THE STRATEGY ANALYSIS FOR DEVELOPMENT OF INDONESIAN NAVY COMBAT CAPABILITIES

Made Suwandiyana[1], Ahmadi[2], Zainal Syahlan[3]

[1,2,3]S2 ASRO VII, Sekolah Tinggi Teknologi Angkatan Laut (STTAL), Bumimoro,
Email : suwandiyana16200@gmail.com

ABSTRACT

Warships are one of the main components of the Navy having the main task of maintaining national security and defense at sea. Based on a research study in 2019, the age of warships over 30 years is 60% which has an impact on the decline in the performance of warships. A strategy is needed to improve the performance of warships to achieve the implementation of its main duties and functions as a means of defense. To solve this problem, it is necessary to pay attention to and consider several aspects, both internally and externally through the dynamic system approach method with the Causal Loop Diagram (CLD) model which emphasizes the impact of dynamic aspects associated with influential cause and effect problems. The selected strategies include human resource development, operational readiness, capability development, and increased interoperability.

Keywords : CLD, STELLA, System Dynamiic.

1. INTRODUCTION.

The national defense system is a universal defense system that involves all citizens, territories, and other national resources which are prepared early by the government and implemented in a total, integrated, directed, and continuous manner to uphold state sovereignty, territorial integrity, and the safety of all nations from all over the world. threat. And one of the aspects that play a major role in realizing national defense is the role of the Indonesian National Army which is the main component in realizing this condition, especially in the field of defense which has the main task according to Law no. 34 of 2004, namely upholding state sovereignty, maintaining the territorial integrity of the Unitary State of the Republic of Indonesia. In the framework of carrying out these main tasks, it is absolutely necessary to have Combat Readiness and High Combat Capability.

Combat Capability is highly dependent on Combat Readiness which is determined by five elements namely Personnel, Main Equipment Weapon Maintenance System, Training, and Work Safety. Combat readiness is of paramount importance to our national security and is used in the management of our military resources to make an understanding of what combat readiness is and how to achieve it very important to military managers. A 2010 DoD report defines combat readiness as: “Readiness refers to the capability to respond adequately diverse situations and to sustain that response as long as necessary. The readiness of defense combat forces depends on a myriad of diverse and often interrelated aspects ". With the limited budget given will affect the condition of the Navy's Alutsista and professionalism, in addition to the number and technology that are still far behind when compared to other countries, many of the Alutsista are very old and no longer worthy of use. Most of the Navy's Alutsista are in critical condition because they have exceeded the age limit, while their replacements are not ready. This is very concerning because, with the current threats, we need to build and maintain the readiness of the Indonesian Navy's defense equipment and weaponry. therefore a policy strategy is needed

for navy posture development. In this study, using a dynamic systems approach to determine the relationship between variables behavior which is then made a simulation according to reality

.

2. MATERIALS/METHODOLOGY

3.1. Simulation Software

To design a dynamic system simulation model, it is necessary to choose the right software and be able to evaluate the behavior description of a model. In the dynamic system model, there are three types of variables, namely Level / Stock, Rate / Flow, and Auxiliary.

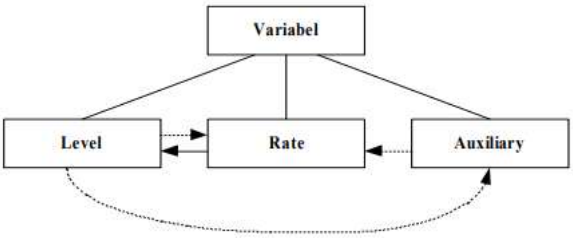

Figure 1. model System Dynamic(Sushil,1993)

Modeling using Software System Thinking Educational Learning Laboratory with Animation (STELLA):

a. Rate is an activity, movement, or flow that contributes to changes per unit time in the Level variable. Rate is the only variable that affects the Level variable. This symbol must be connected to the Level variable. The variable name is shown at the bottom of the symbol.

b. The Level is a variable that can accumulate over a period of time. The level variable is influenced by the Rate variable. The Level symbol is a rectangle with the variable name listed at the top of the symbol.

c. The converter holds constant values, which define the external input to the model, calculates algebraic relationships, and serves as a repository for graphical functions. In general, it converts input to output. The converter name is displayed at the bottom of the symbol.

d. This connector is used to connect the various elements of the model. The connection can be between Level, between Converter, Rate to Converter, Converter to Rate, and Level to Converter.

Table 1. Simbol Stock and Flow Diagram

Simbol	Keterangan
Noname 1	Level/Stock
Noname 2	Rate/Flow
Noname 3	Converter
	Connector

3.2 Causal Loop Diagram (CLD)

According to Sushil (1993), a causal loop diagram is a disclosure about the occurrence of a causal relationship (causal relationship) into the language of images certain. The language of the image is an interlocking arrow, so that forms a causal loop where the upper reaches of the arrow reveal the cause and the arrowhead reveal the effect. Both, whether the element of the cause or

cause-effect or any one of them (cause only or effect only) must refer to measurable conditions, both qualitatively for the perceived state and quantitatively for the actual situation (actual).

The approach through the CLD model has several advantages, including:

a. Encourage to be able to see the problem as a whole, both in terms of scope and time to prevent narrow thinking.

b. The description of the chain of causal relationships makes it more explicit and the rationale is better.

c. Allows effective communication to run and the realization of teamwork will be better.

d. Help explore alternative policies and decisions so that the consequences can be anticipated in advance.

e. Allows the existence of a good position to make decisions

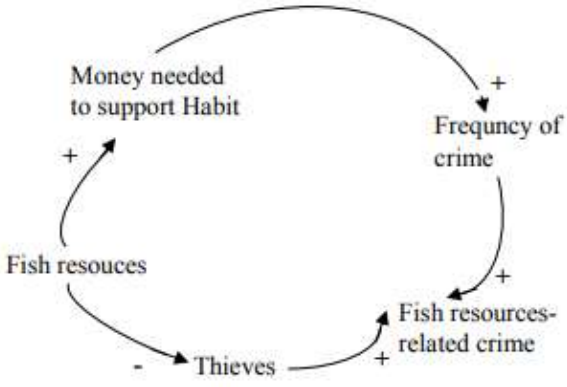

Figure 2. Causal loop diagram

Therefore, the steps needed for modelling and simulating of complex systems based on systems thinking are:

a. Identify the problem.

b. Develop a dynamic hypothesis explaining the cause of the problem.

c. Create a basic structure of a causal graph.

d. Augment the causal graph with more information.

e. Convert the augmented causal graph to a system dynamics flow graph.

f. Translate a system dynamics flow graph into STELLA.

3.3 Model Verification and Validation

The next stage after the initial model simulation is the verification and model validation stage. This stage aims to ensure that the model is verified and validated so that it can be ascertained that the model is running well. Model verification and validation also aim to determine whether there are errors/errors in the model. Model verification and validation can also be a process to compare the structure of the model and its behavior to the actual system structure and behavior so that it can be said that the model is able to represent the real system. In this study, verification was carried out by carrying out the model unit test, while the model validation was carried out by carrying out the model structure test and model parameter test. Model unit tests and parameter tests were carried out with STELLA software.

The verification stage is carried out by examining the model equations and examining the unit (unit) variables of the model. If there are no errors in the model, it can be said that the model has been verified / valid internally.

3.4. Flow diagram.

An outline of all research activities is illustrated in a flowchart as in the following figure:

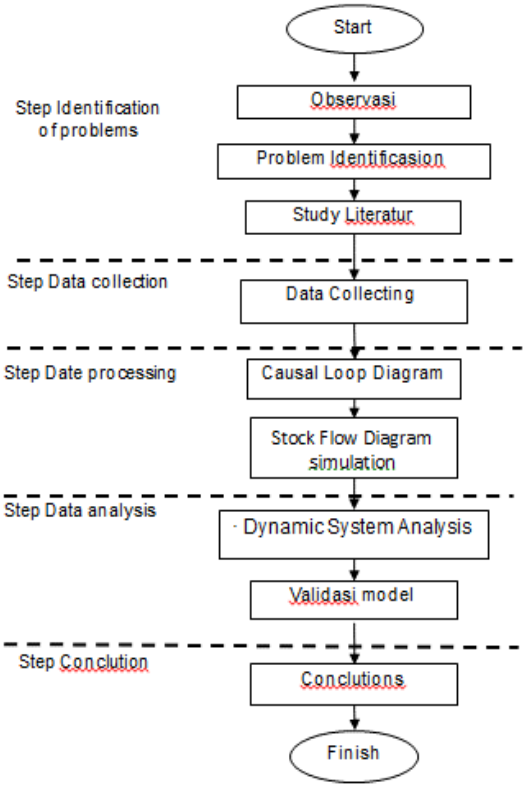

Figure 3. Research Flowchart

3. RESULT AND DISCUSSION.

4.1 Aspects that influence strategy

The policies in an organization are general guidelines for carrying out the activities and decisions of the people in the organization. A policy is usually a statement that can guide organizational members on how they should act in certain situations. Strategy according to Mintzberg and Quinn (1991) is a pattern or plan that integrates the main goals of the organization, policies, and actions into an integrated linkage. A good strategy is expected to help integrate various interests. For the internal interests of the organization, the strategy is expected to be able to assist in the utilization and allocation of organizational resources. Meanwhile, for the external interests of the organization, a strategy is expected to be able to help anticipate environmental changes.

Based on the results of the meeting of the Indonesian defense ministry in 2021, it produced 4 policy focuses to be used as guidelines in increasing the combat capability of the Indonesian navy.

Table 2. Aspects

No	Aspect	Indicator
1	**Interoperability**	• The existence of joint training, • Commonality of Alutsista and its supporters. • Network centric warfare (NCW) • Information warfare (IW) • Maritime security synergy • Information systems based on centralized navy data, • Cooperation between other state defense tools
2	**Human resources**	• The HR management system by fulfilling the needs of personnel • Reducing personnel in the pendirat • Ruilding satdik outside Java • Recruitment priorities for regional men and

		athletes with achievement • Synchronization of personnel strength with modernization of Alutsista • Merit system • The right man on the right place • Educational investment
3	**Navy Capability**	• The ability to carry out four joint operations • Modern navy warfare • Special navy warfare • Mobility and fire power • Military duties other than war • Optimal base support facilities • Maritime ISR coverage • Cyber attack protection.
4	**Navy Operational**	• The success of operations based on outputs and outcomes • Focus on maintenance Alutsista • Maintenance of defense equipment • Acceleration of procurement • elimination of basic equipment supplies
		• Stock of operational BMP needs • Training and personnel graduation

4.2 Causal Loop Diagram

CLD is made to show the main variables, in this case, it is arranged based on the initial variables that have been identified. In this model, a causal relationship that occurs between variables that affect the system is shown. For example, in the aspect of improving Human resources, is influenced by the existence of Lemdik, for the improvement of Lemdik, it is necessary to have a doctrine that embodies it so that it will have an impact on increasing the strength of the Navy.

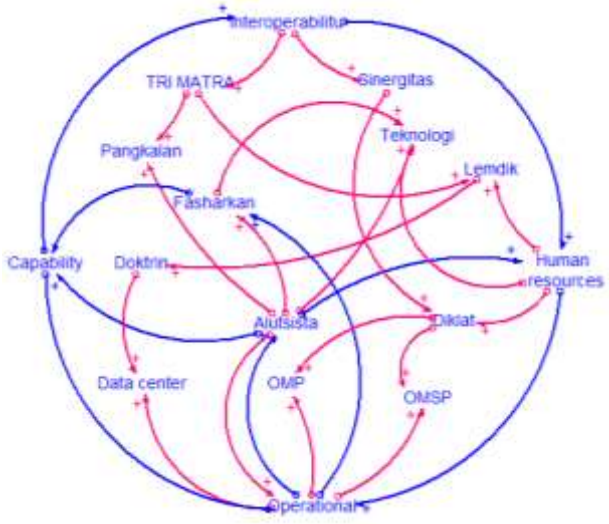

Figure 4. CLD

With the causal loop diagram above, it can be understood the relationship, as well the influence of variables on system behavior. All variables are influential in the system is involved in the model and shows its feedback / reciprocal relationship depicted as the level / stock at the time of model simulation.

4.3 Main Modul

The module image below is a structuralization of the model and system that occurs in Increased navy strength. The structuralization is modeled in the main module form of all the that variables affect the strength of the Navy. From the conceptualization, it can be seen that the strength of the Navy is influenced by the dynamic development of the system from the aspects of Capability, Human resources, operational and technical interoperability. The elements that affect the four main variables are defined by the identification of the variables that have been done previously

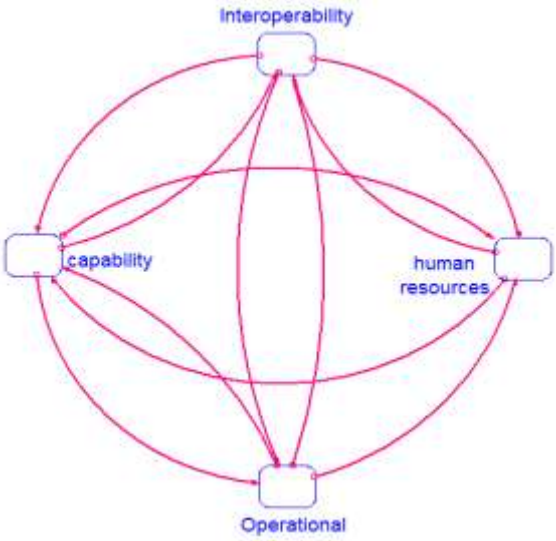

Figure 5. Main Modul diagram

4.4 verification & validation

At this stage, verification is carried out by checking the model equations and checking the unit (unit) variables of the model. If there are no errors in the model, it can be said that the model has been verified / valid internally. which is the internal model validation in the form of unit model validation and equation models that are run on model simulations, where the program is running well, without errors in units or formulations (equations) with an OK indicator on the model, so the model can be said to be valid from the unit aspect and equation.

4.5 Interoperability aspect

Identified as a system for measuring the value of navy forces that is integrated within the framework of the SSAT navy and is integrated with the forces of the army and air forces in an integrated tridimensional framework.In this aspect it is influenced by the existence of joint training, commonality of Alutsista and its supporters. Network centric warfare (NCW) and information warfare (IW), maritime security synergy, information systems based on centralized navy data, cooperation between other state defense tools

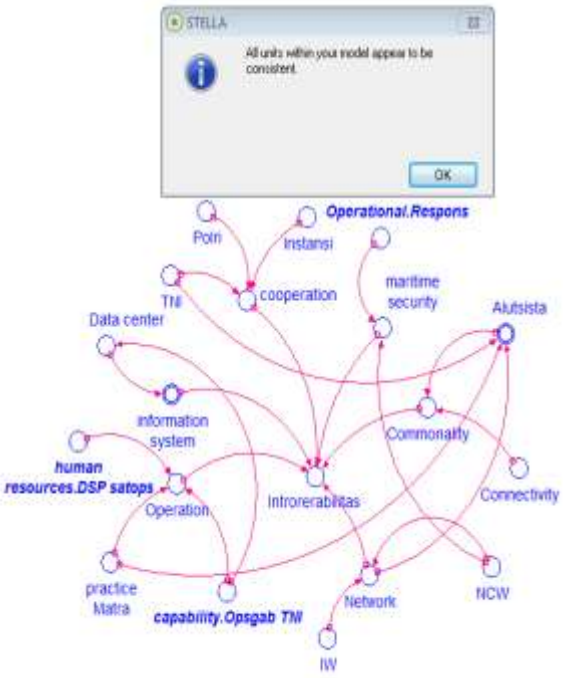

Figure 6. Sub Model Interoperability

4.6 Human resources aspect

Identified as a system for measuring the value of the ability of personnel, professionals in their fields, competency standards according to the duties of authority and responsibility of the position and having character, enthusiasm and high mental struggles.

In this aspect it is influenced by the HR management system by fulfilling the needs of personnel and reducing personnel in the pendirat, building satdik outside Java, recruitment priorities for regional men and athletes with achievement, synchronization of personnel strength with modernization of Alutsista, Merit system and the right man on the right place. , educational investment.

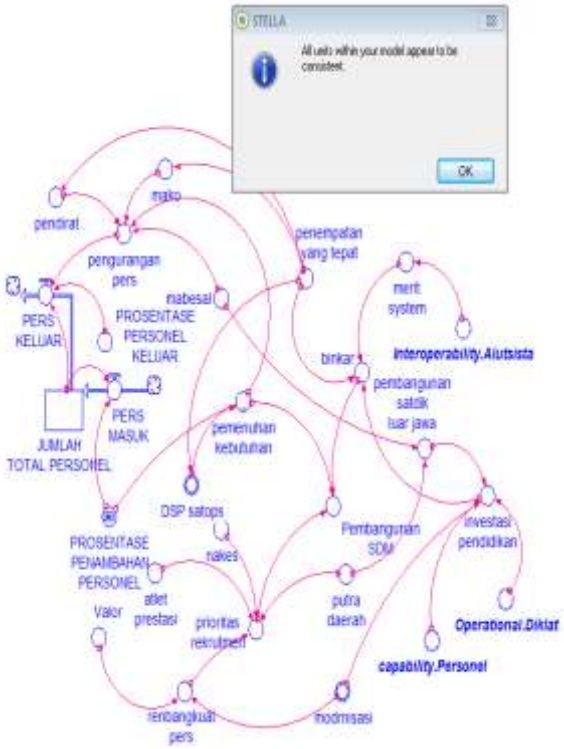

Figure 7. Sub Model Human resources

4.7 Capability aspect

Identified as a system for measuring the value of navy forces which have high mobility, destructive force and high vibration effects. In this aspect it is influenced by the ability to carry out 4 joint operations, modern navy warfare and special navy warfare, mobility and fire power, military duties other than war, optimal base support facilities, maritime ISR coverage, cyber attack protection.

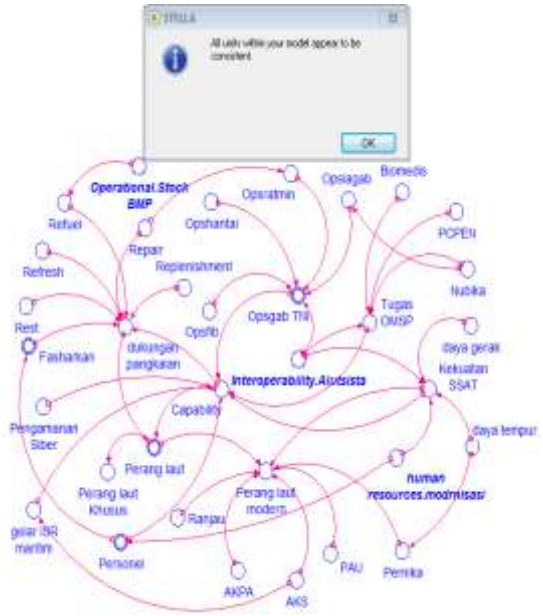

Figure 8. Sub Model Capability

4.8 Operational aspect

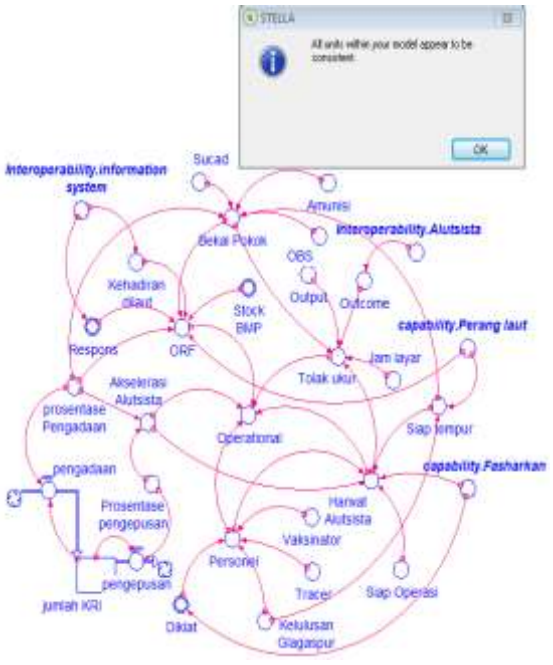

Figure 9. Sub Model Operational

Identified as a system for measuring the value of SSAT forces that are combat ready and operational for use by the commander. In this aspect, it is influenced by the success of operations based on outputs and outcomes, focus on maintenance and maintenance of defense equipment, acceleration of procurement and elimination of basic equipment supplies, stock of operational BMP needs, training and personnel graduation.

4.9 Formulasi

The model formulation is prepared by translating the stock flow diagram into a mathematical model with the basic assumption of a dynamic model in variable assessment.

Figure 10. Equations

4. CONCLUSION

a. By understanding the CLD model system approach, it can be seen more clearly that the strategies and efforts to increase the strength of the Indonesian navy do not only pay attention to or focus on the continuity of internal and external aspects that are usually done but many things need to be considered carefully because each unit can influence each other or have an impact on one another.

b. Based on the results of the verification carried out on the STELLA software, the program will run without a hitch because all variables have the same unit parameters.

c. Based on the results of the validation carried out on the STELLA software, it can be seen that the model simulation parameters have run according to the actual logic.

5. REFERENCES

Malabay. 1998. *Studi Rekayasa Informasi dalam Perencanaan Strategik: Studi Kasus Sistem Informasi* Di Fakultas Teknologi Industri Universitas YARSI, Jakarta.

J.W. Forrester, *Industrial Dynamics,* Massachusetts: The MIT Press, 1972

Hamdy, A Taha , 1996, *Operation Research* Seventh Edition, Prentice Hall, New Jersey USA

Mabes TNI AL, 2005, *Konsep Pembangunan TNI AL* sd. 2024, Jakarta

M. Elrefaie, S. Herrmann, 2012, *System Dynamic Approach For Coastal Nature Conservation*, Journal of Scientific Research.

Robert L. Woods, 1997, *Modelling and Simulation of Dynamic System*, Prentice Hall New Jersey USA.

John D. Sterman, 2000, *Business Dynamics Systems Thinking and Modeling for a Complex World*, Massachusetts Institute of Technology Sloan School of Management.

Michael Pidd, 2004, *Systems Modelling Theory and Practice*, Department of Management Science The Management School Lancaster University.

Suwandiyana, 2020, *Analysis System And Evaluation Of KRI Element Reduction Of*

Tasks As A Means Of National Defense, International Journal of ASRO, Surabaya.

Okol Sri Suharyo, 2006, *Optimization Model of The Fleet Placement, A Case study of Indonesian Navy Patrolling Ship*¸ ITS Surabaya Thesis.