



Implementation of Technological Innovation in the Production of 'Harimau' Medium Tanks Make use of the National Defense Industry's Independence

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Abstract

Efforts to develop the defense industry are to encourage innovation, because only with innovation can an industry always develop competence in the form of technology development and commercialization. The innovation process includes research and development, prototyping, demonstration, commercialization and after-sales service. Innovation is a combination of invention and commercialization of technology. So that innovation requires a process from the background of the needs to the achievement of success during commercialization. Currently, Indonesia has one type of medium tank technology called the Harimau. Basically, Indonesia has implemented technological innovation in the development of the medium tank technology 'Harimau'. However, there are still challenges in the way of implementing these technological advancements, including whether or not their application may lead to defense industry independence or vice versa. This paper aims to analyze the national defense industry on the technological innovation of the medium tank 'Harimau.' The SWOT (Strengths, Weaknesses, Opportunities, and Threats) method is used in this analysis. This research is planned to give an analysis of defense industry technology developments that will advance the provision of defense and defense equipment to land-based forces.

Keywords: *Technological Innovation; Medium Tank 'Harimau'; SWOT (Strength; Weakness; Opportunity; Threat)*

Introduction

National defense aims to achieve national goals, one of which is for the survival and integrity of the nation and state (Defense White Paper, 2015). An ability in carrying out strong and reliable national defense activities to be able to deal with various kinds of threats, be it military threats, non-military threats and hybrid threats, requires the support of defense and security equipment (alpalhankam) which is not only sophisticated, but also sustainable.

A country to be able to meet the needs of defense and security requires a strong and independent defense industry. A country develops the capacity of the defense industry solely to gain independence in weapons technology to support national defense (Lie and Samuels: 1995). The Indonesian government is currently developing the capability of supporting components on an ongoing basis, particularly the defense industry sector. It can be said that a defense force of a country is not only supported by large military personnel in terms of quantity, but must also be supported by technological factors as quality standards. The fulfillment of a sophisticated defense and security guard is a way to optimize the combat power of Indonesia's defense forces. However, one of the problems of modernization that often arises is the high cost of defense and security systems purchased from other countries. This is indeed related to the economic capacity of a country, where the size of the state defense budget often depends on the economic strength of a country. This condition has indeed encouraged Indonesia to realize the independence of the defense industry, considering that with the independence of the defense industry, besides being able to save on defense spending, it also gets more value in the country's foreign exchange income if our defense industry can compete with foreign products.

Several efforts have been made by the Indonesian government in order to improve its defense industry, namely by cooperating with foreign parties in order to realize the independence of the defense industry for the development of its military strength, among others through a series of several technical policies issued by the government. Efforts to achieve defense independence are in the interests of national defense in conducting defense industry cooperation (Al-fadhat and Effendi: 2019). The first thing to do is to oblige domestic users to be able to use domestic production for defense and security and non-alpalhankam defense. Another policy issued by the government is related to the purchase of the defense and security system used by the TNI which is allowed from abroad, and can be carried out if indeed the domestic production of the defense and security product is not technically capable of fulfilling the required specifications. In addition, purchases made from abroad must not dictate in terms of politics to Indonesia in the purchase of military equipment.

One of the efforts made in the modernization of the land defense and security forces to be able to fulfill the Minimum Basic Strength program or commonly referred to as the Minimum Essential Force (MEF), namely the procurement of medium tanks. Currently, in the implementation of land defense, the state defense depends on the strength of the defense and security forces, one of which is the medium tank. Therefore, every year it is necessary to plan the procurement of tank construction, both light tanks, medium tanks and heavy tanks. Planning for the construction of tanks, in addition to increasing strength, is also to modernize the tanks of the TNI AD which are old. In the MEF, the strength of the land force has only reached about 60 percent.

Research Method

This research method is a qualitative research method with data sources from discussions in defense industry lectures, scientific journals, books, as well as from laws and regulations related to research as a literature study. The method used is to look at the phenomenon of the problem, analyze the structure of the phenomenon to be described in a simple system model to gain an in-depth understanding (Sugiyono: 2009). In addition, a SWOT analysis was performed. The purpose of the SWOT analysis is to specify the objectives of a particular company or project and to identify internal and external factors that are beneficial or detrimental in achieving these goals (Rangkuti, 2014: 19).

The SWOT analysis used is a process of identifying the various existing factors that are used to formulate a strategy for the company itself. The analysis carried out is based on logic with aspects of strengths and aspects of opportunities that are maximized as well as aspects of weaknesses and also aspects of threats that are minimized at the same time (Endarwita: 2021).

The SWOT analysis used in this analysis aims to be able to find important aspects of existing weaknesses, strengths, threats, and opportunities. The use of SWOT analysis is to be able to map the strengths, weaknesses, opportunities and threats of existing phenomena. Finally, provide recommendations for solutions to the phenomenon of the problem (Erwin Suryatama: 2020).

Result and Discussion

Research result

The biggest challenge in Indonesia's current defense budget is that Indonesia's defense budget is not proportional to the size of its territory, but requires Indonesia to have a strong military force. Therefore, a mature strategic plan is needed in realizing a defense industry that can ultimately advance Indonesia's military strength. Until now, the Indonesian government has been very consistent with its commitment in terms of prioritizing the domestic defense industry for the procurement of defense and security systems. As one of the state-owned enterprises in the defense sector, PT. Pindad (Persero) has been able to realize the procurement of the medium tank 'Harimau.'

The mastery of the medium tank technology is obtained through the Transfer of Technology (ToT) scheme which is then developed according to the needs required by users by PT. Pindad (Persero). Through this ToT, Indonesia and Turkey cooperate in the defense industry aspect (Amrullah: 2016). In identifying and measuring the potential operational risks that exist in the ToT of the Indonesian defense industry in producing medium tanks, the SWOT method can be used. Broadly speaking, there are two stages in this framework, the first is the problem identification phase and the second is the problem handling phase.



Figure 1. Indonesia's Defense Budget

<https://databoks.katadata.co.id/datapublish/2021/04/27/anggaran-kementerian-pertahanan-naik-78-pada-2021>

The 'Harimau' medium tank was held to create a reliable ground force, this could only be achieved through adequate defense and security support. The step of building defense forces by taking steps to modernize the defense and security system and its technology is one of the priority programs being prioritized at this time. Apart from modernizing the defense and security system, the construction of the 'Harimau' medium tank will certainly also support the independence of the national defense industry,











from there are efforts to avoid dependence on defense and security products from other countries. To make this happen, commitment, determination, and effort are definitely never stopped from all parties in meeting the needs for defense and security. Including the national defense industry which must continue to improve its capabilities in order to fulfill the demands of the needs and realize the independence of the defense industry.

For this reason, it is necessary to have the readiness of the defense industry in developing the technology by first defining the key technologies in the medium tank to determine the level of readiness of the technology to be developed by PT. Pindad (Persero).

National defense is something that has become a measure of a country's readiness to face threats. The size of a country's efforts in facing threats and achieving and defending its national interests can be judged in terms of the quality and quantity of its military, for that the military sphere has an important role in dealing with threats in achieving and defending its national interests. Readiness in dealing with threats is reflected in the readiness of the defense and security system owned by a country. If a country is not able to achieve self-sufficiency in defense or depends on weapons produced by other countries, that country cannot be said to be a strong country. This is because these countries will continue to be under the shadow of the influence and power of their weapons-producing countries (Neuman: 2010).

The readiness of the defense and security forces of the Indonesian state is not yet fully optimal. This can be seen in the study published by Kampusmiliter.com regarding the Military Defense Capability Index or MDCI regarding the ownership of defense and security equipment or land-based defense equipment in Southeast Asia in 2015, that Indonesia in the possession of land-based defense and defense equipment is in fourth place after Thailand. This means that the defense and security defense capability index in 2015, Indonesia's military strength is below that of Singapore and Vietnam. Especially in terms of ownership of land-based combat vehicles that support the defense of land areas.

Kapabilitas Militer di Asia Tenggara per 2015
MDCI 2015 (1410053)

#	Kekuatan Darat	Kekuatan Laut	Kekuatan Udara	Militer Gabungan
1	Vietnam	Vietnam	Singapore	Vietnam 
2	Singapore	Singapore	Vietnam	Singapore 
3	Thailand	Indonesia	Thailand	Thailand 
4	Indonesia	Thailand	Indonesia	Indonesia 
5	Myanmar	Malaysia	Malaysia	Malaysia 
6	Malaysia	Myanmar	Myanmar	Myanmar 
7	Cambodia	Philippine	Philippine	Philippine 
8	Laos	Cambodia	Cambodia	Cambodia 
9	Philippine	Laos	Laos	Laos 
10	Brunei	Brunei	Brunei	Brunei 

kampusmiliter.com

Figure 2. Military Capability in Southeast Asia as of 2015

<https://kampusmiliter.wordpress.com/kapabilitas-militer/perbandingan-kekuatan-militer-di-asia-tenggara-per-2015/>

For now, Indonesia does not have a medium tank that functions to support Main Battle Tank operations. If you look at the area of Indonesia, which borders Singapore and Thailand. The need for

medium tank operations is needed to secure areas that have the potential to threaten and maintain the territorial integrity of the country. This need for defense and security needs to be supported by a defense industry that is capable of producing and as a facilitator who accommodates maintenance, maintenance and as a forum for developing technological mastery in the defense sector.

The domestic defense industry has not been able to independently produce armored fighting vehicles (tanks) to meet user needs in supporting TNI AD operations. Currently, the implementation of the Indonesian defense industry is prioritized through domestic cooperation which includes education, training, technology transfer or technology transfer, research and development, engineering, products, marketing and financing. However, if the state has not been able to fulfill the high-tech security and defense system, the domestic defense industry can carry out foreign cooperation. Through cooperation with the defense industry, Indonesia seeks to be able to create defense equipment independently and free from the threat of embargoes which are indirectly related to national security (Sudarmanto and Sudibyakto: 2011)

To accelerate the mastery of technology in producing medium tanks, the government opens cooperation with other countries that offer technology transfer and is willing to cooperate in a Government to Government or G to G manner in accordance with the mandate of the Act. Medium tank is one of the priority programs launched by the government. Furthermore, this matter was addressed by PT. Pindad (Persero) which is one of the State-Owned Enterprises for the Defense Industry or BUMNIP. PT. Pindad (Persero) has 15 strategic programs that are in line with government policies, one of which is opening combat vehicle cooperation.

The defense and security sector of a country can be supported by the existence of an independent defense industry so that the country is able to be sovereign in meeting the needs of the defense and security forces in carrying out defense and security functions. To realize independence and sovereignty in meeting the needs of defense and security, the defense industry needs to have a foundation of capable mastery of technology, because the core of the strength of the defense industry is at the level of mastery of technology in particular is the level of mastery of technology that is collaborated in the joint development of Medium Tank technology.

In the process the development of the medium tank 'Harimau' will go through several stages (Wulandari, 2017; Pindad, 2016). The key technologies needed to accelerate the process of mastering medium tank technology are knowing the structure and components of the medium tank. The structure of this constituent technology is the forerunner to carry out the technology transfer process as well as a means to determine the technology to be mastered. Medium tank is a national program that contains a lot of technology. The content of this technology will be further traced when it is known that the key technologies being collaborated as well as technologies that have been mastered by the domestic defense industry.

PT. Pindad (Persero) has conducted an initial identification of what technologies will be contained in the medium tank product. Initially, PT. Pindad (Persero) developed a tank by using a tank murder as a development study material. After knowing what Pindad can do and what other industries need to support. PT. Pindad (Persero) independently develops the platform for the ground floor, track link, etc. Because it is realized that platform technology is a technology that underlies or supports other technologies. Until the medium tank became one of the country's national programs, PT. Pindad (Persero) received an offer to produce and develop medium tanks in Indonesia. From the study, it was concluded that PT. Pindad (Persero) needed other industries to develop medium tanks.

Technological components that have been defined and allow to be applied will be visually simulated through software that is run by a computer. This stage is also a sign that the components, systems and subsystems of the medium tank are virtually integrated. Simulations in the development of this medium tank are carried out using the help of hard workstations and software. This is done to assist the virtual integration process before the real integration is carried out. By entering parameter data obtained from component suppliers, the software is able to analyze the manufacture of combat vehicles.

PT. Pindad (Persero) almost carried out all studies and tests on a laboratory scale for tracking and platform independently. At this stage of testing, certification is carried out for dynamic tests and static tests including testing of dimensions, weight, paint thickness and other specifications. Other tests carried out were firing tests, resistance to mines, mobility tests, and shooting accuracy reliability tests. The results of the study on a laboratory scale were obtained in the form of a prototype design that was almost similar to the laboratory scale. At this stage, PT. Pindad (Persero) is seriously following and trying so that this design stage can be mastered to the maximum.

For the initial prototyping process, a manufacturing procedure system and other systems and procedures are carried out to support the production process and development of the medium tank. The prototyping process is also a verification of images, product ToT capabilities that are fully carried out in Indonesia. A certified prototype indicates that the data and documents are complete. Furthermore, the data will flow to the production side for mass products while waiting for orders and work orders.

Discussion

It can be said that the essence of strategy is opportunity divided by capacity. An opportunity by itself has no value unless the company has the capacity (in this case, the resources) to take advantage of the opportunity. This approach considers opportunities and strengths only when dealing with alternative strategies. By itself, a distinctive competence in a vital resource or capability is not a guarantee of competitive advantage.

Weaknesses in other resources can prevent a strategy from failing. Thus, SWOT can be used to use a broader strategic perspective. This reflects an important issue facing strategy managers; Should we invest more in our strengths to become stronger (become a distinctive competence) or should we invest in our weaknesses, so that these weaknesses can become competitive.

From the data obtained, Internal Strategic Factors in the form of aspects of strength (strength) and aspects of weakness (weakness) and for External Strategic Factors namely aspects of opportunities (opportunity) and aspects of threats (threats). The following factors are described and the total score is calculated. The thing to do is to do a SWOT analysis in order to make technological innovations effective and efficient.

Below is a SWOT analysis of the defense industry supply chain that calculates internal and external factors:

Table 1 Calculation of IFAS Weights & Ratings

INTERNAL FACTORS				
STRATEGIC FACTORS		Weight	Rating	Score
<i>Strength</i>	Already gained knowledge, experience, and references.	0,138	3	0,414
	Readiness of the defense industry in developing technology	0,135	2	0,27
	Has carried out initial identification of technologies.	0,120	2	0,24
	Knowing the structure and constituent components.	0,135	3	0,405
	Perform platform development.	0,085	2	0,17
<i>Weakness</i>	Requires another industry in developing medium tanks.	0,117	2	0,234
	Visual simulation through inaccurate software.	0,140	3	0,42
	Non-standard testing.	0,130	3	0,39
TOTAL		1		2,543

Table 2 Calculation of EFAS. Weights & Ratings

EXTERNAL FACTORS				
STRATEGIC FACTORS		Weight	Rating	Score
<i>Opportunity</i>	The prototyping process is also a verification of images, product tot capabilities that are fully carried out in Indonesia.	0,29	3	0,87
	A certified prototype indicates that the data and documents are complete.	0,21	2	0,42
<i>Threat</i>	Manufacturing procedure systems and other systems and procedures to support the production and development processes are not yet in sync.	0,31	2	0,62
	Existing data cannot be carried out by mass products and work orders due to policy and cost constraints.	0,19	2	0,38
TOTAL		1		2,29

From the analysis above in the calculation, if the IFAS and EFAS scores are greater than 2, then the chosen strategy is the SO strategy. If the IFAS score is less than or equal to 2 and the EFAS score is greater than 2, then the strategy chosen is the WO strategy. If the IFAS score is greater than 2 and the EFAS score is less than or equal to 2, then the strategy chosen is the ST strategy. If the IFAS and EFAS scores are less than or equal to 2, then the strategy chosen is the WT strategy.

The results of the reconditioning of IFAS values and EFAS values in table 1 and table 2 show that the total IFAS score obtained is 2.543 and the total EFAS score obtained is 2.29, where the IFAS score is

greater than 2 and the EFAS score is greater than 2, from the results obtained, the best strategy to be applied is the SO or Strength with Opportunity strategy.

And if the SWOT analysis is modeled in a quadrant, then the SO placement is in quadrant I with an Aggressive strategy.



Figure 3 Quadrant Model of SWOT Matrix Analysis

Conclusion

The results of the analysis of internal factors obtained 5 aspects of strength and 3 aspects of weakness. The results of the analysis of external factors obtained 2 aspects of opportunities and 2 aspects of threats. The results of the matrix analysis found that the strategy that fits the weaknesses of the defense industry production process in Indonesia is the SO strategy. SO strategy or Strength and Opportunity is a strategy that uses the strengths and opportunities of the company to overcome threats. The things that are done in the SO Strategy are using the company's internal strengths and external opportunities to be able to avoid or also reduce the impact of external threats. From the SWOT analysis, the results are in Quadrant I which is supported by strengths and opportunities. Strengths and opportunities possessed by the company/business entity/product that can be used to take advantage of opportunities as well as possible and at the same time can also be used to eliminate or minimize threats so that goals are achieved. The final result of the SWOT analysis is in the form of alternative strategies that can later be used as considerations in determining STP: segmentation – targeting – positioning.

After the SWOT analysis has been carried out, the best strategy can be described to be implemented in the Indonesian defense industry in its efforts to independently offset the defense and security technology innovation, namely: PT. Pindad (Persero) must gain knowledge, experience, and international standard references regarding tank development; There is a need for the readiness of the defense industry in developing medium tank technology; Early identification of technologies should be carried out; Knowing the structure and constituent components; and Perform platform development.

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