PLANNING MODEL OF TOTAL REQUIREMENTS OFFICER PERSONNEL IN SUPPORTING THE TASKS OF THE INDONESIAN NAVY

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ABSTRACT

As the main component of national defense and security in the marine dimension, the Indonesian navy must be able to carry out organizational tasks effectively and efficiently so that the successful achievement of organizational goals can be achieved. The main resources needed in supporting the implementation of the duties of the Indonesian navy are Human Resources or personnel. With an important role as a leader/supervisor in decision making and policy determination as well as organizational mobilization, it is very necessary for officer personnel planning in manning the entire spectrum of office space assignments in a timely manner, quality, quantity and place. The plan is a form of implementation in the Navy officer personnel development system with the characteristics of a complex and dynamic system. Given the characteristics of the system, the researcher uses a system thinking approach analysis with the aim of articulating the problem into a causal loop diagram model to then be integrated into a dynamic system simulation model with the aim of getting the best policy scenario formulation from the simulation results of the planning model for the number of officer personnel needs at the rank strata. "C" to "H", so that the behavioral conditions of a stable personnel development system are still achieved regarding the element of the number of personnel needs in supporting the sustainability of the implementation of the Indonesian navy's tasks effectively and efficiently in achieving the success of organizational goals.

Keywords: complex **,** dynamic **,** personnel coaching system, system thinking, dynamic system

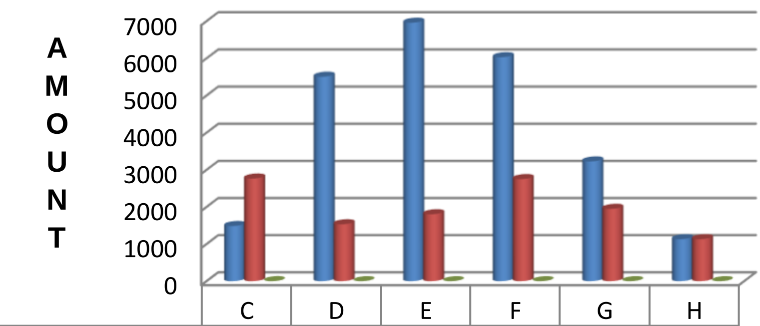
1. INTRODUCTION

Along with globalization and technological advances, the development of the strategic environment today clearly provides an increasingly free space for threats to all areas of state life, including in terms of national defense at sea (Kusuma, AW, Prakoso, LY, & Sianturi, 2021) . As one part of the organization of the Indonesian National Armed Forces , the Indonesian navy is the main component of the defense and security of the sea-level state that carries out its duties based on state policies and political decisions in order to uphold state sovereignty, maintain the territorial integrity of the Unitary State of the Republic of Indonesia. The Republic of Indonesia is based on Pancasila and the 1945 Constitution. In carrying out these tasks, the Indonesian navy is guided by the basic policy of development towards the Minimum Essential Force/MEF. Minimum Essential Force (MEF) is a standard of basic and minimum strength, which is part of the overall and absolute posture of the Indonesian navy to be prepared as the main and fundamental prerequisite for the effective implementation of the tasks and functions of the Navy in dealing with threats and achieving high deterrent effect.

The principle in the MEF program is a form of optimization of the limited defense budget provided by the government to continue to be able to support the successful implementation of the development and development of a more realistic Indonesian navy force by focusing on the fields of organization, defense equipment, personnel and bases. In the development and development of strength in the field of organization and defense equipment, the Navy always carries out organizational validation activities and modernization of defense equipment on an ongoing basis, both within the organizational structure of the Navy and within the TNI Headquarters. These activities have an impact on increasing the number of office spaces that must be manned by Indonesian navy personnel. Based on these conditions, it can be said that the planning in determining the number of navy personnel needs must be in line with the planning of the office space as a result of the validation of the organization and defense equipment.

In planning the number of personnel needs and positions in the Navy, it is carried out based on the strata of rank, where the officer group plays an important role as a leader/superior in decision making and determining policies for the advancement of the Navy organization. So with the important role of officer personnel in the Indonesian navy organization, it is very necessary for the sustainability of the Navy officer personnel to be able to oversee the entire spectrum of office space assignments in a timely manner, quality, quantity and place.

So far, in the implementation of planning the number of officer personnel needs within the Navy, it has not been able to determine precisely the condition of the number of personnel needs faced with the office space that must be manned. This is shown in the navy Personnel Composition List year "X" which is a description of the needs for personnel and positions of the Navy in detail as follows:



	C	D	E	F	G	H
DSP POSITION	1487	5506	6959	6032	3229	1133
DSP PERSONNEL	2767	1534	1804	2752	1951	1133
% POSITION FILLABILITY	186%	28%	26%	46%	60%	116%

Figure 1. Graph of Comparison of the Number of Officers with the Indonesian navy's Office Space

(Source: Z, X)

The picture above shows the conditions of shortage and excess in the number of navy officer personnel needs at certain rank strata which is a form of imbalance between the number of office spaces that must be manned with the real number of officer personnel currently available. In other words, the planning that causes an increase in the officer's office space, in this case the planning for the development of defense equipment and organizations, both within the Indonesian navy structure and within the Indonesian Armed force Headquarters which needs to be manned, is not in line with the planning for the needs of the Indonesian navy officer personnel (Kasal, 2019) . In planning the number of personnel needs, it is an implementation in the complex and dynamic system of personnel development for Indonesian navy officers, so that researchers use system thinking analysis which is integrated into the dynamic system approach method with the aim of obtaining the best policy scenario formulation from the simulation results of the planning model for the number of personnel needs. officers at the "C" to "H" strata, so that a stable condition of behavior for the personnel development system is still achieved regarding the number of elements needed by the Indonesian navy personnel. With the condition of the behavior of the system is expected to support the sustainability of the implementation of the duties of the Navy effectively and efficiently in achieving the success of organizational goals.

2. MATERIAL/ METHODOLOGY

2.1 Research Flowchart

The systematic and structured stages used in conducting research so that existing problems can be resolved properly. The research method is a process consisting of stages that are interrelated with each other or interpreted as the result of a stage that will become input for the next stage. The stages in this research can be briefly described in the following flow chart:

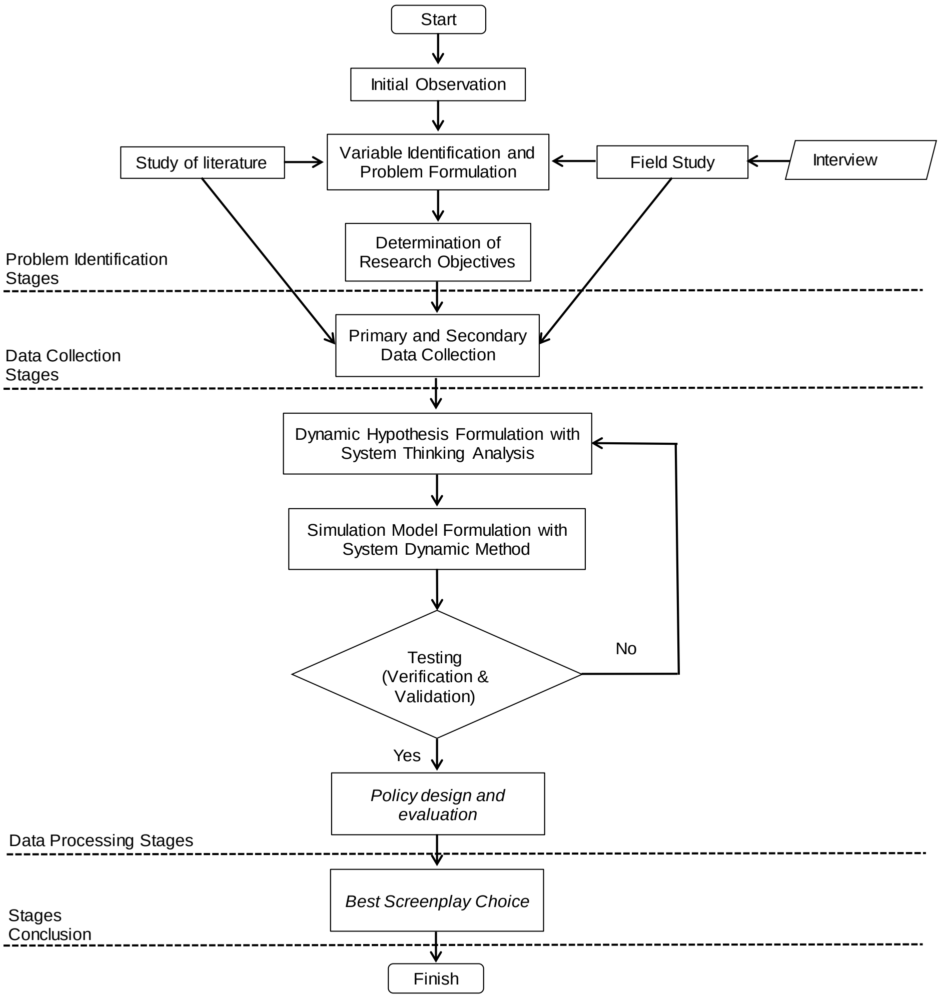


Figure 2. Research Flowchart

(Source: Research data processing, 2022)

2.2 System Thinking

System thinking analysis in this study was carried out based on brainstorming and depth interviews with experts in the field of Navy personnel planning as well as conducting a review and critical study of the existing literature with the aim of defining these problems and identifying variables that have an influence on the problems in the object of research. After identifying the variables that have an influence relationship in the Indonesian navy officer personnel development system, the next step is to structure it into a causal loop diagram model that explains the interrelationships that influence each other (interact) in a causal form between the variables in the total planning system. the need for officer personnel starting from the rank of "C" to " H" . The system thinking approach in this study is used in the stages of the dynamic system modeling process.

2.3 Dynamic System

The development of increasingly complex system dynamics requires an effective approach method to produce the desired system behavior. One method that is effective in analyzing a complex system is system dynamics (Sterman, 2000a) . The dynamic system approach is part of the concept of systems thinking which can be interpreted by looking at the problem as a whole system and the relationship between each element of the system (Addin Aditya, S.Kom., 2018) . In the process of compiling a dynamic system model, there are the following stages (Sterman, 2000b) :

a. Articulation Problems
b. Formulation Dynamic Hypothesis
c. Formulating a Simulation Model
d. Testing (Verification & Validation) Model .
e. Policy planning and evaluation

2.3.1 Articulation Problems

On the articulation problem step is implemented based on brainstorm and depth interview with para expert in charge of planning Indonesian Navy personnel as well as do a review and study critical to existing literature with destination for define problem the as well as identify variables that have linkages influence to problem in the object research. Stages in the articulation problem can outlined as following :

a. Theme Problem

Problems that occur in the planning amount needs Indonesian navy officers are something phenomenon whose presence no wanted , where is output implementation system construction Navy personnel . Existence characteristics structure in the system construction Navy personnel who describe existence complexity dynamic system , and role strategic Commissioned Officer in the Indonesian Navy organization , as well as impact caused is in time period long , then make something very thing important for held a planning amount needs personnel Indonesian navy officer appropriate in support implementation Army duties sea by effective and efficient in the achievement success destination organization .

b. Identification Variable Aspect Main and Criteria .

The identification of variables that affect the complexity of planning the number Of Indonesian Navy officer personnel needs in this study is divided into several main aspect variables based on rank and each of the main aspect variables consists of several sub-variables or criteria. The main aspect variable is a variable that influences the planning of the number of needs of Indonesian navy officers, where these variables are interrelated and interact in a causal relationship. The identification of these variables can be shown in the following table

Table 1. Identification Main Variable Planning Amount Needs Commissioned Officer

NO	MAIN ASPECT	DESCRIPTION
1	Personnel "C"	Amount personnel on group rank the officer who was at the lowest strata _ based on level hierarchy rank in the structure Navy organization
2	Personnel "D"	Amount personnel on group rank the officer who was on the order strata one (1) level on "C" based on level hierarchy rank in the structure Navy organization

3	Personnel "E"	Amount personnel on group rank the officer who was on the order strata one (1) level on "D" based on level hierarchy rank in the structure Navy organization
4	Personnel "F"	Amount personnel on group rank the officer who was on the order strata one (1) level on “E” based on level hierarchy rank in the structure Navy organization
5	Personnel "G"	Amount personnel on group rank the officer who was on the order strata one (1) level on “F” based on level hierarchy rank in the structure Navy organization
6	Personnel "H"	Amount personnel on group rank the officer who was on the order strata one (1) level on “G” based on level hierarchy rank in the structure Navy organization

On Sub-variables or criteria that influence the main aspect variables have the same attributes with different values . So that the identification can be summarized and shown directly in the form of a stock and flow diagram model formulation .

c. Limitation Time design

In the design of this planning model, the determination of a time horizon of 40 years is used, which is the time of one (1) cycle of the personnel development system starting from the initial stage (acceptance / intake of personnel "C" with a minimum age limit of 18 years) to the final stage. (separation/retirement with a maximum age limit of 58 years). The time horizon in planning the number of Indonesian Navy officer personnel needs is an investment plan for Human Resources, which must be made in a far enough scope to be able to find out how a problem arises and what the symptoms are, and it is extended far enough into the future with the aim of being able to capture the indirect effect of a policy in planning the number of officers' needs.

d. Reference Mode

After the design time horizon has been determined, in this step the measurement of the relationship in the dynamic structure of the Indonesian Navy officer personnel development system is carried out which is identified as an assessment system that is influenced by the variables in the model. The identification of the variables in this study is categorized based on each of the main aspect variables that influence the planning of the number of Navy officers. In the relationship between entities, these variables have a positive and negative polarity.

2.3.2 Formulation Of Dynamic Hypothesis

After obtaining a variable entity that has a relationship with the planning of the number of Indonesian Navy officers, then it is connected into an interaction in each of the main aspects of the Planning for the Number of Needs of the Indonesian Navy officers as shown in the main aspect variable diagram as follows:

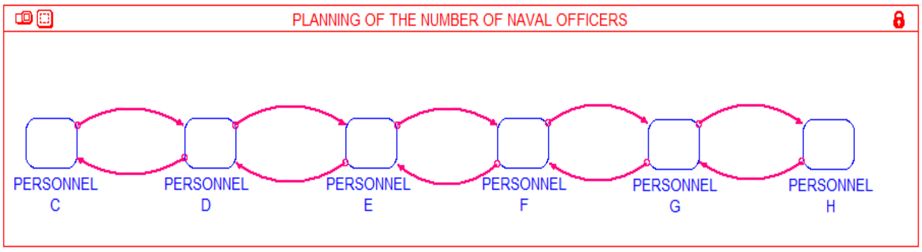


Figure 3. Diagram of the Main Aspects of Interaction Relationships on Planning the Number of Navy Officers Personnel Needs

(Source: Processed data by researchers and Depth Interview Experts using Stella 9.1.3 , 2022)

Then in each of the main aspects, it consists of sub-variables and criteria that influence the main aspect, where the sub-variables and criteria have the same attributes, so that if they are formulated briefly into the Causal Loop Diagrams (CLD) model, they will form a closed system as illustrated in the following figure:

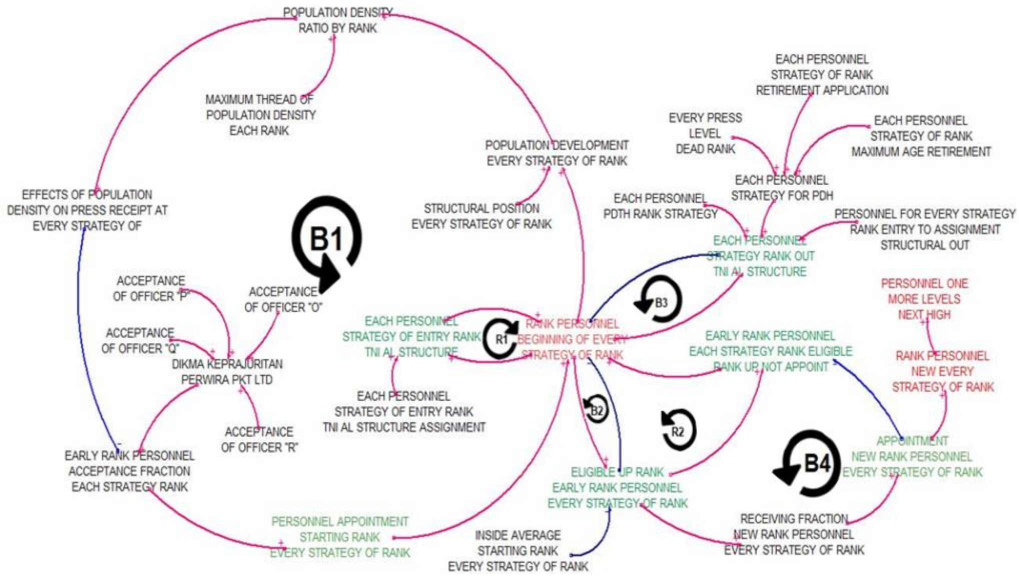


Figure 4. Causal Loop Diagram of Planning for the Number of Navy Officers' Personnel Needs

(Source: Processed data by researchers and Depth Interview Experts using Stella 9.1.3, 2022)

Figure 4 above is a conceptualization of the model of the Indonesian Navy officer personnel development system in the form of CLD which explains the interrelationships that influence each other (interact) in a causal form between the variables in the planning system for the number of officer personnel needs starting from the rank of "C" to "H". "In the main aspect variable, initial rank personnel are state personnel in initial conditions or one lower level which will lead to the new rank personnel state (one level higher), and the new rank personnel state will experience repetition of becoming personnel in the initial state towards the rank personnel state . new again until finally heading to the state personnel rank "H" .

2.3.3 Formulation Of A Simulation Model

The formulation of a simulation model step is the stage in formulating the conceptual model of the Causal Loop Diagram planning the number of Indonesian Navy officer personnel needs (Figure 4.2) into the basic structure of a specific dynamic system modeling (flow diagram / stock flow diagram), complete with equations , parameters and initial conditions prior to the simulation. In structuring into a dynamic system model in this study using the help of a tool in the form of Stella software . The formulation of a dynamic system simulation model in the Causal Loop The planning diagram for the number of Navy officers needs is translated into each rank, starting from the rank of "C" to "H" which is shown in the following figure:

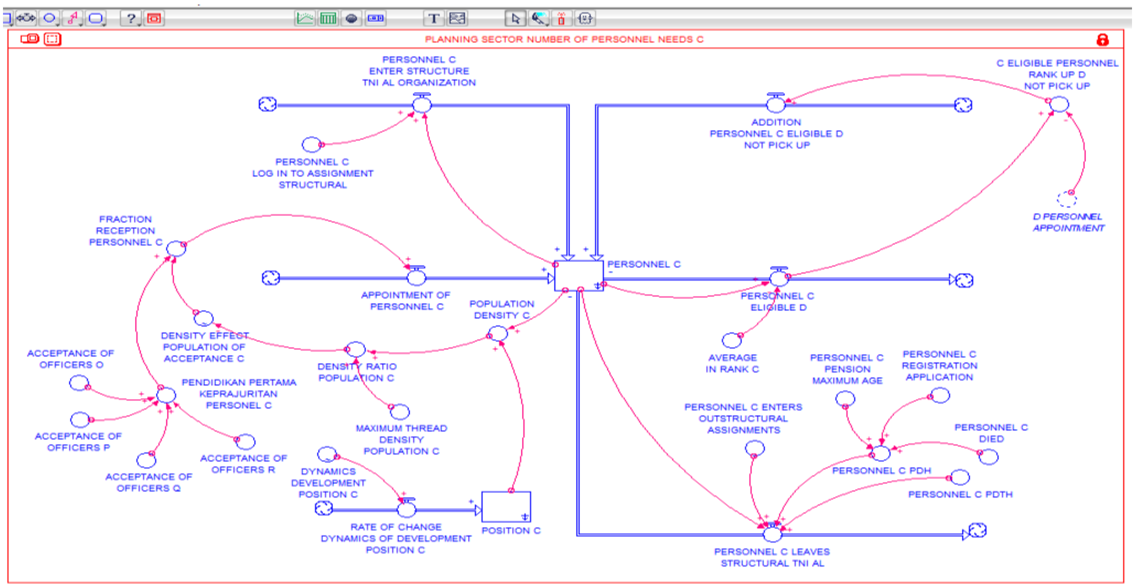


Figure 5. Stock Flow Diagram of the Number of Personnel Needs "C"

(Source: Processed data by researchers and Depth Interview Experts using Stella 9.1.3, 2022)

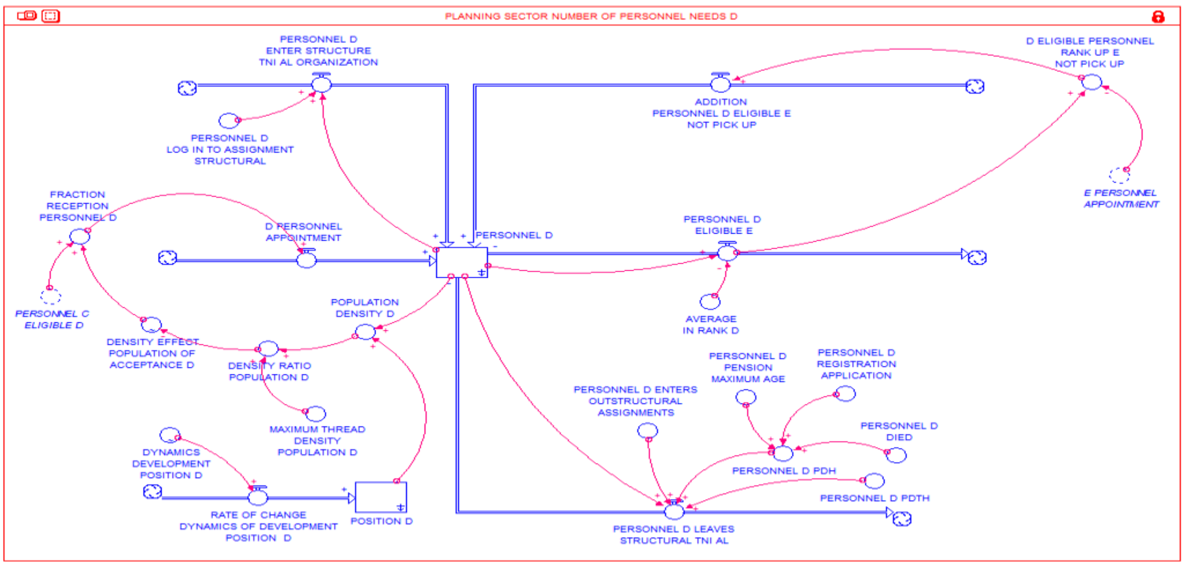


Figure 6. Stock Flow Diagram of the Number of Personnel Needs "D"

(Source: Processed data by researchers and Depth Interview Experts using Stella 9.1.3, 2022)

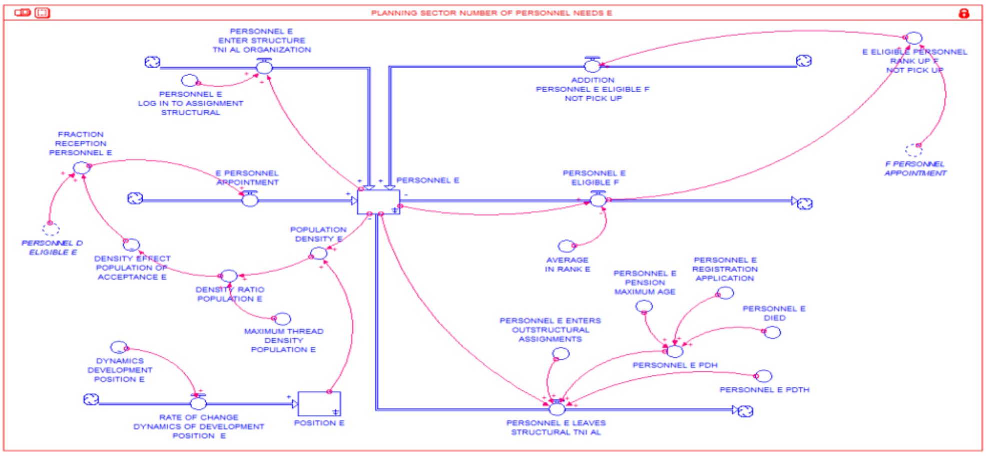


Figure 7. Stock Flow Diagram of the Number of Personnel Needs "E"

(Source: Processed data by researchers and Depth Interview Experts using Stella 9.1.3, 2022)

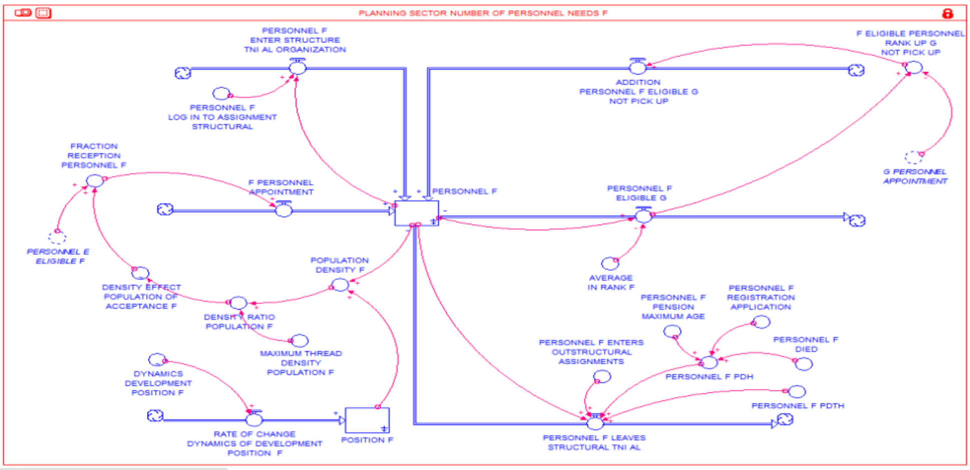


Figure 8. Stock Flow Diagram of the Number of Personnel Needs "F"

(Source: Processed data by researchers and Depth Interview Experts using Stella 9.1.3 , 2022)

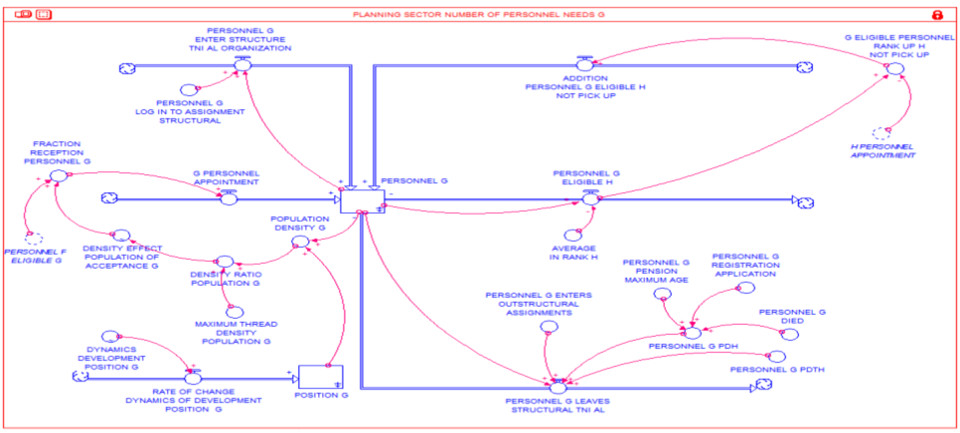


Figure 9. Stock Flow Diagram of the Number of Personnel Needs "G"

(Source: Processed data by researchers and Depth Interview Experts using Stella 9.1.3, 2022)

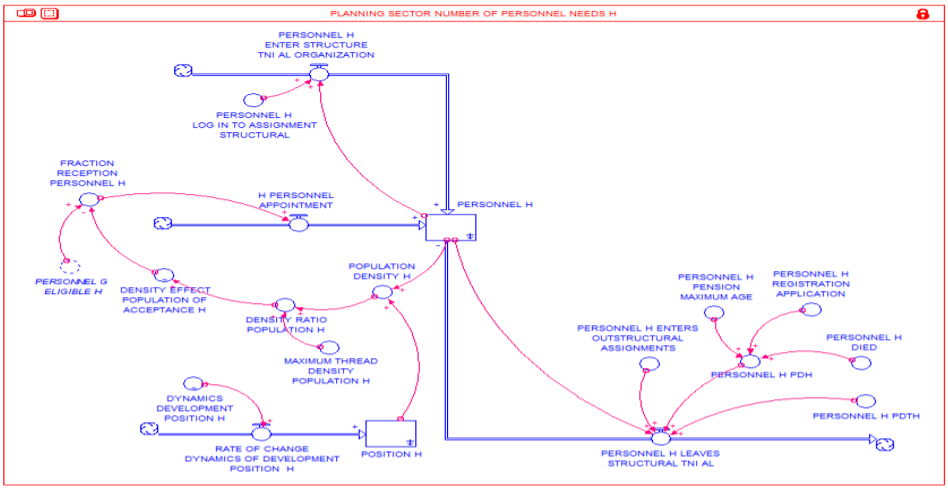


Figure 10. Stock Flow Diagram of the Number of Personnel Needs "H"

(Source: Processed data by researchers and Depth Interview Experts using Stella 9.1.3, 2022)

2.3.4 Simulation Model Testing

Testing is done as early as possible since we enter the first equation. Part of the test, which compares the simulated behavior of the model to the actual behavior of the system. The form of testing the dynamic system simulation model in this study is as follows:

a. Model verification

Is the process of determining whether the simulation model properly reflects the conceptual model. The model verification is carried out to check whether there are errors in the model and ensure that the model functions according to the logic of the observed system. In addition, verification also needs to be done by checking the formulations (equations), models and checking the unit variables of the model. If there is no error in the model, it can be said that the model has been verified. In this study, verification has been carried out in the Stella software with the results obtained that all formulations (equations), models and checking the variable units of the model are consistent as shown in the figure below:

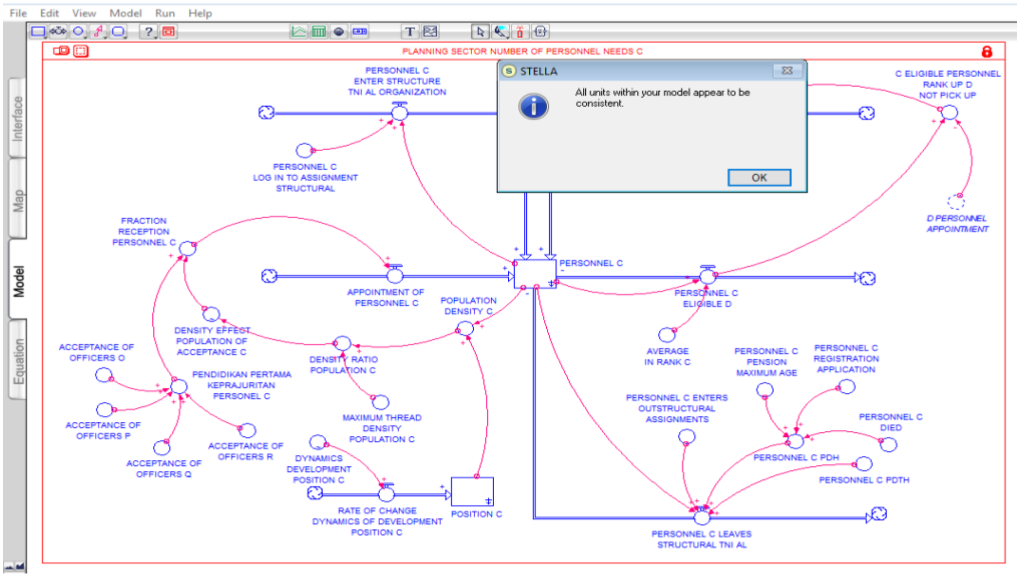


Figure 11. Verification of Planning Model Unit Number of Officer Personnel Requirements From Rank "C" to "H"
(Source: Processed data researcher and Depth Interview Expert using software stella 9.1.3, 2022)

b. Model validation

Model validation is the process of determining whether the conceptual model properly reflects the real system (Harrel, Ghosh and Bowden, 2002a) . In model validation, it is a stage in evaluating whether the model made is representative of the real situation. In this case, model validation is carried out to determine that the conceptual model has accurately reflected the real system and met the overall modeling objectives. Several validation tests that will be carried out in this study are as follows (Harrel, Ghosh and Bowden, 2002b) :

1) Limit Sufficiency Test

This test is done by testing the variables used in the simulation model. If a variable does not have a significant effect on the objectives of this research model, then that variable does not need to be included. So that the variables used in the design of the simulation model are in accordance with the objectives of the model. If the model is made for a certain scope, then the model cannot be used in a larger scope. Therefore, to create a new model, the limitations and objectives of the model must be developed so that it produces a different scope.

2) Model Structure Test

This test is carried out by conducting in-dept interviews with parties who know and master the system. The goal is to ensure the variables and structure of the model that has been built in accordance with the actual system. The model structure is declared valid when the formulation and units are appropriate and can describe the actual concept of the system.

3) Extreme Condition Test

This test is carried out to test the model's ability in extreme conditions so that it can show the model's structural errors. This test can be done by entering the smallest and largest extreme values on the measured or controlled variables in the model. If variable A is a controlled variable in the model, then the decrease in the value of A is followed by the decrease in the value of variable B.

4) Model/Replica Behavior Test

This test is done by comparing the data between the simulation results and real conditions, so that the model can represent the system being modeled. The real/actual conditions carried out by the model are then matched to the state of the real system at some time in the past. Furthermore, an assessment of how close the behavior of the model is to the past data. Quantitatively, the validation of the model is carried out using the Mean Error variance method. (Barlas, 1996) . This method is done by comparing the average value of the actual data with the average value of the simulation model results to find the average value of the error that occurs. The calculation method uses the following equation:

$E = [(S - A)/A$

With :

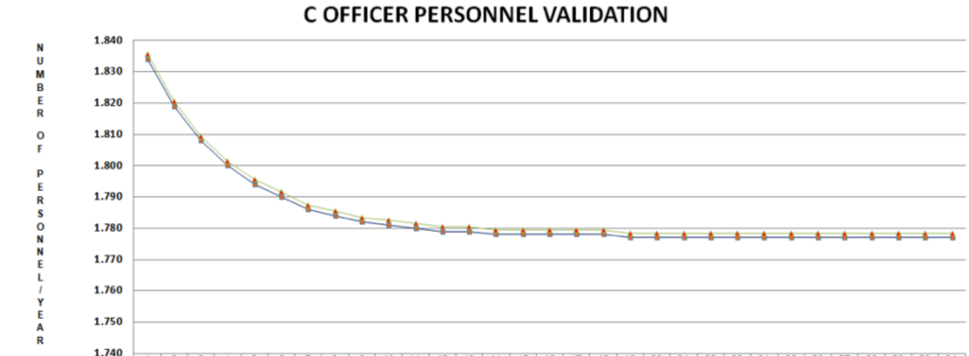
A= real data

S= Simulation result data

E= Error variance between actual data and simulated data Where if E < 0.1 then the model will be valid.

Based on the calculations in table 2, the average error value for each personnel variable C is less than 0.1. Therefore, the model is said to be quantitatively valid. In connection with the research objective to plan the number of needs of Indonesian navy officers for each strata starting from rank C to H in supporting the tasks of the Indonesian navy which is the output in this modeling, so that the model can be said to be quantitatively valid by testing the Mean variance method.

Table 2. Calculations Error Data C personnel current and Simulation



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
MODEL SIMULATION	1,49	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48
ACTUAL	1.83	1.81	1.80	1.80	1.79	1.79	1.78	1.78	1.78	1.78	1.78	1.77	1.77	1.77	1.77	1.77

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
MODEL SIMULATION	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48
ACTUAL	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77

2.3.5 Policy Design And Evaluation

Models that have been made could used for evaluate and designing policy for enhancement future , including designing strategy new , structure , and orran decision with method analyze sensitivity the most influential variables (variable _ key) against results model simulation on planning amount needs personnel Commissioned Officer each rank so that obtained scenario best in the planning and evaluation simulation of the model . Based on run simulation _ on models that have created , then pattern results simulation from aspect main planning amount needs personnel Commissioned Officer the taken three (3) variables key on aspect planning amount personnel C and two (2) variables key on aspect planning amount personnel D arrived with G, as well as one (1) variable key on aspect planning amount H personnel .

From result analysis sensitivity variable key with testing simulation of the model by over and over again , then obtained form results scenario model simulation as following :

a. Scenario on aspect planning amount personnel C is with as following :

1) Reception R again value 95 personnel / year to 450 personnel / year.

2) Reception Q again value 39 personnel / year to 300 personnel / year.

3) O Reception of 220 personnel / year to 50 personnel / year.

4) Average in rank C back 4 years to be 2 years.

5) Average Personnel C who entered to assignment position outside structural original 0.0185 / year _ to 0/ year.

b. Scenario on aspect planning amount personnel D is with as following :

1) Average in rank D back 5 years to be 7 years

2) Average Personnel D who entered to assignment position outside structural back 0.0065 / year _ to 0/ year .

c. Scenario on aspect planning amount personnel E is with as following :

1) Average in rank E back 5 years to be 8 years

2) Average Personnel E who entered to assignment position outside structural back 0.031/ year to 0/ year

d. Scenario on aspect planning amount F personnel is with as following :

1) Average in rank F back 4 years to be 8 years

2) Average Personnel F who entered to assignment position outside structural back 0.050/ year to 0/ year

e. Scenario on aspect planning amount personnel G is with as following :

1) Average in rank G back 4 years to be 2 years

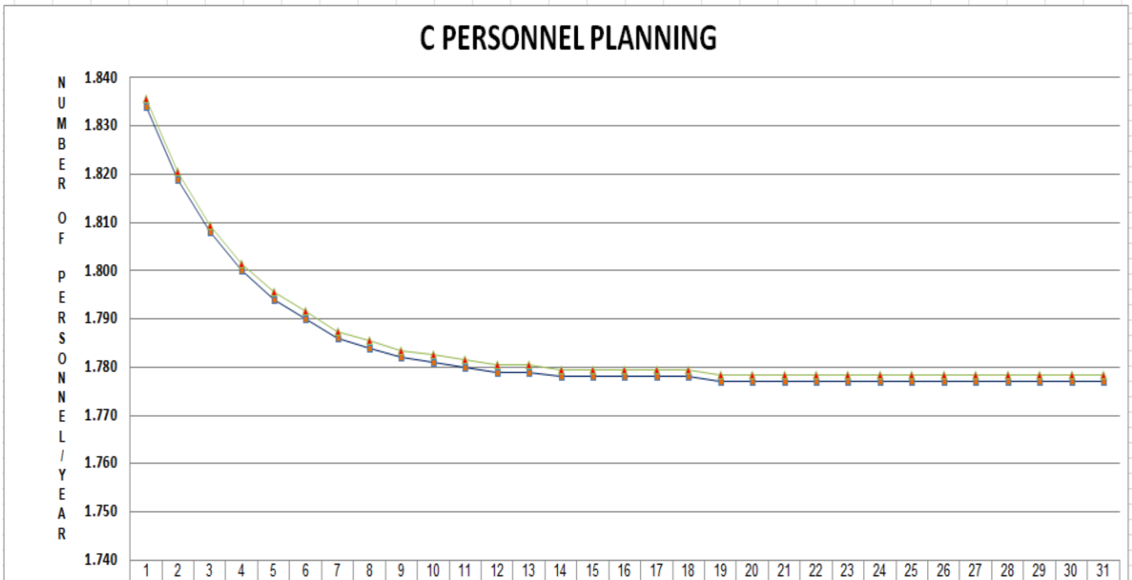
2) Average Personnel G who entered to assignment position outside structural back 0.071/ year to 0.24/ year

f. Average Personnel H who enter to assignment position outside structural back 0.081/ year to 0.019/ year.

3. RESULTS AND DISCUSSION

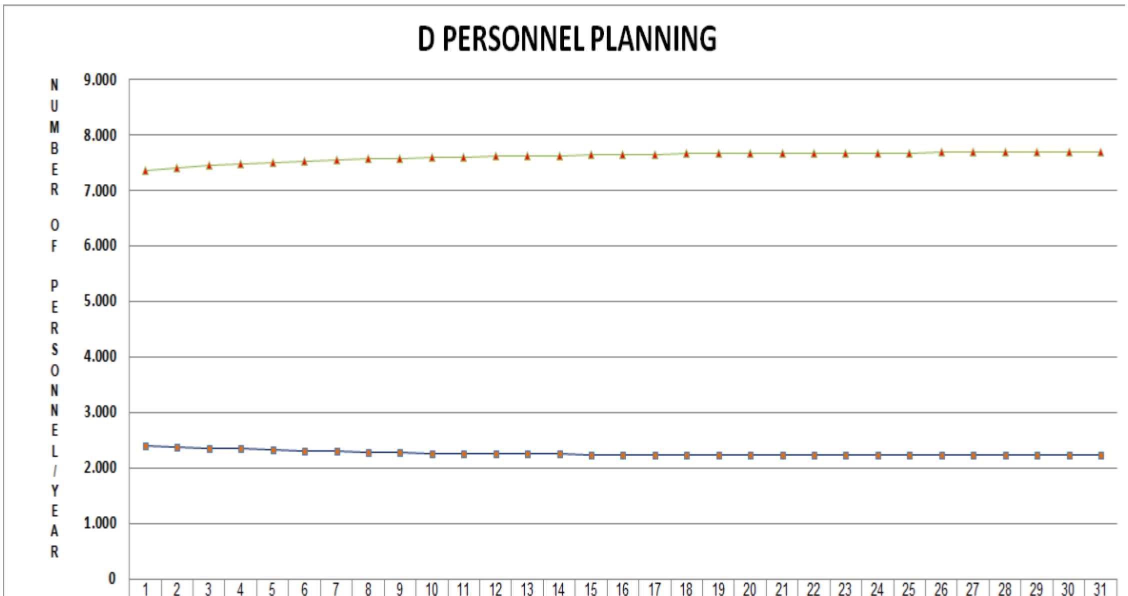
On results and discussion this , will explained simulation running results condition existing and condition scenario policy best on every variable response . Variable the response to be focus on study this is planning amount needs personnel and position each strata (starting from rank C to with H).

Table 3. Planning amount personnel C.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Best Screenplay	1,49	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48
Existing	1.83	1.81	1.80	1.80	1.79	1.79	1.78	1.78	1.78	1.78	1.78	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77

Table 4. Planning amount D personnel



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Best Screenplay	4.95	5.02	5.08	5.13	5.18	5.21	5.25	5.28	5.30	5.32	5.34	5.36	5.37	5.39	5.40	5.41	5.41	5.42	5.43	5.43	5.44	5.44	5.45	5.45	5.45	5.45	5.46	5.46	5.46	5.46	5.46
Existing	2.40	2.38	2.36	2.34	2.32	2.31	2.30	2.28	2.27	2.27	2.26	2.25	2.25	2.24	2.24	2.24	2.24	2.23	2.23	2.23	2.23	2.23	2.23	2.23	2.23	2.23	2.23	2.22	2.22	2.22	2.22

Table 5. Planning amount E personnel

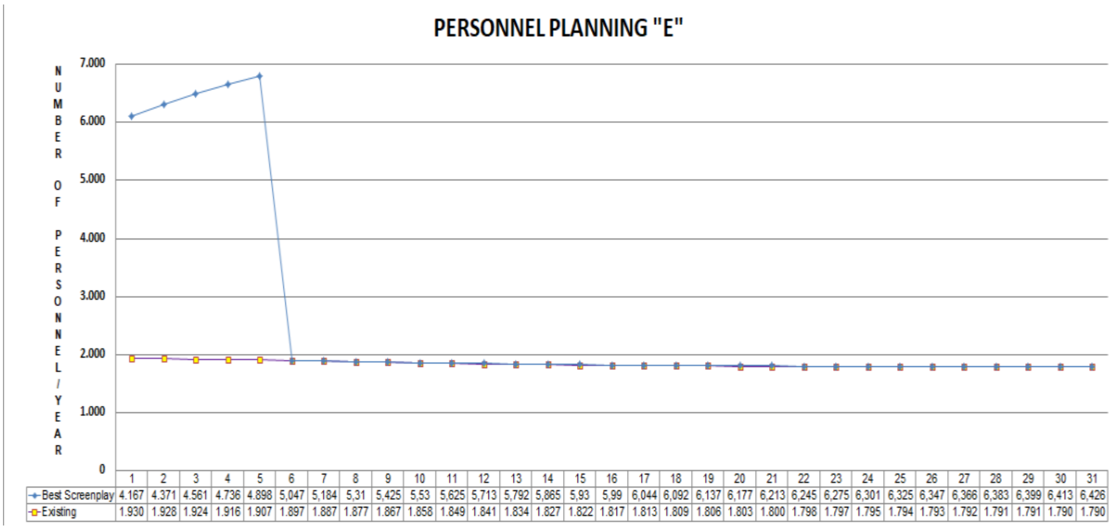


Table 6. Planning amount F personnel

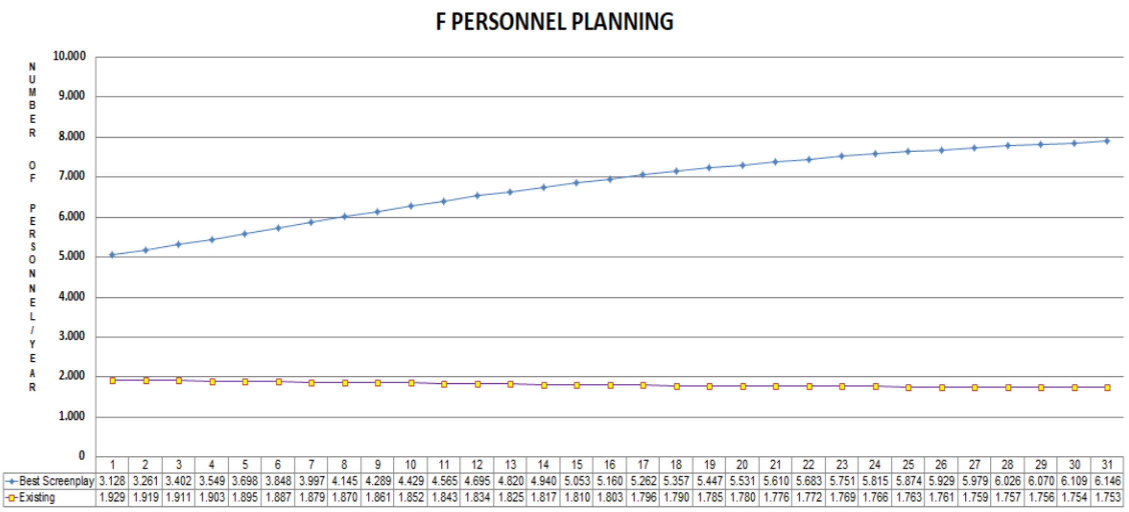


Table 7. Planning amount G personnel

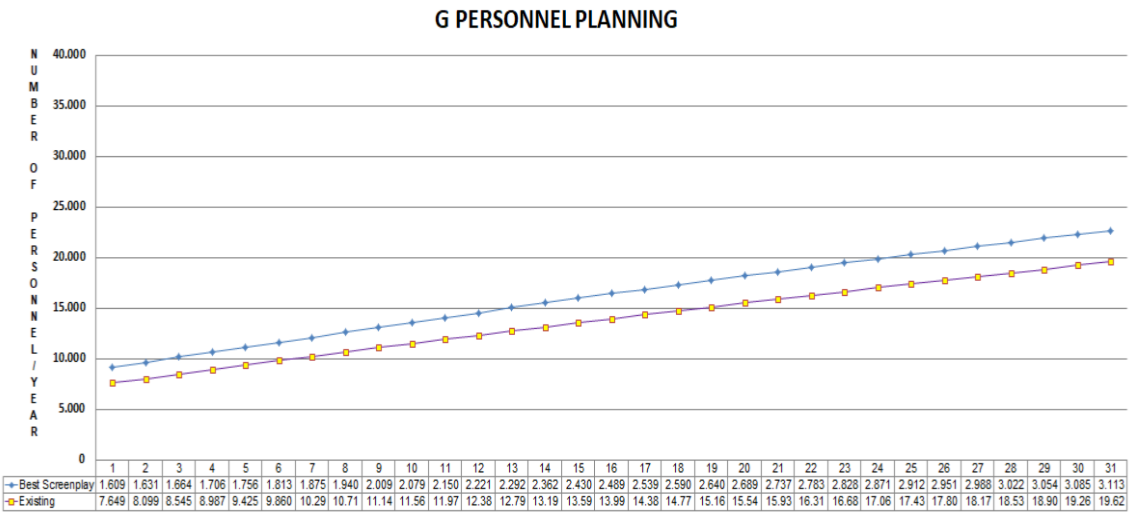
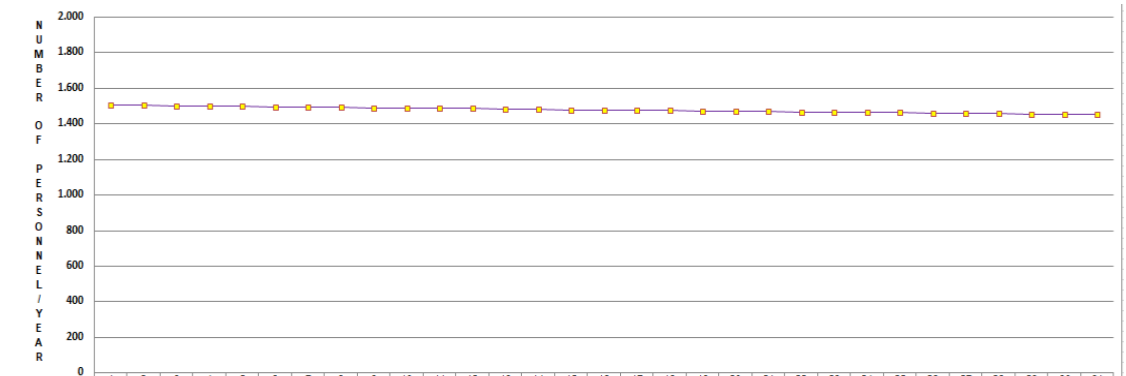


Table 8. Planning amount H personnel



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Best Screenplay	1.272	1.250	1.227	1.205	1.184	1.163	1.142	1.121	1.101	1.082	1.062	1.043	1.025	1.006	988	978
Existing	1.506	1.504	1.502	1.500	1.498	1.497	1.495	1.493	1.491	1.489	1.488	1.486	1.484	1.482	1.480	1.479

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Best Screenplay	978	978	978	978	979	980	980	980	980	980	980	980	980	980	980
Existing	1.477	1.475	1.473	1.471	1.470	1.468	1.466	1.464	1.463	1.461	1.459	1.457	1.456	1.454	1.452

4. CONCLUSION

In the simulation model, the best policy scenario has been prepared in planning the number of personnel needs from rank C to H so that a stable behavior can be produced on the variable number of personnel for each rank strata faced with the number of positions that must be manned. In this scenario, the average variable in the rank of each rank has a very significant change effect in the dynamic behavior of the system.

ACKNOWLEDGEMENT

The authors express their gratitude for the support of the Indonesian navy, and also thank the STTAL Surabaya Indonesia Naval Technology College for providing the necessary resources to carry out this research work. The authors also thank the experts in the field of human resource planning for Indonesian navy officers who have assisted in the analysis in this study.

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