

SECURITY DEFENSE TECHNOLOGY IN THE TECHNOLOGY TRANSFER PROGRAM (TOT) BY THE DEFENSE INDUSTRY FOR SUPPORT NATIONAL SECURITY

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Abstract. Technology Transfer Program (ToT) in the sector defense aiming For strengthen capability military and guard state sovereignty through mastery previous technology owned by other countries. In the ToT program , the aspects security technology is very important For ensure that technology adopted defense No prone to to threat or leakage information. This article analyzing security strategies technology in the ToT program in the sector defense, including identification risk , implementation policy security, and its impact to security national . Research results show that implementation standard strict security on ToT program can increase Power competition defense, but also requires cooperation between institution For guard confidentiality and effectiveness technology.

Keywords: security technology; transfer technology; tot; security national; technology defense

I. INTRODUCTION

Development technology defense in the world today This marked by innovation engineering advanced from expert technology from developed countries that aim increase effectiveness and efficiency system security. Where is the current This discussed and engineered covering AI used For intelligence data analysis, surveillance, and reconnaissance, as well as in development system weapon autonomy that increases precision and responsiveness military; Device integration military through IoMT allows connectivity between various system, such as ships, planes, tanks, drones and personnel military, so that increase awareness situational and coordination operational; With increasing threat cyber, countries strengthen infrastructure digital security for protect sensitive data and systems critical from cyber attack.

Use satellite For reconnaissance and communication become a vital component in modern defense strategy, enabling greater monitoring and coordination effective. Development system defense missile advanced, as the Iron Dome by Israel, shows progress in ability to ward off threat air in a way effective. The use of drones and autonomous robots in operation military increase ability reconnaissance, logistics, and even battle without put personnel in danger directly. Blockchain technology is starting to applied For ensure security and integrity of military data, reducing risk manipulation information. Combined technologies This show world efforts in increase ability defense through innovation and adaptation to modern threats

At the moment For guard stability security a country needs a defense industry "Ministry of Defense of the Republic

of Indonesia-Kemhan." 07 Mar. 2022, <https://www.kemhan.go.id/2022/03/07/membangun-industri-pertahanan-yang-kuat-jadi-kebijakan-utama-kemhan.html> Where industry defense have very close relationship with security national Because his support in strengthen capacity military and capabilities defense a country. It is can explained like under This is a strong defense industry allow a country to produce weapons, vehicles combat, system defense, and equipment military other in a way independent. Independence This reduce dependence on other countries, especially in situation crisis, embargo, or conflict international, so that ensure state readiness in guard security national.

Defense industry facilitate development and adoption technology sophisticated, such as system security cyber, radar, satellite and technology intelligence artificial. Mastery technology This increase the country's ability to detect and respond threat with more fast and effective, and guard territorial integrity and associated sensitive data with security national. Within the framework of technology transfer (Technology Transfer or TOT), the industry defense can to obtain knowledge new useful For increase capability military. This innovation often involves technology advanced that supports operation military, such as drone systems, robotics, and tools surveillance, all of which play a role in strengthen position strategic and security national.

defense industry also plays a role in create field work and advance sector technology and manufacturing, which led to the development of economy. Stable economic development is part from security national, because support stability social

and prevent disturbance domestic which can threaten resilience national.

Defense industry often become element important in connection diplomatic between countries, especially through contract transfer technology or Work The same production weaponry. Through industry defense, the country can increase bilateral relations that also contribute to regional stability and security.

With thus industry defense is one of the factor Supporter security national For ensure readiness and capability military in face threats, as well as play role strategic in economy and diplomacy. Technology Transfer (ToT) in the sector defense is an important process For increase ability defense national, especially for countries that are still develop technology its defense. In ToT, the receiving country access technology critical from the provider country, so that important for the recipient country For own steps strong security to prevent leakage or abuse technology. This article to study importance security technology in the ToT program defense and how effort security the can guard interest national and stability security.

With importance security Technology results ToT by recipient country so beginning security must placed at the head from ToT That utilized that is in the defense industry of the recipient country Ministry of Defense of the Republic of Indonesia - Kemhan.

II. RESEARCH METHODS

The methods used in this study are critical analysis methods and library methods. The critical analysis method that the author means here is an effort to select by summarizing and considering problems so that they can be reduced, repositioned, and presented systematically. Meanwhile, the library method is a research method carried out by collecting, reading, recording library data and processing research materials (Mustika, 2008).

III. RESULTS AND DISCUSSION

System Condition Indonesian Defense

In the 1990s, the power Indonesia's defense gets A exam where the US as provider defense equipment implementing an arms embargo. This condition make Indonesia difficult For do modernization defense equipment, even For operate defense equipment that has there is anything to be something very difficult. Already known wide that condition defense equipment that becomes Supporter main system Indonesia's defense is sufficient worrying . The military equipment operated by the TNI part big aged between 25-40 years ; they continue just maintained and repaired to be ready operated (Connie, 2007). Reality This show that Posture the power possessed by the TNI is still Far from standard and not yet fulfil need Indonesia's defense. When viewed from condition moment this, the TNI-AU becomes dimension defense that experienced the most significant impact from changes that occur consequence development technology weaponry . This is related with start implementation various technology advanced like stealth capabilities as well use of UAVs by the military armed other countries that can with easy break and enter

sovereignty of the Indonesian territory. TNI-AU at the moment This experience difficulty in matter availability and capabilities of radar as well aircraft combat as spearhead of efforts overcome threats said. The Indonesian Air Force only rely on to aircraft F-16 A/B fighters brought in from the US in the period 1990s, the new can return fully operational in 2006 after the US lifted the arms embargo towards Indonesia. Although moment This TNI has bring in aircraft Sukhoi Su-27 and Su30 fighters from Russia, respectively quantity ability weapons owned Not yet capable covers throughout the territory of Indonesia. The Indonesian Navy experienced similar things . Currently the Indonesian Navy does not own enough fleet for securing Indonesian waters. TNI -AL defense equipment is still give place to ships war production East German and Dutch lamas . Even for maritime nations Like Indonesia, the Indonesian Navy only have two ships goodbye Of course just Not yet adequate For fortify Indonesia's maritime territory. This condition clear making Indonesia's maritime territory very vulnerable will intruder both patterned economy like illegal fishing and piracy or related with mission intelligence foreign. The navies of neighboring countries and other countries have own defense equipment adequate For defending the ocean territory they. Currently emerging trends is the race of nations to build force sea with blue waters navy category . Condition of defense equipment owned by the Indonesian Army at the moment this is in general is old procurement made between 1940 to 1986. Most of defense equipment This ethnic group spare parts No available, even the factory that makes it Already No produce again (Subekti, 2012). Although then the Indonesian Army focuses on capabilities member or source Power human , but existence adequate defense equipment become need urge along with development technology defense in global realm. For the Indonesian Army, the need urge That covering vehicle transport personnel Good vehicle land and also aircraft as well as artillery Field and artillery defense air. Beside that, demands will modernization weapon individuals also become focus Because before use SS-1 weapons made by PT. Pindad as standard, TNI-AD uses rifle assault M16 with technology used in the 205 Vietnam war era . For support operational, TNI-AD is still relying on the Scorpion Tank which is classified as in Light Tank class (light tank), even though the Indonesian Army is now requires Main Battle Tank (MBT), support from helicopter assault , and counterinsurgency aircraft. The third condition related TNI dimensions with owned and operated defense equipment moment This show that Indonesia is still experience limitations in fulfillment defense equipment For support system national defense . Problems this is very important For completed remembering in the modern era the existence of defense equipment be one of prerequisite main in fulfillment need system defense country. The reality shown by defense equipment belonging to the TNI, both the Army, Navy and especially the Air Force, makes system Indonesia's defense is very ironic in the middle development technology increasingly sophisticated weaponry day the more rapidly. If things This No quick be noted , then system Indonesia's defense will with easy paralyzed by the party foreign and also threat from domestic

who want undermine sovereignty of the Unitary State of the Republic of Indonesia.

Development of Indonesian Defense Industry

Development industry defense in Indonesia since beginning Indonesian nation independent there is as following:

1. Independence (1945-1960): Indonesia relied on equipment military legacy colonial and began to establish company defense such as PT Pindad , PT PAL, and PT Dirgantara Indonesia.
2. Modernization (1970s - 1980): Under BJ Habibie, Indonesia built industry flight with IPTN, focusing on work The same international and transfer technology .
3. Economic Crisis (1990s) : The Asian crisis hampers industry defense , with Lots stalled projects. However, the industry still endure through restructuring .
4. Reformation (2000): Through Law No. 16 of 2012, the government push independence industry defense and policy transfer technology .
5. Defend ID (2022): Formation of defense state-owned enterprise holding For increase coordination , efficiency , and power competitive , targeting Defend ID entry in the global top 50.
6. Global Cooperation and Technology Transfer: Focus on work The same international For development technology military like boat diving and plane combat.
7. Future Trends: Indonesia's defense industry is starting to adopt elements of Industry 4.0, such as AI and robotics, to increase efficiency and capability defense.

Journey This show Indonesia's commitment to reach independence and power competition in sector defense, but in Indonesia it is also limited by regulations the law that governs industry defense and security the technology Where covering a number of regulation legislation between other:

1. Constitution Number 16 of 2012 concerning the Defense Industry: This law become runway law main for development and management industry defense national. Law This arrange about role government, development industry defense, as well as obligation use product domestic for tool equipment defense and security (Alpalhankam).
2. Government Regulation Number 76 of 2014 concerning the Reward Mechanism Trade in Procurement Defense and Security Agency from Abroad: Regulation This arrange mechanism return trade, content local, and offset in procurement Defense and Security Agency from abroad, with objective increase ability industry defense domestic.
3. Government Regulation Number 141 of 2015 concerning Defense Industry Management: This PP arrange management industry defense, including determination industry defense, criteria, product, function, source Power human, incentive fiscal, funding, financing, and marketing .
4. Regulation President Number 59 of 2013 concerning Organization, Work Procedures, and Secretariat Committee Defense Industrial Policy (KKIP): Presidential Decree This forming a KKIP whose duties include to coordinate policy national in planning, formulation, implementation, control, synchronization, and evaluation industry defense.
5. Regulation of the Minister of Defense Number 6 of 2017 concerning Defense Industry Determination, Licensing

Production, Export and Import Defense and Security Agency: Ministry of Defense This arrange determination industry defense , licensing production, as well as procedure export and import Alpalhankam, including requirements and mechanisms its permit.

Regulations the aiming build industry defense independent, strong and empowered nation competitive, and ensure security technology defense in accordance with interest national .

Development of Indonesian Defense Industry

Defense industry domestically being one spearhead of efforts a country in develop system defense in a way independent. This is related with fulfillment need Good in context provision quality and also quantity appropriate defense equipment with characteristics territoriality as well as remove dependence in a way political towards other countries. Coaching industry defense domestic has proven can become bone back for development system defense and modernization Chinese and Indian defense equipment which is currently This grow become strength military big in Asia. Reflecting to matter said, Indonesia which is currently This middle accelerate the program for fulfil minimum strength requirements his military emit base law for development industry defense domestically through Constitution Number 16 of 2012 concerning the Defense Industry. Development to industry defense domestic has significance main in the relationship with the existing mandate in Law Number 16 of 2012. The mandates That is: to realize industry professional, effective, efficient, integrated and innovative defense ; realizing independence fulfillment tool equipment detention and security ; and improve ability produce tool equipment defense and security , as well as service maintenance that will be used in frame build strength reliable defense and security (Law No. 16 of 2012 Article 3). The existence of this Law show commitment the government is aware importance industry defense domestically . Indonesia at the moment This has own a number of industry strategic moving in field defense , namely PT. Pindad , PT. PAL and PT. Dirgantara Indonesia. The three company This has own history long in production system defense , but Not yet function optimally in fulfil need Indonesia's defense . This condition No can released from lack of attention as well as trust from the Indonesian government itself to ability from industries The arms embargo imposed by the US at the beginning of 1990s has open eye the Indonesian government will importance existence various industry strategic the for system defense . In fact , for a long time the product industry Indonesia's defense has acknowledged its reliability by other countries, such as for example PT DI which has produce aircraft spy maritime for several countries. Reliability product industry defense domestic start acknowledged with use Variants SS rifle produced by PT. Pindad as rifle organic in the TNI and Polri environment . Since awareness will importance industry defense domestic appeared , PT. Pindad has Lots produce a number of innovation . One of them is success produce vehicle combat in the form of armored vehicle named Anoa . This is be one of point beginning development of PT. Pindad in the future come For capable produce defense equipment needed by the TNI such as tanks and technology weaponry other . Currently PT. Pindad Keep

going do innovation in develop SS rifle to in a number of type For TNI interests . Anoa armored vehicles and SS rifles made by PT. Pindad has steal attention from some countries which then give contract For procurement armored vehicle as well as rifle from company the For fulfil need force armed they . PT. PAL also does not lost with success produce a number of boat patrols used by the ranks of the Indonesian Navy. Some some time ago PT. PAL also succeeded develop boat war with Sigma class stealth technology named KRI Klewang. Although in the trial session boat made by PT. PAL burning and still there is some items are still must brought in from abroad , but This No to reduce development boat new that which will be later will strengthen ranks of the Indonesian Navy. This shows that PT. PAL's ability to produce and develop weapons, in particular for dimension sea , no can viewed adjacent eyes . Currently Indonesia is still bring in a number of boat war For fulfil the needs of the Indonesian Navy which are boat war another former country of course Already left behind from aspect technology and also decline ability his combat. This is not can released from limitations budget so that Indonesia only capable buy boat war used from other countries to just fulfil quantity without ignore quality from boat war However, the existence of PT.PAL makes budget issued will Far more low, with hope availability technology weapons and capabilities high combat in procurement defense equipment for the Indonesian Navy.

Defense Cooperation and Technology Transfer

As a new country start effort For develop industry defense domestic , Indonesia needs do cooperation in the field of said , in particular with developed countries. One of them form activity industry defense is development together (co-development) which is a cooperation program between government and companies multinational that does development and production a system weapons, including evaluation, cost together, and sharing profit through sale from production weaponry that (Fredy and Beni, in Perwita , 2013). In technology transfer there is a number of components that must be be noticed namely hardware, software, brainware and supporting network. Hardware is related with equipment that is physical and structural component as well as layout . Software is about what is called with "know-how" or How method For finish A task or order in operational . Brainware more on the subject with knowledge about the ins and outs insight and understanding about Applications and usage from the transferred hardware and software and the supporting net is required network For support use in a way effective in managerial from technology (Saad, 2000) The globalization process mature This bring impact to interdependence between countries in various fields , including in field industry defense . Developed countries can give technology transfer mechanism to developing countries in level technical, namely For do efficiency production, as well as in level political, namely For tighten connection with the country. Technology transfer can also be done among developing countries with objective For each other fill in lack from technology developed . For Indonesia, the technology transfer mechanism This can become opportunity separately, especially in frame build system defense in the middle rapid development technology defense moment this vis-à-vis the conditions defense equipment owned

by the TNI. In order to develop cooperation defense with other countries, the Indonesian government always make an effort For to include technology transfer clause inside it as effort develop defense equipment. Technology transfer This requires that industry defense domestically capable For implement and produce weaponry based on standards that have been given. For Indonesia, this is This it seems No will become constraint remember moment This industry defense domestic owned has show promising development. PT. Pindad as one of the company strategic in industry defense domestic has do cooperation with Fabrique Nationale (FN) Herstal Belgium. This collaboration produce rifle SS-1 assault based to rifle platform FNC artificial assault company Belgium said. PT. Pindad has also succeed develop technology making rifle the with produce various Variants from SS-1 rifle. Production results from PT. Pindad This Then No only for . fulfillment need defense equipment domestically, but also exported to various countries. PT. Pindad's Readiness as recipient transfer technology defense from other countries poured in the Decree of the Board of Directors No. Skep/3/P/BD/X/2005 concerning Technology Transfer Policy as commitment from PT. Pindad as one of the company at the forefront in provide and develop products weaponry for TNI. PT. Pindad's capabilities in accept and implement transfer technology become opportunity big in the middle the amount cooperation the middle defense established by the Indonesian government with other countries. With Still the amount TNI defense equipment originating from from overseas, PT. Pindad sued For capable produce ammunition and also ethnic group spare for various defense equipment This is along with demands transfer technology included by the Indonesian government in every purchase weaponry in a number of time lately This. The purchase of Leopard tanks by the Indonesian government opens up road For do transfer technology, at least in produce ethnic group spare and also ammunition domestically . Even the Memorandum of Understanding (MoU) between PT. Pindad with Rheinmetall as Leopard medium tank manufacturer prepared which was facilitated by the Indonesian and German governments (www.tribunews.com, accessed 2 August 2014). Likewise with PT. DI's ability in produce various the real airplane is results transfer technology. Since standing, PT. DI or the former named IPTN (Indonesian Aircraft Industry) has produce aircraft based on to design from the Spanish Cassa. After succeed apply design and production, PT. DI develops design the in a way independent For fulfil market needs with CN brand on every Variants the aircraft it produces , both For interest flight civil and also military. Defense cooperation that was opened between the Indonesian and South Korean governments have push effort development system weaponry independent, namely with developed production together aircraft combat with the KFX label by both countries, where The Indonesian government appointed PT. DI as executor technically. Through production together said PT. DI will to obtain chance For learn various technology making aircraft combat, which will later will make He capable For produce aircraft combat in a way independent. Defense cooperation with South Korea also covering production together boat dive.This Enough exhilarating because Indonesia is indeed need at least 12 ships

dive – moment this is new Indonesia own 2 units boat diving. In case This PT. PAL becomes partner for South Korean company to do production together boat dive the For fulfil TNI-AL needs . Technology making boat dive is A technology needed by PT. PAL which has been This Still focus on ships surface as well as his supporters . For Indonesia as a maritime country, the existence of boat dive become element important in securing the maritime area . Unfortunately , the procurement boat dive often hampered by limitations budget owned government . With production in a way independent later day , needs will boat dive and also boat war in the future come expected can with easy filled without too burdensome state budget .

1. Identification Risk in ToT Program

In ToT, one of the risk main is leakage information sensitive technology. Risk This can arise from access party third, infiltration cyber, or lack of regulation strict at the transfer stage. Therefore that 's important For identify risk in every stages ToT and establish policy security strict technology .

2. Security Strategy Technology in ToT

Covering a number of step main, between other:

- a. Supervision and Control Access: Restrictions access technology only on personnel authorized, and implementation system authentication layered For prevent access illegal.
- b. Protection Infrastructure Technology: Use data encryption, firewalls, and systems defense cyber For protect from attack.
- c. Formation of Supervisory Team: Involving team special responsible answer For monitor the ToT process in real-time, as well as ensure implementation policy security in accordance standard.

3. Impact of Technology Security in ToT to Security National :

Strict supervision of the Transfer of Technology (ToT) program provides positive benefits to stability and power competition defense a country. With existence protection technology, capability defense can improved without face risk leakage vulnerability that can utilized by the parties foreign. Analysis case show that the countries that succeed guard security technology in ToT has experience significant improvement in matter independence defense .

IV. CONCLUSIONS

Progress technology has have implications big to sector military and defense a country. This is related close with implementation various innovation and discovery new in military aimed at strengthen system national defense . Situation This push every country for renew system defense them to face emerging threats consequence development technology . For Indonesia, this is challenge at a time opportunity For increase system existing defense. Challenges This related with condition tool main system weapons (alutsista) owned by three TNI dimension, which functions as guard security of the country's territory. In quantity and quality, TNI's defense equipment is still Not yet fulfil ideal standard for guard all over sovereignty of the Unitary State of the Republic of Indonesia. However, this this also becomes opportunity for Indonesia to improve and

enhance defense equipment through optimization industry defense domestic and technology transfer. Technology transfer This can achieved through cooperation defense with developed countries that have progress in the field technology defense . Development technology defense globally it should be become booster for the Indonesian government to more focus on independence production defense equipment through various company existing strategic, especially in face threat contemporary. Beside That Security technology defense in the ToT program is very important For guard security national. With apply standard strict and systematic security, the state can minimize risk leakage technology and ensure that accepted technology through ToT contribute in a way maximum on stability defense. Recommendations For study advanced covers analysis development technology compatible local with technology results ToT and evaluation policy more security latest

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