IMPACT DESIGN ANALYSIS AND THE EFFECT OF PANDEMIC COVID-19 ON PERSONNEL READINESS IN MAINTAINING FORCE COMBAT ABILITIES

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ABSTRACT

Personnel are one of the factors that shape operational readiness, in addition to platform and sewaco readiness. The outbreak of the Coronavirus Disease 2019 (COVID-19) virus, coupled with an increase in the number of cases that took place quite rapidly, and spread in a short time, has undeniably had a major impact, including on the military. In this study, the authors attempted to approach an impact analysis through a dynamic systems approach, to provide information that occurred as a result of the COVID-19 pandemic, through a pandemic impact analysis model. The results obtained are that combat capability does not automatically decrease due to the COVID-19 pandemic, because there are 4 factors that influence the value of combat capability. However, if personnel are negligent and indifferent to implementing the COVID-19 response protocol, coupled with the lack of a health support role and control function in personnel discipline in encouraging the handling and prevention of the COVID-19 pandemic, over time the value of combat capability will degrade. considering that the future conditions of war are increasingly unidentifiable or predictable due to uncertainty. Personnel readiness does not become the main reason for decreasing military combat capability, because personnel readiness is one of the four shaping factors in assessing combat capability.

Keywords: *COVID-19, Impact Analysis, Combat Capability, Personnel Readiness, System Dynamics.*

1. INTRODUCTION.

In early 2020, the world was shocked by the outbreak of the Coronavirus Disease 2019 (COVID-19), accompanied by an increase in the number of COVID-19 cases which took place quite rapidly, and spread to various countries in a short time. (WHO, 2020) It is undeniable that the COVID-19 pandemic that has hit the world has had a big impact, it is almost certain that no one thinks the world reality will change completely, whether in political, social, economic, cultural or defense and security aspects (Heisbourg, 2020) (Welsh, 2020) (Ramos & Hynes, 2020) (Thompson, et al., 2006). Facing the uncertainty that the COVID-19 Pandemic can cause, one of which can have an impact on the health and military defense aspects (Ramos & Hynes, 2020) (Mölling, et al., 2020). On 18 August 2020, 21 sailors aboard INS Angre, Indian Navy headquartered in Mumbai tested positive, most of them asymptomatic(Som & Varma, 2020). On 24 March 2020, the first cases occurred at the United States Naval Base in the Gulf. Guantanamo which has been confirmed (Kheel, 2020), and on the ship USS Theodore Roosevelt the COVID-19 pandemic has spread to a number of other naval vessels (Sinha, 2020), where the conditions and situations inside the ship are closed, small areas and lack of personal space for most of the crew, thus contributing to the spread. The disease is even more rapid and more prevalent than on cruise ships. So, in anticipating the impact that will be more severe and protracted, the Navy must and

must help the government to immediately provide a positive curve for handling these impacts.

It is hoped that the readiness of the Indonesian Navy will not be disrupted due to the spread of COVID-19. Universally, the main function of the army is to fight or be the main executor (main component) in war, although there is still a limited amount of the defense budget, there is no defense forecasting and proper management regarding the allocation of existing national resources to the defense sector. The military force must always be in a state of readiness if it is needed at any time, especially the Indonesian Navy. With the possibility of the COVID-19 pandemic and environmental warfare (environtmental warfare) is part of a future war (Shatz & Chandler, 2020) or a sixth generation war. So, in addition to carrying out the role of the OMSP in overcoming the COVID-19 pandemic, the Indonesian Navy must not neglect the role of the OMP by maintaining its combat capability in facing factual and potential threats to guard and protect the waters which are the territorial sovereignty of the Republic of Indonesia. Where the impact that the COVID-19 pandemic could have on combat capability could be enormous and very difficult to predict due to uncertainty.

To anticipate the increasing increase in COVID-19 cases against these personnel, an analysis model is needed in analyzing the impact of COVID-19 on ship personnel readiness, so that strategic steps and concrete efforts can be determined in maintaining combat capability. Looking at the projection of future uncertainty conditions is very important in this study, where the development of the conceptual system dynamic model under study can be used to predict the severity of a pandemic, when the pandemic peaks, and what might be done to avoid the worst case scenario, although not all models are suitable. to inform and provide policy options, however, we can anticipate with a variety of policy scenario options suggested to further determine strategic steps in inhibiting the growth rate and spread of COVID-19, in maintaining the readiness of ship personnel to maintain combat capability. The dynamic systems approach is optimal for seeing future conditions from the simulation results and selected scenarios, which research conducted from modeling of COVID-19 cases has been carried out with a variety of models ranging (Arino & Portet, 2020). The ease of seeing the relationship between variables is reflected in the causality that is formed, as well as the behavior that will occur through scenario implementation. The benefits of this research are expected to provide an overview in identifying, formulating, and prioritizing strategic steps in maintaining the operational readiness of ships, even though the COVID-19 pandemic has yet to predict its final time, so that it can provide input to policy makers in the deployment of future military forces in particular. ship, so as not to cause greater losses.

2. MATERIALS.

2.1. Coronavirus-19.

Coronavirus Disease 2019 (COVID-19) is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). SARS-CoV-2 is a new type of coronavirus that has never been previously

identified in humans. Based on data, the COVID-19 outbreak was first detected in Wuhan City, Hubei Province, China in December 2019, and was subsequently designated as a pandemic by the World Health Organization on March 11, 2020 (WHO, 2020). As of the end of March 2020, more than 5,700 .000 cases of COVID-19 have been reported in more than 210 countries and territories, resulting in more than 352,000 deaths. There are at least two types of coronavirus that are known to cause diseases that can cause severe symptoms such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The general signs and symptoms of COVID-19 infection include acute respiratory symptoms such as fever, cough and shortness of breath. The average incubation period is 5-6 days with the longest incubation period of 14 days. Severe cases of COVID-19 can cause pneumonia, acute respiratory syndrome, kidney failure and even death. The COVID-19 virus is thought to spread among people mainly through respiratory droplets produced during coughing, sneezing and normal breathing. In addition, the virus can spread by touching contaminated surfaces and then touching someone's face. An infected person can be infectious up to 48 hours before symptom onset (presymptomatic) and up to 14 days after symptom onset. A study by Du Z et. al, (2020) reported that 12.6% showed presymptomatic transmission. Common symptoms include fever, cough and shortness of breath, some are without symptoms. Complications can include pneumonia or other severe acute illnesses. Until now, no specific anti-viral treatment or vaccine has been found for this disease, and further research is needed on airborne transmission.

2.2. Operational Readiness

The operational readiness of the future navy is readiness in building operational readiness for naval defense through budget fulfillment, utilization of existing resources, procurement and naval modernization by paying attention to Life Cycle Cost, and interoperability while still paying attention to the paradigm shift in naval capability in the century 21 which will determine the adoption of today's technology *(FICCI and KOAN, 2018)*. The operational readiness of the ship is the readiness of the Platform and Sewaco which is closely related to the readiness of ship personnel in monitoring it *(Ariyoko, et al., 2019)*. In the Combat Force operational readiness planning is based on a four-step framework as shown in Figure 1, which in this framework supports general defense planning that is directed centrally, by carrying out more dynamic and routine interactions for force development *(Hales & Bowen, 2009)*.

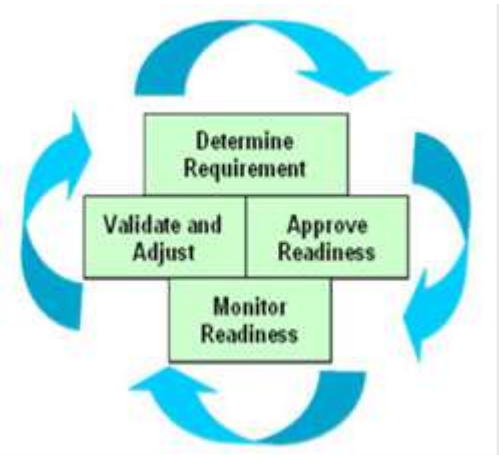

Figure 1. Combat Force operational readiness planning *(Hales & Bowen, 2009)*

2.3. Combat Ability.

Combat Capability is the ability to achieve specified war objectives, for example winning a battle or war or destroying a target, which in broad terms cannot be easily quantified (Department of Defence, 2010). The United States Department of Defense specifies that a military combat capability consists of four components: Readiness, Endurance, Modernization and Strength Structure (Department of Defence, 2010). Where the power structure and doctrine represent two important characteristics, which determine the military capability of a country to be used by leaders. The power structure reflects decisions that are doctrinal in nature and assumptions about the implementation of duties and missions, which is a combination of the professionalism of soldiers, infrastructure (SSAT), organizational structure, and assumptions about operational effectiveness.

2.3.1. Readiness.

In the Congressional Research Service (CRS) identifies the definition of readiness as the ability of the components of the military forces to carry out state missions, and to be able to face the military forces of other countries by referring to the power structure and modernization, military size and sophistication and type of weaponry. (Rumbaugh, June 2017) Readiness is measured in terms of maintaining, equipping and training troops and is defined to include the ability of troops to mobilize, deploy and employ without unacceptable delay. So, readiness can be interpreted, having to prepare troops and defense equipment totally and at any time to meet global demands, but still have an optimal posture for the greatest possibilities that might occur, and require the ability to carry out various military operations. (Betts, 1995) So, planning can be arranged optimally, effectively, efficiently and measurably.

2.3.2. Sustainability.

The endurance of military power, or combat resistance, is influenced by the ability to shift troops to the combat operations area and the readiness of logistical support, where the size of the warship is related to the carrying capacity of the weapons, the increasingly complex sensor and weaponry systems, the range of weapons and the value of endurance. sailing when deployed far from its parent base or aju base. Endurance can also be interpreted as Sustainability, namely the permanent strength of military forces, or how long the troops can continue to fight. Sustainability involves the ability to resupply the troops involved during combat operations and is sometimes measured in terms of the approximate number of days of battle for which supplies are available.

2.3.3. Modernization

Modernization, namely the technical sophistication of troops, units, systems and weapons equipment. These can include new procurement and / or modifications. The modernization assessment can compare the equipment in the existing equipment inventory with the strength of potential enemies. it includes the technical capabilities of troops, combat units, weapon systems and equipment.

Modernization is the "main step" in changing strategic planning through a dynamic and cyclical process in accordance with the threats faced.

2.3.4. Force Structure

The force structure is the number, size and composition of the units that make up a military force. The force structure is usually described as the number of divisions, battleship units or squadrons of aircraft. Based on the above components of military capability, it can be concluded that this is a consequence of a capability-based planning process that is upstream (upstream), but is still connected to the end (end).

3. RESULT AND DISCUSSION.

3.1. Model Formulation

After the system structure in the concept of the combat capability measurement model is made, then analyzing the impact of COVID-19 on personnel is clearly stated through the formulation of a conceptual model diagram that represents the system structure, then the relationship is converted into a flow diagram (stock flow diagram) in a computer assisted by Stella 9.1.3 software.

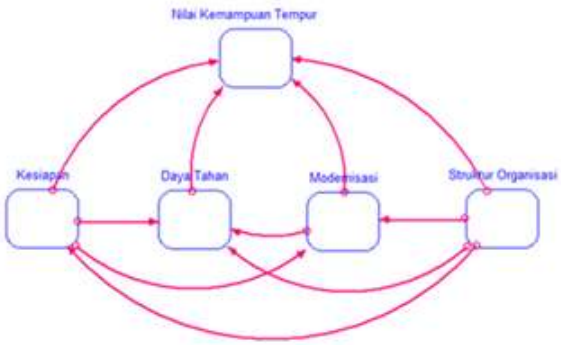

Figure 2. Combat Capability Measurement Model Concept

3.2. Causa Loop Construction and Stock Flow Diagram

Causal Loop Diagram (CLD) states a cause and effect relationship between a set of variables running in the system. The basic elements of CLD consist of variables (factors) and arrows (links). One of the advantages of the causal loop methodology is its ability to include qualitative variables in the thinking system approach in analyzing the impact of COVID-19 on personnel readiness. CLD is also very useful for explaining interdependence in various situations and is effective for the main variables that are most influential in the main system, including readiness, durability, modernization and organizational structure.

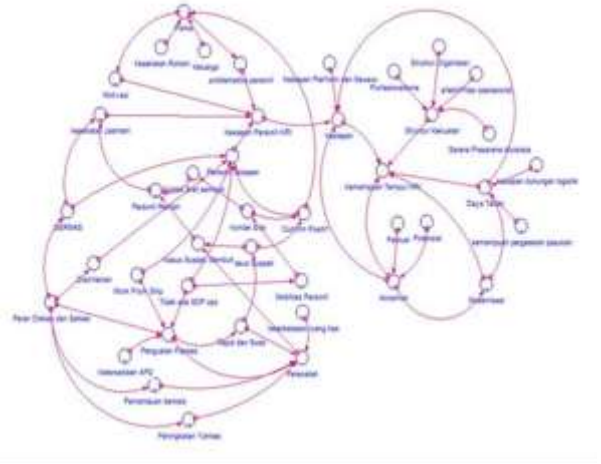

Figure 3. Causa Loop Concept of Combat Capability Measurement Model

3.3. Model Validation

Model validation was carried out in this study by performing internal validation, unit verification and boundary adequacy test (Boundary Adequancy Test). Internal validation is carried out with the aim of testing the model internally in the model, to find out whether the model can run or there are errors, and to compare the model structure and behavior with the actual system structure and behavior, so that in this case, it can be seen that the model is able to represent real system. Internal model validation is the verification stage in the model's internal algorithm, to check whether there are errors in the model and to ensure that the model functions according to the logic in the real system.

Unit and Equation Model verification is done by examining the model's 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. The program has run 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 aspects of units and equations.

The Boundary Adequancy Test of the model must be in accordance with the objectives of the model being designed. The purpose of making models in this study is to see how much impact and system dynamics on aspects that affect the readiness of personnel. This limitation adequacy test is carried out in conjunction with the Model Structure Test which involves the opinions of experts, namely Officers who have carried out operational tasks during the COVID-19 pandemic and several experts from Health Workers and the COVID-19 Task Force in the operational area.

3.4. Sensitivity Analysis

Sensitivity analysis is needed to find and determine which variables have the most significant effect on modeling results. Based on the simulation on the concept of the COVID-19 impact analysis model that has been carried out, three key variables were obtained, namely the role of health workers, the availability of PPE and the absence of SOPs in supporting ship operations, to deal with the COVID-19 pandemic problem on ships.

3.5. Analysis Results from Modeling Simulation based on 3 Policy Scenarios.

In this study, there are 3 policy scenarios that will be simulated against the concept of the COVID-19 impact assessment model on the readiness of ship personnel to maintain combat capability, which consists of:

3.5.1. Policy Scenario Not Implemented

The following provides the meaning and simulation results of the influencing variables, namely:

a. Conditions for the role of health workers that are not optimal in implementing and supporting government policies.

b. Conditions for the availability of PPE that are not optimal and sustainable.

c. Conditions where there are no Standard Operations and Procedures in handling COVID-

19 when the ship is carrying out its operational duties.

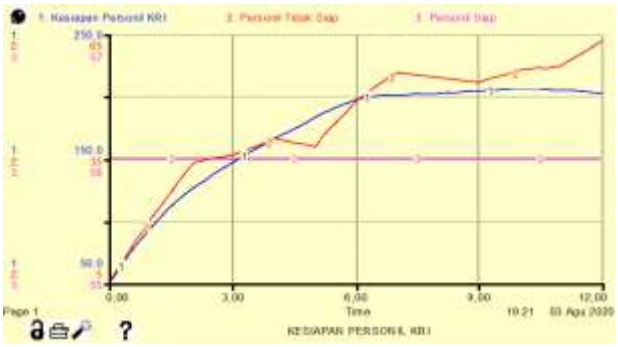

Figure 4. The graph of the impact analysis simulation results in the policy scenario is not applied to the readiness of ship personnel

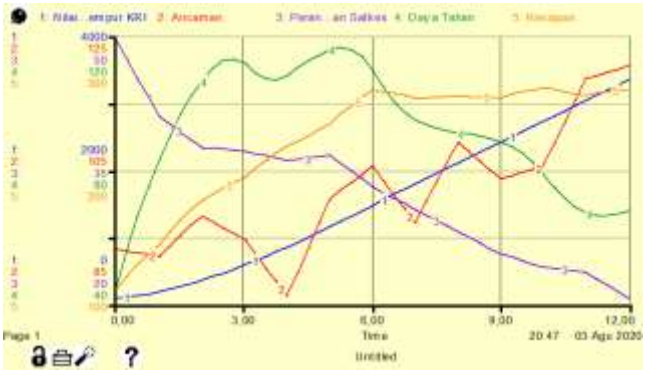

Figure 5. The graph of the impact analysis simulation results in the policy scenario is not applied to combat capability

The results of the impact analysis where the COVID-19 handling policy is not implemented will have an impact on the increase in unprepared personnel on board due to the impact of the pandemic which is in line with the curve of decreasing the readiness of ship personnel. however, the number of ready personnel remains stagnant and combat capability does not drop significantly, it will only remain at a level due to the impact of the unpreparedness of the personnel for the defense equipment crew. this is caused by other factors that affect the combat capability of the ship.

3.5.2. The policy scenario is moderate

The following provides the meaning and simulation results of the influencing variables, namely:

a. Condition of the Role of Health Workers who implement and support government policies in a moderate manner, meaning that they tend to slope.

b. Availability of PPE is sloping and sustainable, but tends to remain.

c. Standard Operating Conditions and Procedures in carrying out handling of COVID-19 when the ship is carrying out operational tasks, which have not been thoroughly discussed and reviewed.

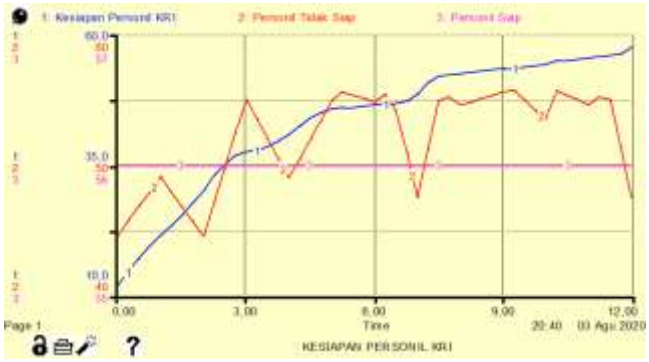

Figure 6. The graph of the impact analysis simulation results in the policy scenario is applied moderately to the readiness of ship personnel

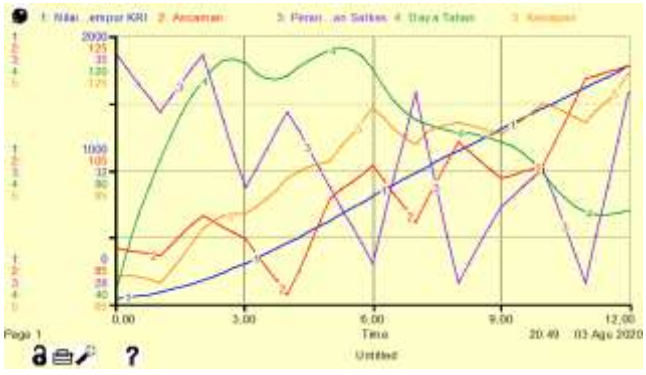

Figure 7. The graph of the simulation results analysis of the impact on the policy scenario with a moderate impact on combat capability

The results of the impact analysis, where the policy for handling COVID-19 is moderate, will have a dubious impact and uncertainty on the curve of the decline and increase on the readiness of ship personnel. Even so, the number of ready personnel is still stagnant and combat capability has not decreased significantly, it is just that the data input into decision making is doubtful.

3.5.3. Optimistic implemented policy scenario.

The following provides the meaning and simulation results of the influencing variables, namely:

a. Condition of the Role of Health Workers who implement and support government policies in an optimal and sustainable manner.

b. Availability of PPE that is supported optimally and sustainably.

c. Standard operating conditions and procedures for handling COVID-19 when the ship carries out its operational duties have been carefully reviewed and available.

Figure 8. The graph of the impact analysis simulation results in the policy scenario is applied optimistically on the readiness of ship personnel

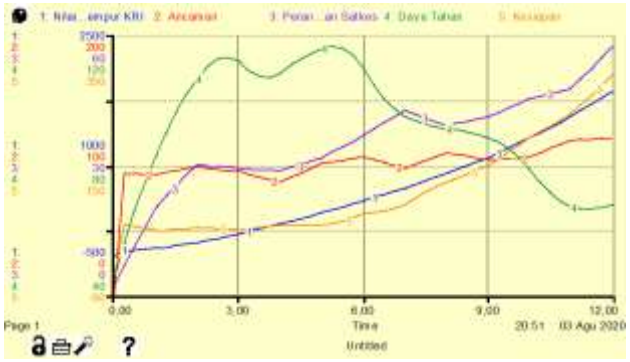

Figure 9. Graph of the simulation results analysis of the impact on the policy scenario optimistically on combat capability

The results of the impact analysis, where the COVID-19 handling policy is implemented optimistically, will have an impact on the decrease of unprepared personnel on board at a predictable time, even though the impact of the pandemic at the beginning of the incident occurred to this day. The readiness of personnel on board will gradually increase in line with the function of time (giving a positive curve) in support of the readiness of defense equipment manning. so that it can maintain the ship's combat capability in the face of future threats, this also encourages the preparedness of health personnel in providing health support to anticipate the presence of uncertain war threats, such as the current viral pandemic, against the Indonesian Navy in the future.

4. CONCLUSION.

The development of a model concept that has been built using a dynamic systems approach can be used as a tool to help analyze the impact of changes that can be caused by the COVID-19 pandemic on the readiness of ship personnel. With the requirements that the variables that make up the modeling system must be determined in advance, so that a clear

impact assessment can be obtained which will be assessed and how the existing data is structured for modeling. The results of scenario simulations from the concept of the COVID-19 pandemic impact assessment model on personnel readiness, if policies are carried out optimistically by ship personnel and medical personnel in the face of the COVID-19 pandemic, it is highly recommended for decision makers. The recommended policy can be chosen, which is implemented optimistically and is not limited in time (when the pandemic is over, cannot be accurately predicted) in dealing with the COVID-19 pandemic so that it does not have a massive impact on ships. Strategic steps in inhibiting the rate of growth and spread, to maintain combat capability, are divided into several aspects, to make it easier to provide a decision support system.

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