# ANALYSIS OF FACTORS INFLUENCING THE INCREASE CAPACITY FACILITIES SURABAYA MAINTENANCE AND REPAIR ON THE WARSHIPS REPUBLIC OF INDONESIA THE HEADQUARTERS COMMAND FLEET 2.

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## ABSTRACT

The ability to carry out the maintenance and repair of Warships of the Republic of Indonesia / naval vessels is a concept used in assessing the achievement of work with time parameters and measures of success. Budget, infrastructure and human resources have an important role in the task of maintenance and repair facilities surabaya. Every maintenance and repair always expects the implementation of the work to be completed on time, and the maximum results, so that the ability to maintain and repair needs to be maintained and improved on the implementation of the work. There are several alternative factors that can lead to improved maintenance and repair capabilities of warships of the Republic of Indonesia / Naval vessels including budget allocation, supporting infrastructure directly or indirectly as well as the readiness of human resources that include willingness, experience and expertise. These factors have an interconnected pattern. This study aims to find out the main factors that affect the improvement of the ability to maintain and repair KRI / KAL in mako koarmada II. In this study used a measuring instrument called dynamic system method with stella software. Factors that affect the improvement of capabilities in the literature can be from the literature whereas, the determination of the main factors that affect is done by modeling dynamic systems. This dynamic system modeling is done by creating a dynamic relationship between the factors that affect productivity. The data collection in this study uses secondary data from the process of maintenance and repair of fasharkan in Surabaya. The scale of the data used to determine the factors that influence the improvement of the ability is modeled in qualitative form. The result of modeling dynamic system factors that affect the improvement of capability is budget, infrastructure facilities and human resources factors that dominate are human resource factors.

**Keywords***: Proficiency, Dynamic System, Stella Software*

## 1. INTRODUCTION

Addressing the demands of the Navy is large, strong and professional required a large maintenance and repair facilities, complete equipment and human resources experts in their fields and good cooperation (Team Work) in accordance with technological advances. Based on the demands of these needs and the importance of technological mastery in handling modern equipment, the Navy Leadership decided to establish a Maintenance and Repair Facility (Fasharkan) Surabaya, according to Skep Pangarmatim Number Skep/28/I/1994 dated January 19, 1994. In the organization Fasharkan Surabaya consists of Machine Workshop, Electric Workshop, Bakap Workshop, Electronics Workshop, Weapons Workshop and Shipyard / Dock Workshop. On December 30, 2006 surabaya maintenance and repair facilities were converted into maintenance and repair facilities of warships of the Republic of Indonesia in line with the formation of the command of the fleet of the eastern Republic of Indonesia and on March 06, 2008 the maintenance and repair facilities of warships of the Republic of Indonesia were again converted into maintenance and repair facilities of

Surabaya under the construction of the main base of the national naval army V until now. The existence of surabaya maintenance and repair facilities under the command of the main base V Surabaya is very important when viewed from the side of the defense area of the fleet command area of the Republic of Indonesia 2 and the Defense of the Maritime Territory of the Republic of Indonesia.

The above is based on several aspects of maintenance and repair facilities (Fasharkan) Surabaya as part of the organization of the main base of the Navy V, has the main task of providing services in terms of maintenance and repair to support the operational weapons of the Indonesian national army NAVY. surabaya maintenance and repair facilities are the only facilities of the Indonesian Navy national army base that is able to technically carry out the level of maintenance maintenance and maintenance of the middle level and maintenance of depot level. Faced with the current condition of Fasharkan Surabaya, with limited human resources capabilities, facilities and workshop support equipment, in providing maintenance and repair support for Navy ships located in Surabaya, it can be felt that the performance of Fasharkan Surabaya is still not optimal. Therefore, this study is expected to know the extent of Fasharkan's performance in supporting HarKan KRI, as well as to know the most influential factors and play a role in improving the ability of Fasharkan Surabaya. Bureaucratic reforms in the indonesian national army environment have a big impact on the pattern of coaching personnel of the Indonesian Navy, especially on the function of use and maintenance. The measure of the successful implementation of Bureaucratic Reform can be seen from the realization of the right organizational function and the right size and output measured in accordance with its core business (Mabes TNI, 2011). To know the effectiveness and efficiency of the work of an organization so that the results are in accordance with the expected, it is necessary to assess and calculate the workload of the organization (headquarters of the Indonesian national army AL, 2016). System dynamics is a methodology for studying complex systems. The system is an academic discipline created in 1960 by Dr Jay Forrester of MIT. In this field of study, the system is defined as a collection of elements that are constantly interconnected over time to form a complete unity. The underlying relationship between these system components is called the system structure. The term Dynamics refers to changes over time. Therefore, a system that exposes related variables to try to change over time. System dynamics are methodologies used to learn and understand how systems change over time. Application elements and variables that make the system vary over time are referred to as system behavior.

The objectives to be achieved from this study are to determine the factors that influence the improvement of the ability to improve the maintenance and improvement of KRI with dynamic systems, and the relationship between factors, as well as determine the factors that dominate.

## 2. METHODS AND TOOLS

### 2.1 Dynamic system software

Some software is used in describing dynamic system simulation models, such as Dynamo, Stella, PowerSim, and Vensim. In representing real systems, this study will use Stella Software to visually build simulation models using computers. Stella is a programming language that describes the model of a system as a simulation model. Some tools commonly used in putting together a simulation model, namely:

• Stock is a tool used to generate accumulated information in the form of the value of a parameter that goes into it.

• Flow is a tool that affects the value of stock that can flow one way or two directions. Converter is a tool used to convert inputs into outputs.

• Connector is a tool used to connect the parameters involved in the model.

Illustration of the tools contained in Stella Software is shown by Figure 2.1.

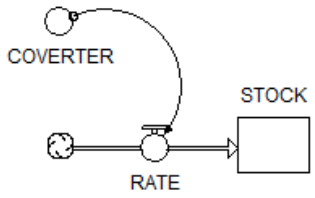


Figure 2.1 Tools Software Stella

## 2.2 Causal loop diagram

(CLD) is an important method used to demonstrate the feedback structure of the system. Causal loop diagrams are well used for:

a Quickly capture the hypothesis we are making regarding the cause of the dynamic.

b Bring up and capture the mental model of an individual or team.

c Communicate important feedback that is believed to be responsible for the problem.

The conditions for drawing causal diagrams are simple but must be followed appropriately. The causal diagram consists of variables connected by arrows that indicate causal influence between variables. Important feedback loops are also identified in the chart.

The variables are associated with a causal relationship, which is indicated by an arrow. For example, the birth rate is determined by both by population and by fraction of birth rate. Each causal relationship has polarity (shown in figure 2.20), be it positive (+) or negative (-) to indicate how dependent variables change when independent variables change (Sterman, 2004, p138). An important loop is represented by a loop identifier (shown in figure 2.21) that indicates whether the loop has positive feedback (reinforcing) or negative (balancing)

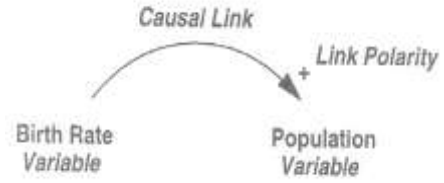


Figure 2.2. Polarity of Causal Relationships
*Source : Sterman (2008)*

A positive relationship indicates that if the cause increases, then the effect will increase above the previous one, and if the cause decreases, then the effect will decrease below the previous one. In figure 2.22, the increase in the birth rate fraction means that the birth rate will increase compared to the previous one, and the decrease in the birth rate fraction means that the birth rate will decrease below the previous one.

A positive relationship indicates that if the cause increases, then the effect will decrease below the previous one, and if the cause decreases, then the effect will increase above the previous one. For example, an increase in the average human lifespan means that the mortality rate will decrease below the previous one, and a decrease in the average human lifespan will increase the mortality rate above the previous one.

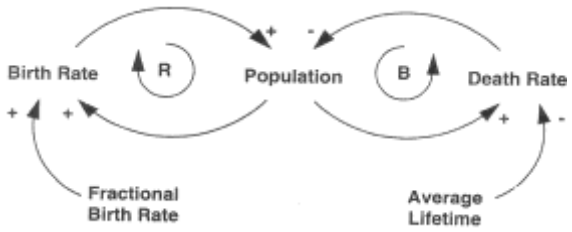


Figure 2.3 Example of Causal Loop Diagram

(CLD) Source : Sterman (2008

### 2.3 Research Framework (Flowchart)

The research framework used to determine the factors that dominate the improvement of surabaya fasharkan ability from several factors in this study can be seen in Figure 2.4

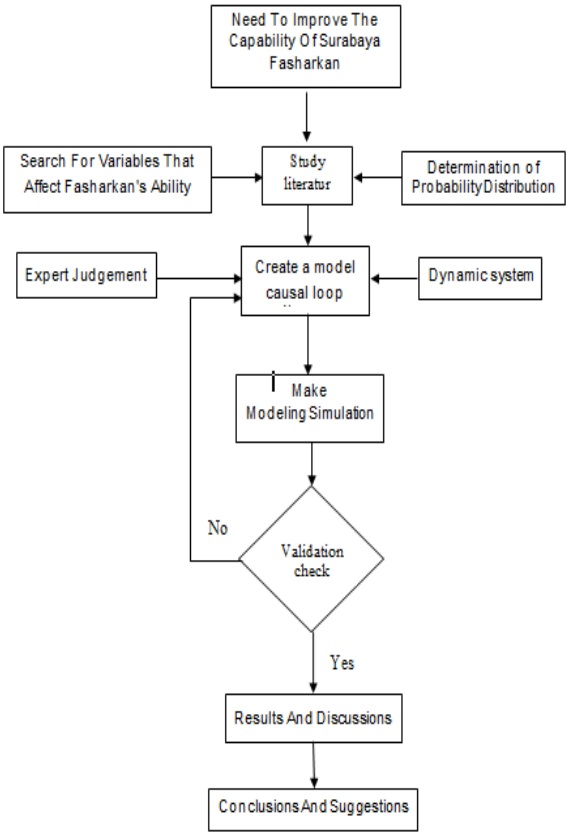


Figure 2.4 Research Flow Diagram

## 3. RESULTS AND DISCUSSION

At the stage of data analysis, several steps will be taken to process the data that has been obtained before. Here is an explanation of each step.

### 3.1 Variables that affect the ability of

On variables that affect the ability of fasharkan made into 3 categories, namely: budget factors, human resource factors and infrastructure factors. From the respondent's data variables grouped into that category, the grouping results of the data variables are displayed in the Table

| VARIABLE | CATEGORY |
|---|---|
| BUDGET | How to plan the budget of the program that has been determined and agreed. |
| BUDGET | How to implement the use of a predetermined and agreed budget |
| BUDGET | How the budget control system has been established and agreed |
| INFRASTRUCTURE FACILITIES | Influenced by how the procurement of equipment facilities supporting repairs, supporting funds and building facilities in carrying out maintenance and repair KRI / KAL. |
| INFRASTRUCTURE FACILITIES | How the status of equipment that has been owned by fasharkan Surabaya when compared to the development of current technology. |
| HUMAN RESOURCES. | Conditions how the ability of all personnel in completing and supporting the maintenance and repair of KRI / Kal. |
| HUMAN RESOURCES. | Conditions how the will of all personnel in completing and supporting the maintenance and repair of KRI / Kal. |

Table 1. Variable Grouping Results

The grouping of variables by ability category consists of: individually owned skills. Ability to interact with the work environment and personnel and Skills in the expertise of education, the category of Willingness to work consists of: Professionalism in work, Sense of responsibility in work, Leadership in work, mindset in understanding work, safety and health conditions in

the project, satisfaction with the work carried out, level of competition between employees, and work experience. The result of the grouping of variables can be applied to dynamic system modeling using Stella, shown in Figure 3.

### 3.2 Causal Loop Diagram Design

At this stage will be described a variety of relationships between variables - variable shapers. Each corresponding variable will be linked by an arrow. The tail of the arrow indicates causation while the head of the arrow shows the effect of a cause. If the variable on the tail of the arrow changes directly to the variable on the arrowhead, then the arrow connecting the variable is positive (+). Whereas if the variable on the tail of the arrow changes inversely against the variable on the head of the arrow, then the arrow connecting the variable is negative (-).

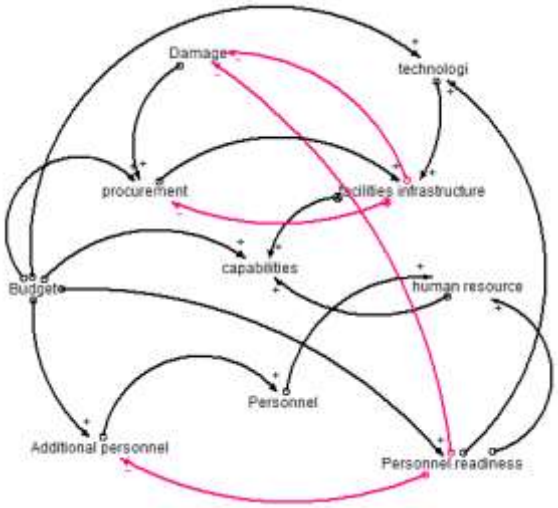


Figure 3.1. Causal Loop Model Diagram of Fasharkan Capability

### 3.3 Main modules

In the uatama module below is a description of causal relationships siatem with mutual influence. The main module image means that the improvement of the capability of surabaya fasharkan is strongly influenced by three factors including the budget sector, infrastructure sector and personnel readiness sector. Thus, the infrastructure sector is influenced by the budget sector and personnel readiness as well as affecting the sector's ability to repair and perssonil readiness. The same is true in the personnel readiness sector.

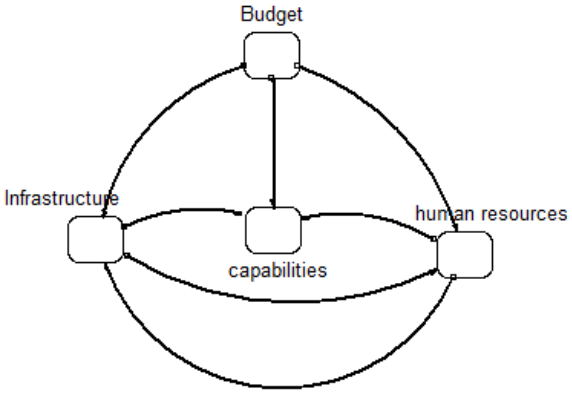


Figure 3.2 Main Models for Improving Fasharkan Capabilities

### 3.4 Verification & validation

#### 3.4.1 Verification

The next stage after the initial model simulation is the model verification and validation stage. This stage aims to ensure the model is verified and validated so that it can be ensured that the model is running properly. Model verification and validation also aims to find out if there are errors in the model. Verification and validation of models can also be a process to compare the structure of the model and its behavior to the structure and behavior of the system in its actual state, so that it can be said that the model is able to represent the real system. In this study verification was done by carrying out model unit tests while model validation was done by carrying out model structure tests and model parameter tests. Model unit tests and parameter tests are conducted with STELLA software while structural validation is carried out by expert judgement.

3.4.1.1 Verification is also referred to as source criticism. This activity is carried out by testing the validity of the source, which is seen from two types of criticism.

a External Criticism.

Testing the authenticity of source especially the accuracy of the historical document, such as the time of creation and material of the document

b. Internal Criticism.

Testing the level of credibility of the source is the evidence contained in the historical source by examining and analyzing the degree of error against testimony in history which is the most determining factor in the validity of the evidence or fact of history itself Interpretation or interpretation of history. Analyze and find relationships between facts with each other.

3.4.1.2 Verification Mode

Verification is a conformity test or logic accuracy model and checking for simulation program errors. This is done by examining the formulations, equations and parameter units on variable model variables. Model verification is done by checking for errors in the model either errors in variable units, or errors in the model created. If there is no error in the model, it can be said that the model has been verified. Verification conducted using STELLA simulation software is carried out by checking the unit (unit) as well as checking the formulation (equation) of variables from the model. Unit tests will ensure that the relationships between variables in the model have units that can be converted and valued. The verification process by unit test on STELLA software can be seen in Figure 4.1.

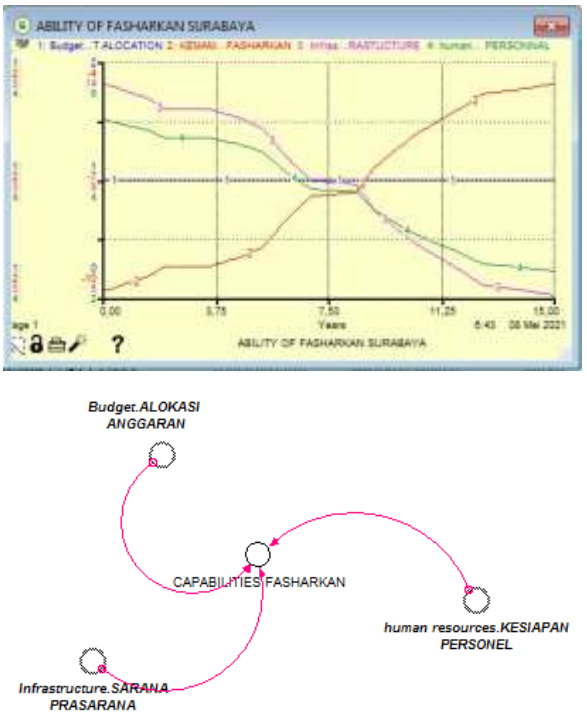


Figure 3.3. Model unit verification

### 3.4.2. Validation

Model validation is the process of determining whether a simulation model created can represent a real system appropriately. The validation process that will be done on the model is to compare the data on the model with the data on the real system. By running each simulation model, the output of the simulation result is obtained. Furthermore, from the simulation results are obtained to compare the resulting existing conditions (actual).

### 3.5 Budget allocation factors

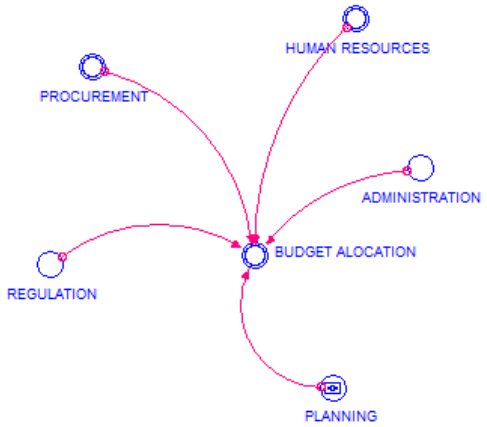


Figure 3.4. Creteria budget allocation

Budget allocation is very influential to efforts to improve the ability of surabaya fasharkan. the figure above measures the percentage value of applications and those affected by budget regulation, budget planning and budget control systems.

### 3.6 Human resource factors

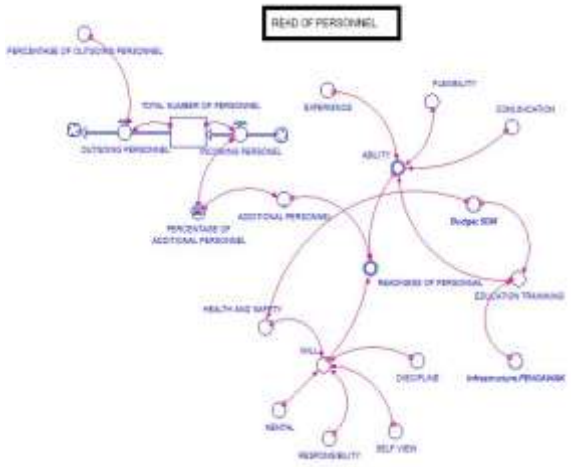


Figure 3.5. Human resources creteria

The above model is used to measure the extent of human resource readiness that greatly influences efforts to improve the capability of surabaya fasharkan in carrying out maintenance and repair activities KRI / KAL in the command headquarters of the fleet 2. Personel capability factors are strongly influenced by the experience of personnel during the ministry in the navy in the field of electricity KRI / KAL ship. Another factor that affects is the willingness of personnel mentally, selected work, have a sense of responsibility and can interact with the environment. Furthermore, another factor that affects is the capacity of personnel who serve as implementers of repairs.

### 3.7 Infrastructure factors

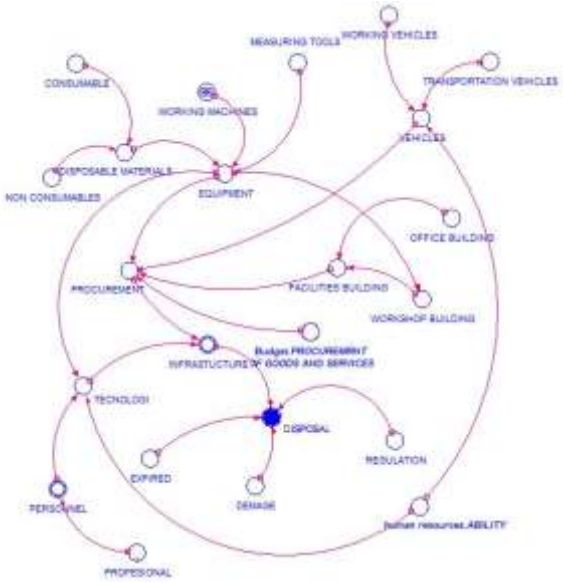


Figure 3.1. Criteria for infrastructure

The model above shows the factor of kreteria factor that influences the main factors in the effort to improve the capability of surabaya fasharkan including equipment procurement system and technology that is currently used. There are several factors that affect the credibility of the equipment procurement system including materials used during repairs, working machines used and measuring instruments used. Technology kreteria factor is influenced by several alternative factors such as the equipment used, the readiness of personnel and the number of wak. All systems affect each other including budget allocation and human resource readiness.

## 4. CONCLUSION

Factors that affect the improvement of the ability of surabaya fasharkan is the kreteria factor of budget allocation, infrastructure and human resources.. Each factor of creteria is influenced by variables that affect, budget allocation factors are influenced by budget planning variables, budget regulation and budget control. infrastructure kreteria factor is influenced by the variable procurement of equipment and technology used, for the human resources kreteria factor is influenced by the ability, willingness and addition of personnel. Relationships between influencing factors using Dynamic System modeling using data distribution. Determination of dynamic system model simulation using Stella software**.**

a The dominant factor that influences the improvement of the ability of fasharkan is the variable factor of human resources.

b For further research can use primary data with dynamic system methods, in the hope that the final result of dynamic system modeling can be applied in the field.

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