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ENGINE SIMULATOR DEVELOPMENT STRATEGY TO SUPPORT MECHANICAL ENGINEERING CORPS CADET TRAINING

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ABSTRACT

Study This is motivated by the holding of the Mechanical engineering corps Taruna training, which is less than optimal because space is not used optimally in the Sapudi Building Engine Simulator. The main objective in determining this strategy is to be able to maximize the available space in the Engine Simulator at the Sapudi Building. The research challenge is to determine the right strategy to optimize the engine simulator room in the Sapudi building to support the Mechanical engineering corps cadets. This research is quantitative and conducted by collecting respondents using a questionnaire with a purposive sampling technique. This study uses SWOT analysis. The first step is to create an IFAS and EFAS matrix with weights and determine the total score for the IFAS and EFAS variables. The second step is to develop strategies: SO, WO, ST, and WT. Further research shows that the advantages of the engine simulator room of Gedung Sapudi are designed like the KRI Sigma class. The drawback is that the Engine Simulator equipment included in the MCR (Machine Control Room) simulator is not yet mature in terms of quality and quantity. The results of this study are in the third quadrant, this condition is by minimizing existing internal problems and by maximizing existing opportunities through a review strategy to create something new.

Keywords: *SWOT Analysis, Engine Simulator, Borda Method*

1. INTRODUCTION

The Indonesian Naval Academy is an educational institution within the Indonesian Navy that organizes an effective and efficient educational process to develop a navy that is responsive, competent, fighting spirit, prideful, professional, disciplined, and in charge of training prospective naval officers who are hardworking, and intelligent. , and skilled. With proper educational management and application of technology, the Naval Academy has five study programs that train cadets in academic and non-academic disciplines designed to enhance the skills of each cadet. One of the Naval Academy study programs is the Warship Mechanical Engineering Study Program.

Mechanical engineering corps cadets are future naval officers who are prepared to become candidates for the highest naval leadership in logistics. Every officer of the engineering corps must be able to lead his members to meet the demands of the mission. Qualifications are required for an Engineering officer who graduated from the Naval Academy and can serve as an officer of the corvette class warships and Sigma class battleships. Ability to perform tasks such as potential defence science skills in the maritime field, aspects of mechanical engineering operations, management skills, leadership, law, and social communication for career development as a cadre of officers who are professional in manning corvette class warships and Sigma class warships.

The level of understanding of the mechanical engineering corps officers is obtained during the implementation of practical training (Lattek). Understanding will be made easier when the material is given repeatedly and implemented in direct practice to provide an overview of the basic material needed to become a credible Mechanical engineering corps officer.

Provide room facilities to support direct training of Mechanical engineering corps cadets to improve their understanding and enable them to carry out live simulations by performing tactical maneuvers and allow them to carry out surveillance of engine control, tactical maneuvers, and communications, including carrying out forming tactical formations according to ship orders, and Cadets can perform direct simulation proskomtis to improve the understanding of cadets when communicating with PAI (inventory equipment crew) ships via radio or HT (Handy Talking) in the engine room.

2. MATERIALS AND METHODS

2.1 Strategic Management Concept

Strategic management is a managerial way to determine the direction of performance in the long term in an organization which includes observing the influential environment, formulating or planning strategies, carrying out evaluations, and implementing the strategy itself (J. David Hunger, 2003). Etymologically, strategy comes from the Greek word strategos, in Athenian democracy which means "military commander". On the other hand, in terms of terminology, experts have different understandings of

the notion of strategy but have the same meaning or meaning, namely a plan to achieve goals efficiently and effectively (Syahtaria, 2019).

According to (Istiqomah, 2017), management strategy can be defined as technology and science to develop, apply, and evaluate decision cross function which allows an organization to reach its goal. Definition This means that management strategy focuses on integration management, marketing, finance/accounting icon/ operation, script and development, and system information to achieve a successful organization. In the text, the management term strategic is used as a synonym with the term planning strategically.

Based on a book written by (Hunger & Wheelen, 2010) Management strategy is a set of decision and action management that determine the performance period long an organization. This including scan the environment, developing a strategy, applying a strategy, and assessing as well as controlling it.

2.2 SWOT Analysis Concept

Analysis SWOT has made much progress since the first time used. SWOT first time appear at Harvard Business School at the beginning 1950s and analyze studies cases by professor University Harvard George Albers Smith Jr. and C. Roland Kristensen. They learn strategy organization which is related to the environment (Benzaghta et al., 2021).

SWOT is an abbreviation for (Strengths, Weaknesses, Opportunities, and Threats) there is factor internal and external that could influence the process or the structure that is currently being investigated. In Thing this, appraisal control impacts quality is at in Organization area social complex _ (Leiber et al., 2018). SWOT confesses internal aspects and external which are important for reaching company goals. Aspect internal refers to existing characteristics in the control company, whereas the external aspect is factors located outside company control. (Benzaghta et al., 2021) Step first in using analysis SWOT is we must know what which included in factor internal and what includes factor external.

SWOT analysis is one way to identify many problems in an organization. We can find out what are the strengths, weaknesses, opportunities, and threats to our organization. In the SWOT matrix, four strategies can be developed :

a. A Strategy SO, Strategy catch opportunity which exists by utilizing strength.
b. Strategy WO, is the strategy that tries to minimize weaknesses or fix weaknesses to try to snatch opportunities there.
c. ST strategy, which is a strategy that uses strength to overcome or minimize the threats we face.
d. WT strategy, which is a strategy aimed at minimizing or reducing weaknesses to avoid the threats faced.

2.3 Research Approach

This research is quantitative research with a descriptive approach. Quantitative research is a type of research that is characterized by being carried out in a systematic, planned and structured manner. Quantitative research can also be interpreted as empirical research used to study a particular population/sample using research tools and quantitative data. The descriptive approach means that the research aims to explain the research topic and findings to the reader. This method also aims to provide an overview/description without first making an analysis or general conclusion.

2.4 Research Subjects

Research sources are people who are familiar with the Sapudi Building Machine Simulator Facility. The resource persons used in this study were several offices placed _ in the department of Engineering Corps who are directly involved in the research and who have an understanding of the functioning of all the facilities in the Sapudi Building Engine Simulator. Researchers use officials because they already know all the facilities and know about this research.

2.5 Data Collection Techniques

We collect data to obtain the information needed to achieve the research objectives. In this study, data collection techniques were collected from observation, interviews, documents and literature searches. Primary data from observations and interviews (Detailed Interviews) is the collection and processing of data by a researcher from the subject or research topic. In addition, it is also obtained from books, documentation, literary studies, and indirectly from the subject or object.

2.6 Data Analysis Techniques

Data analysis aims to find items or sections that contain smaller categories of research data. In this study, researchers use sources to pick patterns that match what they learn. Based on the existing problems, this research method uses the SWOT method. The SWOT analysis consists of several stages, including identifying external and internal factors, processing a matrix of external and internal factors, and creating several questionnaires (Kuncoro et al., 2021). From the survey results, respondents can conclude the evaluation of existing indicators and integrate them into the SWOT matrix. We then evaluate external and internal factors by weighting strategic factors on a scale of 1 (poor) to 5 (good).

The weighting of internal and external strategic factor groups and factors with pairwise comparisons. When developing alternative strategies, use the SWOT matrix to identify strengths and opportunities (SO strategy), strengths and threats (ST strategy), opportunities and weaknesses (WO strategy), and weaknesses and threats (WT strategy) to adapt. Once you have a strategy, prioritize those options using the BORDA method.

2.7 SWOT Framework

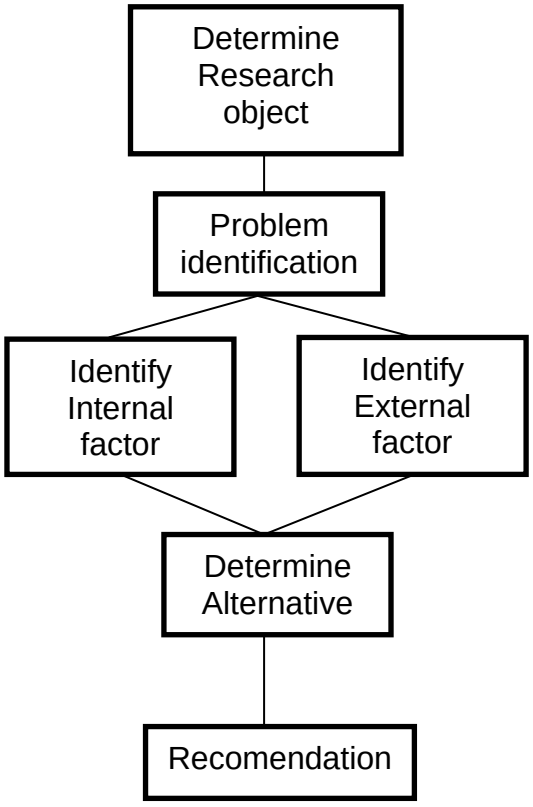

Figure 1. Research Framework

3. RESULTS AND DISCUSSION

This strategy development section uses EFAS and IFAS SWOT weighting to present an analysis of the results of the weighting of criteria and alternative strategies for developing the Engine Simulator Room at the Sapudi Building of the Indonesian Naval Academy. EFAS and IFAS Weighting Using Questionnaires were Given to Officers in part Engineering Corps Academy Force sea for Strategy Development.

3.1 Weighting of External Factors

After the external opportunities and threats factors in developing the space of the Engine Simulator Sapudi building are known, the EFAS weighting can be carried out as shown in the following table :

Table 1. Weight of External Factors

	External Factors	Score	Weight	w*r
O1	Correlation with other agencies	5	0.22	1.1
O2	Financial support from the Navy	4	0.23	0.92
O3	Facilities outside the Indonesian Navy	2	0.15	0.3
				2.32
T1	*Covid* pandemic conditions	1	0.1	0.1
T2	Uncertainty about the schedule for using the Facility	1	0.13	0.13
T3	Procurement priority	2	0.17	0.34
		JML	1	**0.57**

Based on the external weighting table of the factors above, it can be seen that the weighting calculation is carried out to know how much these factors affect the strategy factor itself. The weighting of strategic factors in the table is obtained from a total score of 2.32 opportunities and a total threat score of 0.57 so the total external factors are 2.89. This assessment aims to provide a scale from 4 to 1 based on these factors.

The overall total value can show that this function is to optimize the Engine Simulator of the Sapudi Building with cabin facilities to support the operational training of the Mechanical engineering corps cadets against external factors. The following are the results of the analysis of opportunities and threats to the weights, ranking values, and scores that have been obtained :

a. Opportunity Analysis

Based on the results of the formulation of external factors, it is known that there are three opportunity factors. From all these criteria, it was found that the criterion that has the highest weight is correlation or collaboration with institutions outside the Navy with a weight of 0.80, while the criterion that has the lowest weight is sophisticated facilities owned by agencies outside the Navy with a weight of 1.1. weight 0.22.

Measurement rating is from 1 to 4. A score of 1 indicates a less likely condition and a score of 4 indicates a very likely condition. The ranking details are, 1 = less likely, 2 = somewhat likely, 3 = likely and 4 = very likely. Based on the answers from the experts' answers in the table above, each can be analyzed each criterion. The criteria for obtaining a rating are very likely, namely correlation with institutions outside AAL. In the third rank or included in the opportunity category, namely the budget support provided by the Navy to the agency. The last factor is the existence of

sophisticated facilities owned by other agencies outside the Navy which have a rating of one or less.

The next criterion factor which has the highest score which means the aspect which has the most opportunities big is the existence of correlation or cooperative relationship with agency or units working outside AAL with a score of 1.1 whereas which one with a score Lowest is facility advanced owned _ agency other with score 0.22.

b. Threat Analysis

Based on the results of the weighting of external factors, it is known that there are three threat factors. The factor that has the highest weight is procurement which is given based on a priority scale with a weight of 0.18, while the criterion that has the lowest weight is the presence of a virus pandemic that causes limited space for lattek with a weight of 0.10.

measurement rating is from 1 to 4. A score of 1 indicates a less threatening condition and a score of 4 indicates a very threatening condition. The rating details are, 1 = very threatening, 2 = threatening, 3 = somewhat threatening and 4 = less threatening. Based on the answers from the respondents in the table above, it can be analyzed completely on each criterion.

Based on the ranking calculation, the criteria for obtaining a threatening rating are: Procurement is carried out by the institution depending on the priority scale. The factor that received a less threatening rating was the virus pandemic which caused limited training space and training time.

3.2 Internal Factor Weighting

Table 2. Analysis of Internal Factors

	Internal factors	Rtng	Wght	b*r
S 1	Sigma Battleship-like design	4	0.08	0.32
S 2	Give the actual condition of the cadets	5	0.1	0.5
S 3	Provide educational support for cadets	4	0.07	0.28
S 4	Engineering Corps Department members provide high motivation for Facility maintenance	3	0.05	0.15
			1.25	
W 1	Operations provide less than optimal	3	0.13	0.39
W 2	The software has many problems	2	0.10	0.22
W 3	Lack of cubicle facilities to support exercise	2	0.2	0.4
W 4	The application is never updated	2	0.14	0.28
W 5	Engine controller not working properly	2	0.07	0.14
W 6	Lack of personnel in the Engineering department	3	0.06	0.18
		JML	1	**1.61**

Internal Factors After knowing the strengths and weaknesses of internal factors in the development of the Engine Simulator Room for the Sapudi Building, the IFAS weighting is carried out as shown in the following table :

a. Strength Analysis

Based on the table weighting factor internal, is known there is four criteria strength. of the four criteria, could is known that the criteria weight highest is Sapudi Building Simulator Engine with facility simulator capable engine give description real for mechanical engineering corps cadets in Thing control engine During exercise execution with weight 0.1. Weight Lowest which shows the criteria weight smallest is an engine simulator as a tool to help study with a weight of 0.05.

The next evaluation measurement started from 1 until 4. Score 1 shows the condition is not enough strong and score 4 shows the condition is very strong. Thing this showed with score 1 = not enough strong, 2 = rather strong, 3 = strong, and 4 = very strong. Could be analyzed by completing each criterion that is Engine simulator designed like KRI class sigma, Giving description real for cadets corps technique, As tool help study get rating four which is category influence very strong. Rating 3 with category strong that is motivation which tall from personnel Ministry ESDM in Engine Simulator maintenance.

The score is a multiplication Of weight and ranking. Criteria which are important and in condition good are criteria which have scored tall. So also on the contrary criteria which not enough important and in condition not enough good is criteria which have scored low. Based on the weighting factor internal in on, show that score highest is Engine Simulator which gives description real for cadets in machine control function with score 0.5. The next criterion which has a score Lowest is the height motivation apparatus Ministry of National Education in Engine Simulator maintenance with a score of 0.15. It means criteria this is aspect strength but in condition most no good and the weight not enough important compared to criteria other.

b. Weakness Analysis

Based on the results of the weighting of internal factors, it is known that there are six criteria for weakness. From all these criteria, it can be seen that the criterion that has the highest weight is the lack of cubicle facilities as practice support with a weight of 0.2, while the criterion that has the lowest weight is the lack of personnel from the mechanical engineering corps department with a weight of 0.06.

Rating measurement range from 1 to 4. Score 1 shows a condition which not enough weak and A score of 4 shows a condition very weak. Rank rating is, 1 = very weak, 2 = weak, 3 = somewhat weak, and 4 = not enough weak. Based on answers from

the answering expert in table 4.7 at the top can be analyzed by complete on respectively i.e _ use space which no max, software which often experiences an error, lack of facilities cubicle supporter practice, engine simulator app which seldom updates, lack of personnel in the part department. Next, get rating one including in less category weak that is equipment engine control on Engine Simulator in MCR not yet ready.

Based on the weighting factor internal, the factor that has scored highest which means an aspect weakness weakest is the application rare engine simulator updated with a score of 0.28. Whereas which get score Lowest is equipment engine control on the MCR simulator engine is not yet ready with a score of 0.14.

Based on the calculation of the results done through analysis SWOT obtained score end and recapitulation factor internal and external, as seen in the table following :

Table 3. Recapitulation Factor Internal and External

NO	FACTOR	DESCRIPTION	SCORE
1.	Internal factors	*Strength (S)* *Weakness (W)*	1.25 1.61
2.	External Factors	*Opportunity (O)* *Threat (T)*	2.32 0.57

The step next is to look for analysis position SWOT use strategy weight calculation :

Table 4. SWOT. Quadrant Analysis

S	1.25	-0.36
W	1.61	
O	2.32	1.75
T	0.57	

From the calculation of the results, axis x is at -0.36 and axis y is at 1.75, so the position quadrant SWOT could be viewed in the picture following :

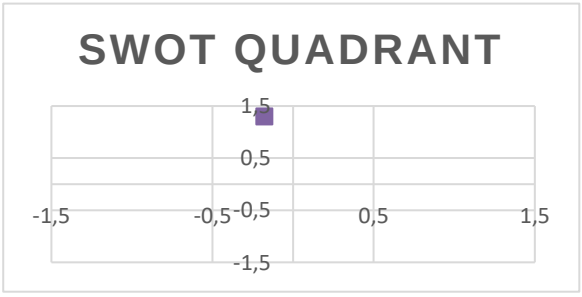

Figure 2. SWOT Quadrant

The results of the weighting of internal and external factors resulted in an alternative strategy that got the highest score was weaknesses-opportunities (WO) as shown in Figure 2. It can be concluded as a strategy to take advantage of opportunities to overcome weaknesses.

Based on the results of the calculation recapitulation above, the next step is to determine the SWOT matrix to determine the strategy to be used which is analyzed using the SWOT matrix. The strategy chosen is a combination of strategies obtained from existing opportunities that are maximized to reduce or cover existing weaknesses so that the combination can be used as a strategy.

Quadrant III is a condition that has a very large opportunity, but on the other hand, faces internal constraints/weaknesses. The focus of the strategy in this condition is to minimize existing internal problems by maximizing existing opportunities through strategy reviews to produce something new.

Based on the strategy formulation obtained to optimize the Sapudi Building Engine Simulator with cubicle facilities to support the Mechanical engineering corps cadets, a strategy ranking was carried out from the results of interviews and questionnaires by experts using the Borda Method. The following are the results of the analysis using the Borda Method for ranking strategies for respondents.

Table 5. WO. Strategy

NO	WO STRATEGY	CODE
1	Increase amount of Mechanical engineering corps personnel Academy Navy _ through coordination with Disminpersal.	WO1
2	Updated the simulator engine App feature.	WO2
3	Upgrading cubicle facilities by the latest provision standard with the latest development technology.	WO3
4	Improve the operating competence of the corps departmental personnel through computer courses.	WO4
5	Do an update on engine control equipment in engine simulators.	WO5

In the table above, it can be seen that there were five strategies chosen and the ranking of strategies was carried out through the Borda questionnaire which was filled out by respondents to obtain strategic priorities. The ranking starts from Roman numerals I for strategy sequence 1, Roman numerals II for strategy sequence 2, Roman numerals III for strategy sequence 3, Roman numerals IV for strategy sequence IV, and Roman numerals V for strategy

order 5. Below are the results of Borda's questionnaire for the ranking strategy of the respondents :

Table 6. Priority Calculation Strategy

RANK	STRATEGY					n-1
	WO1	WO2	WO3	WO4	WO5	
I		2	3			5
II		3		1		3
III				2	2	2
IV	2			1	2	0
V	3				1	0
TOTAL	5	5	5	5	5	

The next step is to normalize by multiplying each frequency by (n-1) as shown in the calculation table below :

Table 7. Calculation of Strategic Priority Normalization

RANK	STRATEGY				
	WO1	WO2	WO3	WO4	WO5
I	0	4	12	0	0
II	0	5	0	2	0
III	0	0	0	2	2
IV	2	0	0	1	2
V	0	0	0	0	0
AMOUNT	2	9	12	5	4
TOTAL	32				
WEIGHT	0.062	0.281	0.375	0.156	0.125
RANK	**5**	**2**	**1**	**3**	**4**

Score weight obtained with share normalization amount for every strategy with amount total normalization. The calculation normalization for each weight is as follows :

Weight WO1=1/32=0.062

Weight WO2=10/32=0.281

Weight WO3=12/32=0.375

Weight WO4=6/32=0.156

Weight WO5=3/32=0.125

Total Quantity = 1.00

From calculation in on, order priority strategy can be seen on chart following :

Figure 3. Strategy Priority Ranking Results

In determining strategic priorities, it aims to determine alternative strategies that must be implemented first according to the level of importance. Based on the graph above, it can be seen that the main priority with the highest weight of 0.375 is the WO3 strategy. Carry out improvement of cubicle facilities according to standard provisions by adjusting to the latest technological developments. The second priority with a weight value of 0.281 is the WO2 strategy, namely rejuvenating the bridge simulator application features. In third place with a weighted value of 0.156 is WO4. Improving the competence of departmental personnel through computer courses. The next fourth order with a weight value of 0.125 is the strategy for implementing engine control equipment updates on the Engine Simulator.

4. CONCLUSIONS

With the Borda method, the results of the global priority weights can be formulated which show that the strategic priority scale that can support the optimization of the Sapudi Building Engine Simulator with cubicle facilities to support the cadet corps technique is :

a. Carry out upgrading of cubicle facilities following standard provisions and be able to adapt to the latest technological developments. get the highest weight which is 0.375.

b. Doing rejuvenation on app engine simulator features with weights 0.281.

c. Enhancement competence personnel Deptek through courses computer get weight 0.156.

d. Implementation updates equipment engine control in the simulator engine get weight 0.125.

e. The increase in the number of AAL mechanical engineering corps personnel through coordination with Disminpersal through coordination with Disminpersal received a weight of 0.062.

The strategy formulation obtained is expected to optimize the Sapudi Building Simulator Engine with cubicle facilities to support the Mechanical engineering corps cadets. This is very important because it can improve the quality of the use of the Sapudi Building

Engine Simulator and the quality of the AAL Corps technical cadets who have the knowledge, competence, training facilities, and joint skills through the development of operating technology.

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