Naval Technology Development Strategy in the Integrated Fleet Weapon System for Supporting the Principal Task of Indonesian Navy

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Keywords: Naval Technology, Strategy, Fleet Weaping System.

Abstract: As an effort to optimize the implementation of Indonesia Navy principal task, development strategy has an important role to encounter naval defense and security threat. This research aimed at formulating a strategy to develop naval technology to strengthen the integrated naval weapon system. This research used SWOT (Strength, Weakness, Opportunity, Threat) analysis method as strategy formulation. Secondly, this research used the Interpretative Structural Modeling (ISM) and Balanced Scorecard approach. Naval technology development strategy in the integrated fleet weapon system (SSAT) which was based on naval technology was formulated into a strategic management plan which was based on five points of SO strategy, three points of ST strategy, six points of WO strategy and one point of WT strategy that made in fifteen stages of strategy in the naval technological mastery. The strategy mapping created in the Balanced Scorecard structure presented that financial perspective was made of one strategy target. Nine strategy targets were in the internal process perspective. Learning and Growth perspective was made of four strategy goals. In addition, customer aspect consisted of one strategy goal. This research was expected to give contribution to the naval strategic development to support the integrated fleet weapon system in the Indonesian Navy.

1 INTRODUCTION

Located in a strategic trade route and sea transportation, Indonesia faces some challenge in the management of maritime defense which comprises several dimensions including defense and security management. The national defense strategy which is implemented in the sea is referred to the infrastructure and the mastery of Naval Technology, especially in Integrated Fleet Weapon System in Indonesian Navy, where the military strategy believes that technology-supported weapon system is an asset to win a combat.

As an effort to optimize the implementation of Indonesia Navy principal task, development strategy has an important role to encounter naval defense and security threat. This research aimed at formulating a strategy to develop naval technology to strengthen the integrated naval weapon system by using technology management approach. This research used SWOT (Strength, Weakness, Opportunity, Threat) analysis method as strategy formulation. Secondly, this research used the Interpretative Structural Modeling (ISM)-Balanced Scorecard approach as a part of strategy implementation Sahiti et al. (2016).

There is some literature in support of research likely SWOT analysis uses to obtain the weight value from the expert in identifying the internal and external factors of traditional shipbuilding industry. SWOT analysis uses to determine the external and internal factors to support of strategy formulation in business schools in the Kingdom of Saudi Arabia. Integrate results of each level and provide a final assessment of the market selection strategy. SWOT analysis used to give a rank of countries in calculating the number of gold medals, silver medals and bronze medals won.

ISM for analyzing interactions between barriers to just-in-time (JIT) production operations. ISM to analysis of core industry competencies in Pekalongan City. ISM to identify the drivers of travel / tourism growth and build relationships between enablers. ISM to study various aspects and correlations between youth and sustainable rural development. ISM to identify and rank the various criteria used for supplier evaluation (Yüksel and Dağdeviren, 2007).

BSC as a methodological concept for performance assessment based on system dynamics. The relevance of BSC to improving financial performance.

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Implement BSC on the performance of strategic management for the banking industry. BSC to evaluate performance, implement organizational mission and strategy. BSC to measure the performance of higher education. BSC to examine employee performance appraisal in implementing the company's new strategy. BSC to observe the organization's strategic planning process in directing its efforts.

There were three stages of strategic management namely strategy formulation, strategy implementation, and strategy evaluation. The delimitation of the study was on the strategy formulation strategy evaluation plan. This research was expected to give contribution to the naval strategic development to support the integrated fleet weapon system in the Indonesian Navy.

The paper is organized as follows. Section 2 reviews the basic concept of method, Naval Technology, Integrated Fleet Weapon System. Section 3 gives the result and discussion of the paper. Section 4 describes the conclusion of Naval Technology development strategy for Integrated Fleet Weapon System

2 MATERIALS / METHODOLOGY

2.1 Indonesia Navy

The Indonesian Navy (Indonesian Navy) is one of the branches of the army and is part of the Indonesian National Army (TNI), which is responsible for the Republic of Indonesia's national defense operations at sea. According to Law No.34/2004 on the Indonesian National Armed Forces, Article 9, the Navy has the following tasks (Quesado et al., 2018):

- Perform military duties in national defense
- Enforce the law and secure the order in the sea area of national jurisdiction in accordance with national laws and ratified international laws
- Perform diplomatic duties in support of foreign policy set by the government
- Engage with other duties relevant for the maintenance and development of naval power
- Support civilian empowerment in sea defense areas

2.2 Integrated Fleet Weapon System (SSAT)

As the main component of sea national defense, Indonesian Navy implements national defense policy

Figure 1: Integrated Fleet Weapon System of Indonesian Navy

which is defending national sovereignty and territorial integrity, protecting the national honor and security, and performing military operations. Indonesian Army strength is integrated in Integrated Fleet Weapon System (translated as Sistem Senjata Armada Terpadu or SSAT). SSAT consists of four components, namely Republic of Indonesia Warship (KRI), Aircraft, Marines, and Naval base. These four components are interrelated and support each other. The SSAT is literally correlated with the integrated use of the four Navy weapon systems during operation. The four components cannot act separately but under the integrated instruction of the Navy.

2.3 Naval Technology

In conducting naval operations in the future, there is a need for highly skilled personnel with an effective response to an attack. In designing new systems and equipment, flexibility and adaptability are needed to manage technology improvements. In testing skills and providing training, there needs to be a closer relationship between naval personnel and the defense industry to provide feedback on developing new capabilities.

The general trend towards fewer crews will encourage the application of technological capacity to improve crew capability. The role of warships by 2030 will begin to change with the use of unmanned systems and remote control systems. It will have a greater effect with less risk of the aircraft carrier. In addition, the need for mission flexibility and energy efficiency in naval vessels will encourage the application of technology which is related to energy storage, production, shipping and reuse or energy management.

In the Global Marine Technology Trends 2030, will focus on 8 (eight) technology fields, with the potential to change naval operations in the future.

These eight technologies will play an important role in future war battles (Attri et al., 2013). The eight technologies include 1) Advanced Material; 2) Autonomous System; 3) Big Data Analytic; 4) Advanced Manufacturing; 5) Energy Management; 6) Cyber and Electronic Warfare; 7) Human Computer Interaction; 8) Human Augmentation

2.4 SWOT Analysis

SWOT Analysis is an analysis consisting of micro environment analysis to find out the strengths and weaknesses of a company, and macro environment analysis to find out opportunities and threats to the company. This analysis is based on logic that could optimize strengths and opportunities, but it could minimize weaknesses and threats at the same time [19]. The strategic decision-making process is always related to the development of missions, goals, strategies, and policies of an industry/company. A research shows that industry or company performance can be determined by combination of internal and external factors. Both of these factors must be considered in the SWOT analysis. Internal factors include strengths and weaknesses, while the external factors include opportunities and threats.

SWOT matrix is a decision-making formulation instrument to determine the strategies adopted based on logic to optimize strengths and opportunities of the company, and simultaneously minimize the weaknesses and threats. Below are steps in preparing SWOT matrix:

- Compiling a list of external opportunities and threats of a company as well as the internal strengths and weaknesses.
- Developing SO (Strength-Opportunity) strategy by matching the internal strength with the external opportunities.
- Developing WO (Weakness-Opportunity) strategy by matching the internal weaknesses with the external opportunities.
- Developing ST (Strength-Threat) strategy by matching the internal strength with the external threats.
- Developing WT (Weakness-Threat) strategy by matching the internal weaknesses with the external threats.

2.5 Interpretative Structural Modeling (ISM)

The interpretative structural modeling (ISM) used for ideal planning, is an effective method because all elements can be processed in a simple matrix. ISM was first proposed by War field in 1973. The interpretative structural modeling is a methodology that aims to identify the relationship between a particular item, which defines a related problem or issue and a suitable modeling technique for analyzing the influence of one variable on another variable.

ISM has been well proven to identify structural relationships among system-specific variables. The basic idea is to use practical experience and expert knowledge to parse complex systems into multiple sub-systems and build structured structural models. The ISM-based approach is one of the versatile and powerful techniques that have been used to solve complex multi-factor problems. ISM is interpretative, since the group assessment selected for the study determines whether and how the related variables. There are procedures or stages in the use of the ISM method, such stages as :

- Identify parameters.
- Development of Structural Self Interaction Matrix (SSIM). The development of an interpretive structural model begins with the preparation of a structural self-interaction matrix, indicating the direction of the contextual relationship between elements.
- Reach ability Matrix. From the self-interaction matrix (SSIM), the relational indicator is converted to binary numbers 0 and 1 to obtain a square matrix, called the reach ability matrix.
- Partition level.
- The construction of interpretative structural modeling (ISM).
- MICMAC analysis. MICMAC is used to check driving power and dependence power. Variables have been grouped into four criteria known as Autonomous, Linkage, Dependent and Driving / independent. The following is the meaning of the four categories (Shahbandarzadeh and Haghighat, 2010): 1) Variable Autonomous. 2) Linkage Variables. 3) Dependent Variables. 4) Independent Variables.

Table 1: Rule of Development SSIM.

Symb.	Relationship between row(i)&column(j) element
V	Barrier i lead to barrier j, not in reserve direction
A	Barrier j lead to barrier i, not in reserve direction
X	Barrier i and j lead to each other, in both direction
O	Barrier i and j are unrelated

(i) \ (j) ENABLERS	1	2	3	4	5	6	7	8
1	1	1	1	0	0	0	0	0
2	0	1	1	0	0	0	0	0
3	1	1	1	1	1	1	1	0
4	1	1	1	1	1	1	1	0
5	1	1	1	1	1	1	1	0
6	1	1	1	1	1	1	1	0
7	1	1	1	1	1	1	1	0
8	1	1	1	1	1	1	1	1

Figure 2: Sample on Reachability Matrix

2.6 Balanced Scorecard (BSC)

Balanced scorecard is a method developed to measure every activity carried out by a company in order to realize the goals of the company. Balanced scorecard is a separate activity related to targeting, but then integrated with the strategy management system. Strategic management system is the process of formulating and implementing strategies to realize the vision continuously and structured. Balanced scorecard is further developed as a means to communicate from various units within an organization. Balanced scorecard is also developed as a tool for organizations to focus on strategy management.

In matrix development, data collection, and data analysis, BSC refer to four perspectives, namely:

a. Financial Perspective. In the financial perspective, there are three aspects of the strategy implemented by the company; a) revenue growth and a combination of income owned by a business organization; b) decreased costs and increased productivity; c) optimal use of assets, and investment strategies.

b. Customer Perspective (Customer). In this perspective, measurements are carried out with five main aspects, likely : 1) Market share measurement. Measurement of the size of the company's market share. 2) Customer retention. Measurement is done by knowing the percentage of business growth, with the number of customers owned by the company. 3) Customer acquisition. Measurement can be done through the percentage of the number of additional customers. 4) Customer satisfaction. Measurement of the level of customer satisfaction. 5) Customer profitability. Measurement of customer profitability can be done using Activity Based-Costing (ABC) techniques.

c. Internal Process. In this perspective, the company measures all activities carried out by the company, both managers and employees to create a product, which can provide satisfaction to customers, and shareholders. In this case, the company focuses on three main business processes, namely: the innovation process, the operating process, the post-sale process.

d. Learning and Growth. Kaplan revealed the importance of a business organization to pay attention

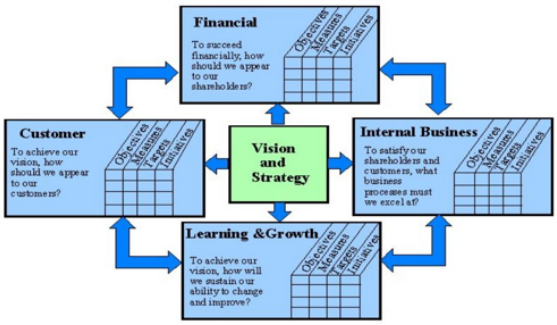

Figure 3: The Balanced Scorecard

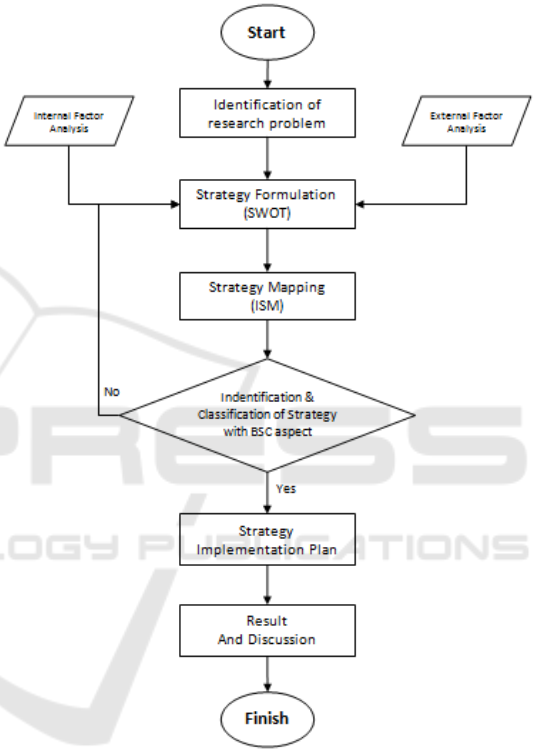

Figure 4: Flowchart for Development Strategy of Integrated Fleet Weapon System

to its employees, monitor employee welfare, and increase employee knowledge, because with increasing levels of employee knowledge, it will also increase the ability of employees to participate in achieving results and company goals.

3 RESULT AND DISCUSSION

The research was started by data collection by interviewing six expert personnel (E1;E2;E3;E4;E5;E6) for the development of Integrated Fleet Weapon System (SSAT). After all data were collected, the data

were categorized into external and internal analysis. SWOT analysis was used in order to know the strengths and weaknesses in the internal condition regarding SSAT development, as well as recognizing the opportunities and threats.

3.1 Internal Factor Analysis

According to the respondent assessment result, there were several internal factors which became the strengths and weaknesses of technological mastery as mentioned below.

Based on the table above, there were eleven points in strength analysis factor and thirteen points for weakness analysis factor which is identifies in internal factor.

3.2 External Factor Analysis

The respondent assessment result showed that there were some external factors which became the threats and opportunities in technological mastery as mentioned below :

Based on the identification from various internal and external factors, the next step was arranged to be factors of strategy. The existing internal and external factors were combined to determine an alternative for the strategy of navy posture development. In this following table presented the strategies which were formulated from the SWOT matrix.

The data from the table above, there were five points of SO strategy and three points of ST strategy for naval technological mastery, followed by six points of WO strategy and one point of WT strategy. They were compilated into fifteen strategies for the naval technological mastery.

3.3 Identification of Priority and Strategy Mapping

The arrangement of priority and strategy mapping was started by creating hierarchy system between previously identified aspects. The creation of hierarchy used the Interpretative Structural Modeling approach method. This method aimed to plan the chosen strategy to be described in the implementation plan according to the hierarchical system.

- SSIM was the stage to determine the dominant variables from the SWOT analysis result to know the interrelation level between sub strategy in maritime food development.
- Structural Self Interaction Matrix (SSIM).
- Reach ability Matrix (RM). Table xx of matrix SSIM was made into the table of Reachability Matrix (RM) by changing V, A, X, O into 1 and 0.
- ISM Framework Model to SSAT development strategy. The data development result of SSIM and RM were made into the sub strategy framework which influenced the SSAT development strategy

Structure of element above showed that WT-1 strategy was in priority 1, while strategy of ST-1 and WO-5 was in priority 2, ST-3 strategy was in priority 3, also SO-1 and WO-1 strategy were in priority 4. In priority 5, there were four strategies namely SO-2, SO-3, SO-4, and WO-2. Strategy of WO-4 was in priority 6, WO-3 and ST-2 strategy were in priority 7, SO-5 strategy was in priority 8 and WO-6 in priority 9.

3.4 Strategy Mapping

Strategy mapping presented a portrayal of how each work could support the whole strategic achievement of the organization. Strategy mapping helped the organization to especially visualize what was needed to do and support the development strategy of integrated fleet weapon system.

Strategy mapping would ease the organization actors to monitor strategy implementation development. The result from the analysis of strategy mapping design correlated Balanced Scorecard with the designed strategy which was the development if integrated fleet weapon system.

Financial perspective consisted of one strategy goal to improve defense budget. Internal process perspective consisted of nine strategy goals as follows: 1) Big Data Analytic Mastery; 2) Technology Transferred; 3) Cyber Infrastructure; 4) Autonomous System; 5) Nano Technology Development; 6) Stealth Technology; 7) Diplomacy Ability; 8) Energy Management; 9) Technology Development by National Industry. Learning and Growth perspective was made of four strategy goals namely 1) Blue Print is Realized; 2) Cyber Ability; 3) Cyber and Electronic Warfare Ability; 4) New Technology for Weapon System. Customer aspect consisted of one strategy goal, High Value Research.

4 CONCLUSION

Development of technology affects every dimension of human life, including the defense and security aspects. Along with the strategic position in the trade

Table 2: Internal Factor Analysis

Strength	**Weakness**
1. Able to develop Nano-compositetechnology 2. Able to develop unmanned system. 3. Had cyber infrastructure in theheadquarter 4. Z generation who were familiarwith computation 5. Technology transfer cooperationwho opened theopportunity for technological mastery. 6. Had maintenance system untilorganic stage 7. There was a Committee of DefenseIndustry Policy (*KKIP)* as the basic of independent *SSAT* technological development 8. Organization managerial which wassolid enough 9. Presence of the blueprint of *MEF* 2024. 10. As the biggest organization in Southeast Asia 11. Logistic supporting system whichwas systematicand well-structured from the organization	1. Limited stealth aircraft of *SSAT* 2. Absence of electro molecular system in *SSAT*. 3. Nanocomposite technology which was still in thestage of prototype. 4. The Big Data Analysis technologywhich was stillhack-prone. 5. Partially data analysis. 6. Absence of integrated energy management systemyet. 7. Hack-prone in the Major Command level 8. Electronic warfare technology which was stilllimited to generation $\frac{3}{4}$. 9. Absence of the use of human augmentationtechnology 10.Limited manufacturing tools. 11. Technology development was dependent to importpolicy. 12. Budget strength was below the standard (2% of GDP). 13.Research and development were not in line with KKIP policy and defense industry

Table 3: Eksternal Factor Analysis

Threat	**Opportunity**
1. 1.Dependent to unrenewable resources 2.Fund for research and development waslimited 3.Threat of cyber-attack. 4.Threat of data hack. 5.Natural resources as the target ofmany countries. 6.Threat as the weapon market. 7.Radicalism and communism threat. 8.Threat as a traffic when there wasa conflict between countries.Social gap.	1. 1. National economy growth which was above global economy growth. 2. Abundant stock of alternative energy. 3. Low wage level 4. There was a legal protection of *KKIP*for defense industry. 5. Vast development of internet 6. Internet system which supported the decision-making time 7. *PMD*policy of the government 8. As the biggest democratic countryBonus of population demographic

Table 4: SWOT matrix of Strategy Formulation

Strategy (SO)	Strategy (ST)
1. Nano technology development which reached production stage. 2. Development of unmanned system based on *KKIP* to production level 3. Development of cyber infrastructure to the level of Major Command. 4. Implementation of technology transfer to the level of *TOK*, TOKH, *TOP* 5. Development of *blue print* that was suitable with naval technological mastery of 2030 and *PMD* policy	1. Implementation management of energy and development of renewable resources 2. Optimization of the ability of Z generation in the system of information and cyber development 3. Improvement of the diplomacy ability as the balance of power in Asia Pacific
Strategy (WO)	Strategy (WT)
1. Development of unmanned technology with *KKIP* and *Inhan* 2. Integration of big data analytics to the high level 3. Improving electronic warfare ability to the fifth level. 4. Upgrade of manufacturing tools. 5. Development of technology by focusing on domestic procurement. 6. Doing a research which was suitable with *KKIP* policy and defense industry.	1. Improvement of standard defense budget strength (2% GDP) gradually.

Table 5: Compilation of Naval Technology for Weapon System Strategy

Code	Sub Strategy
SO-1	Development of Nano-technology development to production stage
SO-2	Development of unmanned system based on *KKIP* to production level.
SO-3	Development of cyber infrastructure to the level of Major Command
SO-4	Implementation of technology transfer to the level of *TOK*, TOKH, *TOP*.
SO-5	Development of b*lue print* that was suitable with naval technological mastery of 2030 and *PMD* policy
ST-1	Implementation management of energy and development of renewable resources
ST-2	Optimization of the ability of Z generation in the system of information and cyber development
ST-3	Improvement of the diplomacy ability as the balance of power in Asia Pacific
WO-1	Development of unmanned technology with *KKIP* and *Inhan*
WO-2	Integration of big data analytics to the high level
WO-3	Improving electronic warfare ability to the fifth level.
WO-4	Upgrade of manufacturing tools.
WO-5	Development of technology by focusing on domestic procurement.
WO-6	Doing a research which was suitable with *KKIP* policy and defense industry.
WT-1	Improvement of standard defense budget strength (2% GDP) gradually.

		Strategy														
No	Code	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
1	SO-1	V	X	A	V	X	O	X	A	O	O	X	X	O	A	-
2	SO-2	V	X	A	V	X	O	A	A	X	V	X	X	X	-	
3	SO-3	V	X	A	O	X	X	O	A	X	O	X	O	-		
4	SO-4	V	X	A	V	A	O	X	O	X	O	X	-			
5	SO-5	V	X	A	X	V	X	X	X	X	V	-				
6	ST-1	X	X	A	X	O	O	O	O	O	-					
7	ST-2	O	X	A	X	X	X	O	A	-						
8	ST-3	V	X	A	O	X	X	V	-							
9	WO-1	V	X	A	X	X	O	-								
10	WO-2	V	X	O	O	X	-									
11	WO-3	V	X	A	A	-										
12	WO-4	X	X	X	-											
13	WO-5	X	X	-												
14	WO-6	V	-													
15	WT-1	-														

Figure 5: Structural Self Interaction Matrix

		Strategy															
No	Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	DP
1	SO-1	1	0	0	1	1	0	0	0	1	0	1	1	0	1	1	8
2	SO-2	1	1	1	1	1	1	1	0	0	0	1	1	0	1	1	11
3	SO-3	0	1	1	0	1	0	1	0	0	1	1	0	0	1	1	8
4	SO-4	1	1	0	1	1	0	1	0	1	0	0	1	0	1	1	9
5	SO-5	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	14
6	ST-1	0	0	0	0	0	1	0	0	0	0	0	1	0	1	1	4
7	ST-2	0	1	1	1	1	0	1	0	0	1	1	1	0	1	0	9
8	ST-3	1	1	1	0	1	0	1	1	1	1	1	0	0	1	1	11
9	WO-1	1	1	0	1	1	0	0	0	1	0	1	1	0	1	1	9
10	WO-2	0	0	1	0	1	0	1	1	0	1	1	0	0	1	1	8
11	WO-3	1	1	1	1	0	0	1	1	1	1	1	0	0	1	1	11
12	WO-4	0	0	0	0	1	1	1	0	1	0	1	1	1	1	1	9
13	WO-5	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	14
14	WO-6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
15	WT-1	0	0	0	0	0	1	0	0	0	0	0	1	1	0	1	4

Figure 6: Reach-ability Matrix

		Technology			
No	Code	Reachability	Antecedent	Intersection	Priority
1	SO-1	1;4;5;9;11;12;14;15	1;2;4;5;8;9;11;13;14	1;4;5;9;11;14	4
2	SO-2	1;2;3;4;5;6;7;11;12;14;15	2;3;4;5;7;8;9;11;13;14	2;3;4;5;7;11;14	5
3	SO-3	2;3;5;7;10;11;14;15	2;3;5;7;8;10;11;13;14	2;3;5;7;10;11;14	5
4	SO-4	1;2;4;5;7;9;12;14;15	1;2;4;5;7;9;11;13;14	1;2;4;5;7;9;15	5
5	SO-5	1;2;3;4;5;6;7;8;9;10;11;12;14;15	1;2;3;4;5;7;8;9;10;12;13;14	1;2;3;4;5;7;8;9;10;12;14	8
6	ST-1	6;12;14;15	2;5;6;12;13;14;15	6;12;14;15	2
7	ST-2	2;3;4;5;7;10;11;12;14	2;3;4;5;7;8;10;11;12;13;14	2;3;4;5;7;10;11;12;14	7
8	ST-3	1;2;3;5;7;8;9;10;11;14;15	5;8;10;11;13;14	5;8;10;11;14	3
9	WO-1	1;2;4;5;11;12;14;15	1;4;5;8;9;11;12;13;14	1;4;5;11;12;14	4
10	WO-2	3;5;7;8;10;11;14;15	3;5;7;8;10;11;14	3;5;7;8;10;11;14	5
11	WO-3	1;2;3;4;7;8;9;10;11;14;15	1;2;3;5;7;8;9;10;11;12;13;14	1;2;3;7;8;9;10;11;14	7
12	WO-4	5;6;7;9;11;12;13;14;15	1;2;4;5;6;7;9;12;13;14;15	5;6;7;9;12;13;14;15	6
13	WO-5	1;2;3;4;5;6;7;8;9;11;12;13;14;15	12;13;14;15	12;13;14;15	2
14	WO-6	1;2;3;4;5;6;7;8;9;10;11;12;13;14;15	1;2;3;4;5;6;7;8;9;10;11;12;13;14	1;2;3;4;5;6;7;8;9;10;11;12;13;14	9
15	WT-1	6;12;13;15	1;2;3;4;5;7;8;9;10;11;12;13;14;15	12;13;15	1

Figure 7: Conical Matrix

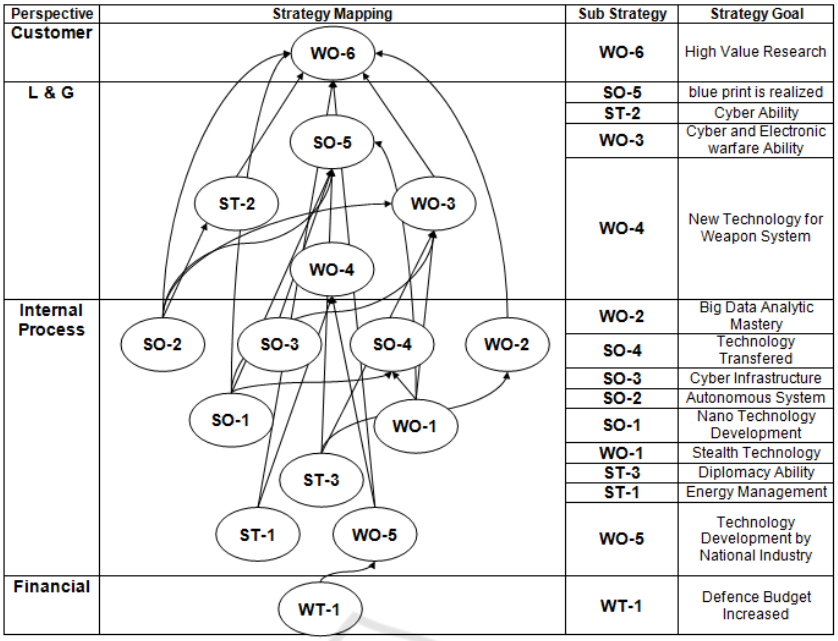

Figure 8: Strategy Mapping of Balanced Scorecard from Weapon System Development.(Source: FGD from Expert)

and sea transportation route, naval technological-based maritime management strategy was needed specially to develop the integrated fleet weapon system (SSAT) of the Indonesian Navy. Naval technology development strategy in the integrated fleet weapon system (SSAT) which was based on naval technology was formulated into a strategic management plan which was based on five points of SO strategy, three points of ST strategy, six points of WO strategy and one point of WT strategy that made in fifteen stages of strategy in the naval technological mastery.

Hierarchical structure in sub strategy element showed that WT-1 strategy was in priority 1. Besides, strategy of ST-1 and WO-5 was in priority 2, ST-3 strategy was in priority 3, and SO-1 and WO-1 strategy were in priority 4. There were four strategies in priority 5 namely SO-2, SO-3, SO-4, and WO-2. Priority 6 had Strategy of WO-4, WO-3 and ST-2 strategy were in priority 7, SO-5 strategy was in priority 8 and WO-6 in priority 9.

The strategy mapping created in the Balanced Scorecard structure presented that financial perspective was made of one strategy target: improvement of defense budget. Nine strategy targets were in the internal process perspective, and they were 1) Big Data Analytic Mastery; 2) Technology Transferred; 3) Cyber Infrastructure; 4) Autonomous System; 5) Nano Technology Development; 6) Stealth Technology; 7) Diplomacy Ability; 8) Energy Management; 9) Technology Development by National Industry. Learning and Growth perspective was made of four strategy goals namely 1) Blue Print is Realized; 2) Cyber Ability; 3) Cyber and Electronic Warfare Ability; 4) New Technology for Weapon System. In addition, customer aspect consisted of one strategy goal, High Value Research.

5 FUTURE WORK

In this research, the strategy implementation needs to be continued by giving weight on sub strategy. Besides, estimation of implementation time must be added to the planning of strategy implementation. Further development is needed by the making of timeline and road map as the implementation of continuing strategy.

REFERENCES

Attri, R., Dev, N., and Sharma, V. (2013). Interpretive structural modelling (ISM) approach: an overview. *Research Journal of Management Sciences*.

Quesado, P., Guzmán, B. A., and Rodrigues, L. L. (2018). Advantages and contributions in the balanced scorecard implementation. *Intangible Capital*.

Sahiti, A., Ahmeti, S., Sahiti, A., and Aliu, M. (2016). The Impact of Balanced Scorecard on Improving the Performance and Profitability of the Implementing Companies. *Mediterranean Journal of Social Sciences*.

Shahbandarzadeh, H. and Haghighat, F. (2010). Evaluation of the strategies of target market selection on the basis

of IFE and EFE matrixes using linmap technique (A case study of Bushehr province). Technical report.

Yüksel, I. and Dağdeviren, M. (2007). Using the analytic network process (ANP) in a SWOT analysis - A case study for a textile firm. *Information Sciences*.