a process of procuring defense-related goods, particularly weaponry (defense equipment), by cooperating with domestic and international contractors. The defense acquisition system is "a management process by which the ministry of defense acquires weapons systems and their information systems". Defense acquisitions can occur when there is an interaction between the defense department/ministry and the defense industry, with the aim of produce important military capabilities now and in the future. Regarding collaboration between countries, the defense industry and the defense ministry can come from different countries.

III. DISCUSSION

3.1. ANALYSIS OF CONDITIONS AND DEVELOPMENT OF DEFENSE TECHNOLOGY USING VUCA AND VUCA 2.0

Indonesia's defense strategy cannot be separated from the development of domestic and foreign defense technology and the conditions that influence the implementation of these policies. The concepts of VUCA and VUCA 2.0 are needed to determine the right policy in increasing the mastery of domestic defense technology.

Table 1. VUCA and VUCA 2.0 analysis. on the Condition and Development of Defense Technology in Indonesia

VUCA (Volatility, Uncertainty, Complexity, dan Ambiguity)		VUCA 2.0 (Vision, Understanding, Courage, dan Adaptability)	
V o l a t i l i t y	Hyper-Competition between countries in order to master knowledge and technology in the industrialization of defense technology [13].	Strengthening defense technology by focusing on automation technology accompanied by the development of autonomous weapons systems, improving sensor technology that leads to the development of remote sensing systems, as well as the development of national cyber systems [13].	V i s i o n
U n c e r t a i n t y	The threat of war in the future is dominated by the use of information technology. Military weapons in the future are more directed to the use of Machine Learning, Artificial Intelligence, and Big Data [14].	The use of defense technology in the future requires competent people in this field. Therefore, it is necessary to prepare human resources (HR) to build military and non-military forces in order to maintain Indonesian sovereignty at this time and in the future [14].	U n d e r s t a n d i n g
C o m p l e x i t y	The legal basis for the border between Indonesia and neighboring countries is not clear, such as territorial disputes between Indonesia and Malaysia [15], border disputes between Indonesia and China [16] and also between Indonesia and Vietnam [17] around the Natuna Islands and the South China Sea, or land and maritime border conflicts between Indonesia and Vietnam. Timor Leste [18] and Australia [19].	Adoption of the concept of digitizing defense technology in order to improve the quality of production of the main weapons system (defense equipment) in the country [13]. Establishment of a master domestic defense industry in order to create efficiency and competitiveness. It is also aimed at increasing the capability of the domestic defense industry to supply the defense equipment needs for the TNI, Polri, and other domestic defense and security institutions [20].	C o u r a g e
A m b i g u i t y	Based on the 2018 Global Firepower (GFP) military strength analysis, Indonesia is the 15th strongest military power country in the world [19]. However, most of the defense equipment owned by Indonesia are old [21] [22].	Long-term defense investment policies must be implemented systematically with consistent implementation of plans in order to keep up with developments in advanced technology [23]. In addition, modernizing the defense industry [24] and upgrading defense equipment independently [25] as well as paying attention to the alignment of the Minimum Essential Force policy.	A d a p t a b i l i t y

3.2. ANALYSIS OF DEFENSE INDUSTRY POLICY ON STATE ARMAMENTS THROUGH ACHIEVING MINIMUM ESSENTIAL FORCES (MEF)

Indonesia is currently trying to realize its commitment to building defense capabilities by setting long-term main targets to build the independence of the defense industry. In addition to issuing UU No. 16 Tahun 2012 concerning the Defense Industry, the government also established the Defense Industry Policy Committee (KKIP) which is tasked with realizing the independence of the defense industry by bridging the needs of the military and the development of domestic strategic industries. The military embargo imposed by the United States in 1995-2005 has made the Indonesian government aware of the importance of the independence of strategic industries for the defense system.

The independence of the defense industry or the ability to produce its own military equipment without relying on other countries is one of the targets of the Indonesian government in the defense sector. However, there are still some challenges in balancing the needs of the military with the capacity of the defense industry. Commission I of the Indonesian House of Representatives has made the development of the defense industry and the modernization of the Main Equipment of the Indonesian Armed Forces Weapon System. one of the focuses of attention, especially in achieving the fulfillment of the Minimum Essential Force (MEF) target.

At the inaugural working meeting with the Minister of Defense on 12 November 2019, Commission I of the Indonesian House of Representatives emphasized the fulfillment of the MEF target in 2024 and the independence of the defense industry as the main homework for the next five years. Commission I of the Indonesian House of Representatives is also committed to encouraging the fulfillment of defense equipment needs which are realized with budgetary support through an increase in the 2020 defense budget of Rp. 131 trillion. In addition, this commitment was also followed up with a series of specific visits by Commission I of the Indonesian House of Representatives to several defense industries such as PT. PAL Indonesia (Persero), PT. Pindad (Persero), and PT. Len Industri (Persero) on November 14-15 2019.

The Minimum Essential Forces (MEF) is a process of modernizing Indonesian defense equipment that has been launched by the government since 2007. This program does not only develop defense equipment through procurement, but also through empowering the defense industry to build self-reliance. Currently, MEF has entered the end of strategic plan II for the development of the minimum posture strength of defense equipment. Indonesia applies the concept of capability based defense in planning the development of defense forces as implemented in the MEF program. Capability-based defense is the development of military strength, including the procurement of defense equipment based on the identification of threats based on budgetary capabilities. The data above shows the achievement of the TNI's defense equipment development in the MEF program from strategic plan I to strategic plan II for the strength of three defense dimensions, which also shows the condition of Indonesia's defense equipment strength.

the fulfillment of the TNI's defense equipment has not fully met the MEF achievement targets. In the ground dimension, the fulfillment of the MEF strategic plan-II target reached 74.2%, the fulfillment of light weapons and cannons/rockets/missiles had basically met the target and experienced a significant increase compared to strategic plan-I, but not for ranpur and aircraft. In the marine dimension, the fulfillment of the KRI, submarines and airplanes has almost met the achievement target, although the fulfillment of the marines has not yet reached the set target. The marine dimension itself reached 68.72% of the MEF target. For the air dimension in strategic plan-II, it reached 44.40% of the MEF target. The achievement of the fulfillment of defense equipment in strategic plan II is still far from the specified target, the procurement of radar, missiles and air attack deterrents (PSU) has not been fulfilled in this strategic plan period. The current condition of the defense equipment for the three TNI dimensions shows that Indonesia is still experiencing limitations in fulfilling the defense equipment to support the country's defense system.

Currently, Indonesia has several strategic industries in the defense sector, which have been able to assemble and produce several defense equipment for the TNI. The defense equipment produced by the national defense industry includes; Medium Tank (Joint venture PT PINDAD and FNSS Turkey), CN235-220 MPA Maritime Patrol Aircraft (PT Dirgantara Indonesia) and 60 m Fast Missile Ship (PT PAL). However, there are still some challenges in empowering the national defense industry, which are basically not new problems [26].

MEF policy alignment is very important to be realized, the alignment aims to answer several problems which include; threat determination aspect, planning aspect, implementation mechanism aspect, budget aspect, and MEF decision-making management aspect, as well as personnel and organization. As for issues related to the stages of achievement, it can be focused on achieving (four) MEF strategies, namely rematerialization, revitalization, relocation, and procurement. In an effort to harmonize the Minimum Essential Force, the main components mentioned several risks and impacts on the country's inability to maintain defense that can be accepted by Indonesia if the MEF is not met, the possible risks include [27];

1. Threats and disturbances to the sovereignty and territorial integrity of the Republic of Indonesia are getting bigger and have an impact on national stability.
2. The national development program in the field of national defense has not been achieved.
3. The bargaining position of the Indonesian government in international diplomacy has weakened and has not been taken into account by the international community.
4. The non-fulfillment of the Main Component MEF development results in a decrease in the deterrence of national defense in the region.
5. The declining position of the nation's competitiveness (Competitive Index) in the international environment.
6. The reduced ability of the TNI in carrying out its main tasks.

With risk factors that can have a large enough impact on the development of the Indonesian Agriculture Industry and Alusista, the MEF is a very important thing to be realized. And the basic alignment of the MEF can realize the urgent interests of national defense development until 2024 within the framework of an ideal posture by taking into account the development of the strategic environment and urgent actual threats (Indonesian Ministry of Defense, 2020) [27].

3.3. TYPOLOGY OF THE INDONESIAN DEFENSE SYSTEM IN TERMS OF INSTITUTIONAL AUTHORITY BASED ON THE DEFENSE IRON TRIANGLE

The defense iron triangle (DIT) describes the three-party relationship between the congress/parliament (legislature), the defense department (executive) and the defense industry. This relationship refers to political contributions, political approvals and lobbies to finance military institutions. The term defense iron triangle was adopted from the term military-industrial complex (MIC) which was coined by the US President, Dwight Eisenhower in 1961 [12]. It should be understood that the MIC terminology used as the basis for DIT was coined in the context of post-World War II and during the Cold War, where the demonstration of weapons force between the West and East Blocks to create a deterrent effect for each other was still very strong, so that at that time, DIT is dominated by defense elements related to the military. However, the DIT terminology is still considered relevant for analyzing the defense typology of a country which has 3 elements mentioned in it, namely the congress/parliament, the defense department and the defense industry.

Based on Law Number 3 of 2002 concerning National Defense, the Indonesian state defense system is a universal defense system that involves all citizens, territories, and other national resources, and is prepared early by the government, carried out in a total, integrated, directed, and coordinated manner. and continue to uphold state sovereignty, territorial integrity, and the safety of all nations from all threats. This diction can be interpreted that the government is the leading sector in managing defense resources owned by the state.

The government's dominance in defense management is reaffirmed in the same law, Article 13 Paragraphs (1) and (2) which state that the President is authorized and responsible for managing the national defense system. The President also stipulates a general policy on national defense which will serve as a reference for planning, implementing and supervising the national defense system. More specifically regarding defense technology, Article 16 Paragraph (16) states that the Minister of Defense establishes policies on budgeting, procurement, recruitment, management of national resources, as well as development of defense technology and industry required by the Indonesian National Armed Forces (TNI) and other components. From this we can say that the defense industry element is under the control of the government which in this case is the Minister of

Defense. Thus, the defense industry in Indonesia, which is represented by, among others, PT Pindad and PT DI as part of the BUMN, is subject to the guidance carried out by the Minister of Defense.

In addition, the defense system in Indonesia also allows for the dominance of the congress/parliament which in this case is represented by the Indonesian House of Representatives. In the same law, it is stated that the Indonesian House of Representatives gives approval to the President regarding the deployment of TNI forces, the appointment and dismissal of the TNI Commanders who are authorized to use all components of national defense. Thus, the Indonesian House of Representatives in this case has an important role in making political decisions by the executive regarding the deployment of TNI forces and other defense components. The support of the Indonesian House of Representatives is very much needed by the executive to strengthen all aspects related to defense, including the development of defense technology. As stated in the DIT theory, political lobbying by the executive in the Indonesian House of Representatives will greatly determine the realization of the defense technology development program.

Referring to the DIT theory, Indonesia's defense system is more dominated by state authority (in this case the President, Minister of Defense and Indonesian House of Representatives compared to the defense industry. This may be because the majority of the domestic defense industry in Indonesia is dominated by state-owned companies whose programs refer to government policies. The consequence of this situation is that efforts for sovereignty and independence in the defense sector will be put forward. The government with the approval of the Indonesian House of Representatives will strive to create independence, by continuing to develop the defense industry. In the current situation of the national defense industry, 'holistic' independence in the field of defense technology is still considered difficult to create in Indonesia. Therefore, the defense acquisition step carried out by collaborating with external parties, both G to G (government to government) and B to B (business to business) is still considered very relevant, provided that the cooperation includes deep technology transfer. The long term will encourage the creation of Indonesia's independence in the field of defense technology.

IV. CONCLUSION

Indonesia needs to improve the quality of defense equipment that can keep pace with the development of information technology in order to maintain national defense and security. To achieve the independence of the defense industry and the modernization of the defense equipment system, the Government has set a Minimum Essential Force (MEF) target. Policy alignment in the MEF towards the development of the Defense Industry and Indonesian alusista can be the answer to realizing the development of national defense until 2024 within the framework of an ideal posture, taking into account the development of the strategic environment and actual threats. This is also reinforced by the typology of the Indonesian defense system which is dominated by the influence of the government and the Indonesian House of Representatives, which should prioritize the sovereignty and independence of the defense industry.

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