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ANALYSIS OF OCCUPATIONAL SAFETY AND HEALTH RISK MANAGEMENT ON THE AMPHIBIOUS OPERATIONS EXERCISE USING HIRARC METHOD

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ABSTRACT

To Keep Indonesian defense, the TNI has one of the main tasks, namely carrying out War Military Operations (OMP). One form of this operation is the amphibious operation, which is a military operation launched from the sea by the Indonesian Navy's marine units and landing troops loaded on ships and involving air power. In its implementation, amphibious operations exercises contain potential risks that can endanger the safety of personnel and defense equipment materials. Several accidents in amphibious operations have been experienced by the Indonesian Navy. The purpose of this study is to determine the risks that exist in amphibious operation activities and then measure the risk value in amphibious operation activities so that risk control proposals can be made. The method used in this study is HIRARC. The HIRARC method is widely used in the world and is very suitable to be applied in conducting a risk analysis because it is considered complete enough to include the process of risk identification, risk assessment and risk control. Based on the risk analysis using HIRARC, it is known that amphibious operation training activities have 84 potential risks with 19 risks at the extreme level, 27 risks at the high level, 29 risks at the moderate level and 9 risks at the low level. While the highest risk value is in the attack stage with a risk value of 297. With the research results that have been obtained, several proposals for risk control and appropriate risk mitigation can be proposed in order to realize the Navy towards zero accident.

Keywords: *Amphibious Operation, Risk Management, HIRARC*

1. INTRODUCTION

Law of the Republic of Indonesia No. 3 of 2002 concerning National Defense has provided legality for the role and function of the TNI as a means of state defense in upholding the integrity and sovereignty of the Unitary State of the Republic of Indonesia from various threats both from outside and within the country. In tackling these threats, a series of operations are carried out, including combat operations.

Joint Operations of the TNI as a combat, carried out by deploying various TNI forces. Joint TNI operations can be carried out in various types of operations, one of which is Amphibious Operations.

Amphibious Operations are carried out by the Amphibious Joint Task Force with task organizations including the Marine Task Force, Landing Forces Troops and Air Task Forces. This operation was launched by Amphibious Joint Task Force Command starting from the embarkation area, then by sea and landed in certain coastal areas to carry out their main tasks. The main purpose of carrying out Amphibious Operations is to seize an area on the enemy's coast or potentially be controlled by the enemy in order to support the implementation of further combat operations and prevent an area or facility from being used by the enemy.

The risk of work accidents can happen to anyone, anytime and anywhere, including in the Indonesian Navy's work environment which is full of the potential for accidents. Accidents are one of the things that need to be avoided because they cause various losses to the organization. Accidents have a bad impact and the effects vary from minor injuries to fatalities and mild to severe environmental and property damage (Mullai, 2011) .

Based on data summarized from several sources, several defense equipment accidents occurred in the Indonesian Navy (figure 1)

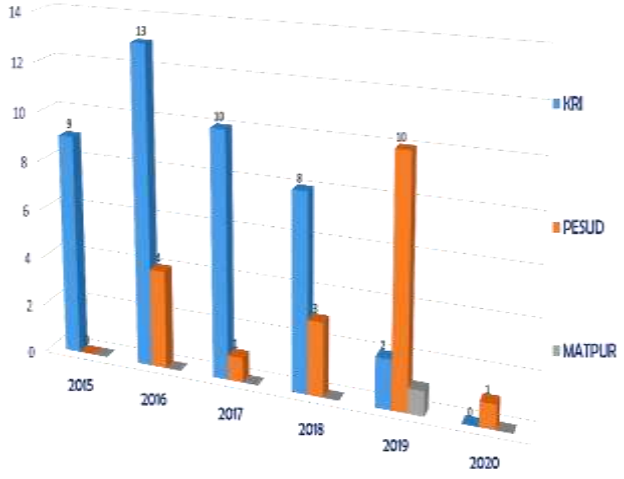

Figure 1, Accident Data of the Indonesian Navy

Based on these data, the potential for accidents can be experienced by KRI or Tank Amphibious in every operation or training activity, including Amphibious Operations Exercise which is essentially a war simulation exercise. The potential risks that can occur in this Amphibious Operations Exercise can be in the form of work accidents that threaten the safety of personnel and materials and can even threaten the success of operating tasks.

Responding to the high number of accidents in operations/training activities within the Indonesian Navy, the Indonesian Navy has set a target of zero accidents or no work accidents at all in every operation/training activity. The purpose of zero accident is to change the mindset of soldiers that accidents can be prevented and no soldiers should be harmed by taking preventive steps that must be taken, namely through risk management.

To minimize the occurrence of a work accident, a risk management is needed in an organization. Risk management aims to minimize losses that must be borne by an organization (Australian/New Zealand Standard, AS/NZS 4360, 2004) . In the risk management process, appropriate strategies and actions are needed to handle the level of risk from a high level to a low level.

Based on these conditions, it is necessary to have a study that discusses risk management in Amphibious Operations Exercise activities carried out by the Indonesian Navy in order to realize the achievement of a zero accident Navy Navy.

In this study, a risk analysis was carried out using the Hazard Identify, Risk Assessment and Risk Control (HIRARC) method. The HIRARC method is very suitable to be used to carry out risk analysis of a work activity because it is quite complete with a hazard identification process, risk measurement to risk control. For the proposed risk control, this study uses a reference to the 2018 ISO 45001 standard.

This paper is organized into several parts, the second part are the material and method, the third part are the research results, the fourth part are the discussion and finally the fifth part are the conclusion.

2. MATERIAL AND METHODS

2.1 Amphibious Operation

Amphibious Operation is an operation that integrates various types of forces, namely ships, aircraft and landing troops in an attack on the enemy's coast and has the potential to be controlled by an enemy who has a marine nature so that in this operation the Indonesian Navy plays a major role. Amphibious Operations are carried out from the sea by the Navy's Marine Units and landing troops loaded on ships and amphibious landing facilities and landed on enemy beaches and/or beaches potentially controlled by the enemy. In its implementation, Amphibious Operations are carried out by the Amphibious Joint Task Force Command, which is a task organization formed to carry out Amphibious Operations, including the Marine Task Force, Landing Forces Troops, and Air Task Forces.

In the Amphibious Operations Jukgar Book it is explained that the implementation of Amphibious Operations has several stages including:

a. Planning stage.

The planning stage takes place from the time the instructions are received preliminary operation until the start of embarkation.

b. Embarkation Stage.

The embarkation stage is the period of time during which troops, equipment and supplies are loaded into the ships that have been determined. Embarkation is carried out in accordance with a detailed loading plan so that the use of ship transportation facilities can be utilized as effectively and efficiently as possible.

c. General Exercise Stage.

General exercises are carried out as far as possible under conditions of which is almost the same as the conditions that will be encountered in the actual operation.

d. Movement Towards Target Stage.

In this stage the Amphibious Joint Task Force Command element moves from the point embarkation to battle field. This stage can go through a general training area, waiting area or gathering area and ends when Amphibious Joint Task Force Command elements have arrived at a predetermined position in the Amphibious Target Area .

e. Raid Stage.

The raid stage covers the time between arrivals the main body of Amphibious Joint Task Force Command in a predetermined position in the Amphibious Target Area until the completion of the implementation of the main tasks of Amphibious Joint Task Force Command.

f. End of Amphibious Operations.

Amphibious Operations are declared to end after the main tasks of Amphibious Joint Task Force Command can be completed in accordance with the conditions stated in the Preliminary Instructions.

2.2 Risk Management

Risk management is defined as a science that discusses how an organization determines the size in mapping an existing problem by placing various management approaches that are carried out comprehensively and systematically (Fahmi, 2010). Risk as uncertainty about future events or risk is a form of uncertainty about a situation that will occur later (future) with decisions taken based on various considerations at this time (Griffin, 1996).

OHS management systems that are widely applied in the world include OHSAS 18001:2007, ISO 45001:2018 and the system developed by Australia AS/NZS 4360:2004. In the risk management system used, AS/NZS 4360:2004 divides risk management into 3 parts, namely Hazard Identification, Risk Assessment, and Risk Control or commonly known as HIRARC.

2.3 *Hazard Identify, Risk Assessment and Risk Control* (HIRARC)

Hazard Identification, Risk Assessment and Risk Control (HIRARC) is a reference for risk management actors in identifying hazards, assessing risks and controlling risks in an activity process. The purpose of HIRARC is a systematic and objective and structured approach to assessing hazards and risks that may occur, so as to provide an objective assessment of a hazard identification and provide appropriate methods for controlling risks. (Department of Occupatinal Safety and Health, 2008).

a. Hazard Identification

Hazard identification is a systematic effort to find out the potential hazards that exist in the work environment. Without knowing the hazard, the risk cannot be determined, so that risk prevention and control efforts cannot be carried out

b. Risk Assessment

The risk assessment in HIRARC is carried out by referring to the *Australian Standard/New Zealand Standard for Risk Management* (AS/NZS4360) scale. According to this standard issued by the countries of Australia and New Zealand, the parameters used in assessing risk are divided into 2, namely *probability* and *severity* (Australian/New Zealand Standard, AS/NZS 4360, 2004) . The risk assessment scale and the descriptions used can be seen in table 1, table 2 and table 3.

Table 1 Index *Likelihood* AS/NZS 4360

Level	Description	Information
1	*Insignificant*	Minor injuries, Little financial loss
2	*Minor*	minor injury, little financial loss
3	*Moderate*	moderate injury, need medical treatment big financial loss
4	*Major*	Serious injury with victim > 1 person, big loss, production interruption
5	*Catastrophic*	Death of > 1 person, very large loss and very wide impact, cessation of all activities

Table 2 Index *Severity* AS/NZS 4360

Level	Description	Information
5	*Almost Certain*	Can happen any time
4	*Likely*	Often occurs
3	*Posibble*	Maybe it can happen
2	*Unlikely*	Very rarely happens
1	*Rare*	Almost never happened

Tabel 3 *Risk Matrix* Standar *AS/NZS 4360*

Likelihood (Frequency) Of Risk)	Severity (Risk Effect)				
	1	2	3	4	5
5	M	H	E	E	E
4	M	H	H	E	E
3	L	M	H	H	E
2	L	M	M	H	H
1	L	L	L	M	M

Risk calculation is done by multiplying the Likelihood value with Severity .

Risk = Likelihood x Severity ..... (2.1)

Keterangan:

Where:

Likelihood = Chances it happen.

Severity = Severity level.

c. Risk Control

Risk control is carried out on all hazards found in the hazard identification process and considers risk ratings to determine priorities and how to control them. In ISO 45001, applying specific risk control guidelines in the field of K3 with control groupings namely elimination, substitution, engineering control, administrative control, and the use of Personal Protective Equipment (PPE).

2.4 Research Design

This research follows the research steps as shown in Figure 2 below:

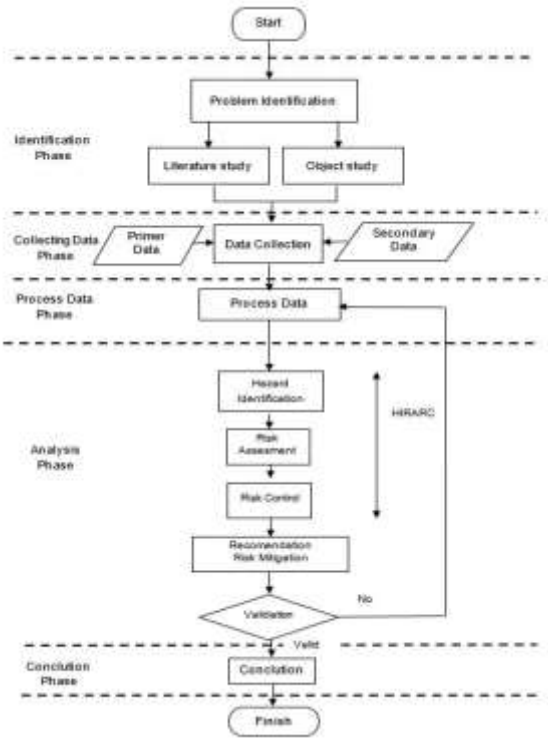

Figure 2, Research Design

3. RESULTS AND DISCUSSION

3.1 Results of Hazard Identification and Risk Assessment

From the data collection process, hazard identification is carried out. The results of the hazard identification that have been carried out based on the mapping of the activity stages, it is known that there are several potential risks in Amphibious operation activities. Furthermore, a risk assessment was carried out on several potential risks by submitting a questionnaire to the experts with the results as shown in the following table:

Table 4. Risk Event

No.	Risk Event	Code	Risk Score
1	The ship sank and there was a leak in the seawater system or the bottom of the ship's waterline due to the preparation of machinery equipment and checking the platform system was not optimal	B4	20
2	Ship collision or run aground due to inadequate preparation of navigation equipment	B9	15
3	Ship collision or run aground due to navigational hazard when scouting out of the channel	B15	20
4	Ship collisions, torn hulls and leaks due to jammed rudders or hitting floating objects	B16	20
5	Ship collision or run aground due to navigational hazards during the shipping process	B17	20
6	The hull of the ship was torn and a leak occurred during the shipping process due to hitting a floating object	B18	20
7	Personnel fell into the sea due to waves and big waves during voyage	B19	15
8	There was a fire during the cruise due to an electric short circuit	B20	20
9	The ship sank during the voyage due to a leak in the sea water system or damage to the ship's underwater body	B21	20
10	There was a fire during the voyage due to a leak in the fuel system in the ship's engine	B22	20
11	Tank Amphibious leaked and sank during the process of launching the Tank Amphibious into the sea in a general exercise stage stage	C11	20
12	Danger of ship navigation crash or run aground when determining the lego point in the general exercise stage stage	C14	15
13	Tank Amphibious fire due to leakage of the fuel system during the attack stage	D13	15
14	Tank Amphibious leaked and sank during the process of launching the Tank Amphibious into the sea in the attack stage	D16	20
15	Tank Amphibious leaks and sinks during maneuvering at sea in the attack stage	D17	20
16	Danger of ship navigation crash or run aground when determining the lego point in the attack stage	D18	15
17	Danger of ship collision navigation when carrying out the role of evasion	D25	20
18	Tank Amphibious exploded as ammunition exploded in the barrel at the time of shooting	D27	15
19	Recoset ammunition hits personnel at the time of firing	D28	15
20	Shocked while preparing the bow door ramp's power supply in the embarkation stage	A1	8
21	Tank Amphibious cannot enter or exit because the bow door ramp is damaged or the hydraulic system is leaking during the embarkation stage	A8	12
22	Shocked when preparing the engine aircraft in the preparation stage for sailing ships	B1	8
23	There was a fire due to a leak in the fuel system while preparing the engine before the ship sailed	B3	15
24	Shocked when preparing electronic aircraft in the preparation stage for sailing ships	B8	8
25	Shocked when preparing the anchor plane in the preparation stage for sailing ships	B11	8
26	The crew was hit by a broken rope while operating the tros rope	B12	8
27	Shocked while setting up the bow door ramp's electric current in the general exercise stage stage	C1	8
28	Tank Amphibious cannot enter or exit because the bow door ramp is damaged or leaks in the hydraulic system in the late stage	C8	12
29	The personnel experienced respiratory problems due to air pollution when Tank Amphibious warmed up in the late stage	C9	12

No.	Risk Event	Code	Risk Score
30	Material damage due to Tank Amphibious hitting the ship's hull during its descent into the sea in the general exercise stage stage	C10	12
31	Shocked when preparing electricity for lego/anchor lifting in general exercise stage stage	C15	8
32	Crew falls into the sea while passing on the open deck during lego/lift anchor in general exercise stage stage	C18	9
33	When lowering the anchor in the general exercise stage stage, the anchor is lost/falls into the sea due to the anchor brake lever not working	C19	12
34	When raising the anchor in the late stage, the anchor cannot enter the anchor housing due to jammed/rusted swivel	C20	12
35	Shocked when preparing the electric current for the bow door ramp in the attack stage	D1	8
36	The crew fell from a height while preparing the bow door ramp in the attack stage due to the big waves	D5	8
37	Tank Amphibious cannot enter or exit because the bow door ramp is damaged or the hydraulic system leaks during the raid stage	D8	12
38	The personnel experienced respiratory problems due to air pollution during the heating of Tank Amphibious in the attack stage	D9	12
39	Tank Amphibious crew's finger was broken as a result of being pinched by the dome of the door of Tank Amphibious when boarding Tank Amphibious in preparation for launching Tank Amphibious into the sea in the attack stage	D11	9
40	Tank Amphibious fire due to electrical short during the attack stage	D12	12
41	Material damage due to Tank Amphibious crashing into the ship's hull while descending to the sea in the attack stage	D14	12
42	Shocked while preparing electricity for lego/anchor lifting in attack stage	D19	8
43	Crew falls into the sea while passing on the open deck during lego/lifting anchor in raid stage	D22	12
44	When lowering the anchor in the attack stage, the anchor is lost/falls into the sea due to the anchor lever brake not working	D23	9
45	When raising the anchor in the attack stage, the anchor cannot enter the anchor housing due to jammed/rusted swivel	D24	9
46	Personnel suffered injuries due to falls while the ship was carrying out the role of embezzlement	D26	12
47	Falling from the stairs due to slipping while preparing to open/close the bowdoor ramp in the embarkation stage	A2	6
48	Falling from a height while opening the locking spanscrew due to big waves when preparing to open/close the bowdoor ramp in the embarkation stage	A5	6
49	The crew fell/bounced due to the break between the retainer when opening the ramp during the embarkation stage	A6	6
50	The crew fell/slipped due to a hydraulic oil spill during the preparation of the bow door ramp in the embarkation stage	A7	6
51	Personnel injured as a result of being hit by Tank Amphibious at the time of receiving Tank Amphibious to the ship from the dock in the embarkation stage	A10	4
52	Material damage (hull/Tank Amphibious) due to being hit by Tank Amphibious when receiving Tank Amphibious to the ship from the dock in the embarkation stage	A11	6
53	Material damage (hull/Tank Amphibious) due to Tank Amphibious slipping and not being controlled when entering from the sea to the ship	A12	6
54	The personnel were hit by alternating slashes due to the alternating breaking when Tank Amphibious was pulled into the ship using a holdwinch because Tank Amphibious was on strike.	A13	4
55	The crew slipped and were injured due to an oil system leak while preparing the engine for sailing	B2	6
56	Fall from stairs and injury due to slipping while preparing nautical equipment and weapons in preparation for sailing ships	B5	6
57	Fall from stairs and injury due to slipping when raising or lowering the ship's signal flag	B10	6

No.	Risk Event	Code	Risk Score
58	Personnel fall or slip due to slippery decks and large waves while manning ropes during rear-facing roles	B13	6
59	Personnel fall or slip due to slippery deck and big waves when raising/lowering the stairs	B14	6
60	Falling from the stairs due to slipping while preparing to open/close the bowdoor ramp in the late stage	C2	6
61	Falling from a height while opening the locking spanscrew due to big waves while preparing to open/close the bowdoor ramp in the late stage	C5	6
62	The crew fell/bounced due to the break between the retainer when opening the ramp in the general exercise stage stage	C6	6
63	The crew fell/slipped due to a hydraulic oil spill during the preparation of the bow door ramp in the late stage	C7	6
64	Material damage (hull/Tank Amphibious) due to Tank Amphibious slipping and not being controlled when entering from the sea to the ship	C12	6
65	Personnel pinched and injured when opening or closing anchor seal locks when lego/lifting anchor is in general exercise stage stage	C16	6
66	Personnel pinched and injured when operating anchor line when lego/lifting anchor is in general exercise stage stage	C17	6
67	Falling from the stairs due to slipping while preparing to open/close the bowdoor ramp in the raid stage	D2	6
68	The crew was caught and injured when opening the spanscrew while preparing the bow door ramp in the attack stage	D3	6
69	Falling from a height while opening the locking spanscrew due to big waves when preparing to open/close the bowdoor ramp in the attack stage	D4	6
70	The crew fell / bounced due to the break between the retainer when opening the ramp during the raid stage	D6	6
71	The crew fell/slipped due to a hydraulic oil spill during the preparation of the bow door ramp in the raid stage	D7	6
72	The crew slipped / fell and were injured while ascending / descending Tank Amphibious at the time of launching Tank Amphibious into the sea in the attack stage	D10	6
73	The crew was hit by Tank Amphibious and injured during the launch of Tank Amphibious into the sea in the attack stage	D15	6
74	Personnel pinched and injured when opening or closing anchor seal locks when lego/lifting anchor in attack stage	D20	6
75	Personnel pinched and injured while operating anchor line when lego/lifting anchor in attack stage	D21	6
76	Crew caught and injured when opening the spanscrew while preparing the bow door ramp in the embarkation stage	A3	3
77	The crew fell and was injured due to the porous deck when opening/locking the bow door ramp spans during embarkation stage	A4	2
78	The crew was injured due to the fall of the plate when installing the base plate shoes at the time of receiving Tank Amphibious to the KRI in the embarkation stage	A9	2
79	Personnel hit by a tank when the turntable is operating in the embarkation stage	A14	2
80	Personnel injured due to being pinched by mechanical weapons when preparing weapons equipment	B6	3
81	Personnel injured by falling hard objects while preparing nautical equipment and weapons	B7	3
82	The crew was caught and injured when opening the spanscrew while preparing the bow door ramp in the general exercise stage stage	C3	3
83	The crew fell and was injured due to a porous deck when opening/locking the spanscrew of the bow door ramp in the late stage	C4	2
84	Personnel hit by a tank while the turntable is operating at the time of rebarkage in the late stage	C13	2

Risk Score = Likelihood x Severity

Overall, there were 84 risk events in the Amphibious Operations Exercise. Furthermore, the risk events are grouped according to the level of risk, namely *Extreme Risk is* shown in red, *High Risk is* shown in yellow, *Moderate Risk is* shown in blue and *Low Risk is* shown in green. The risk levels at each stage are summarized and presented in the following figure 3.

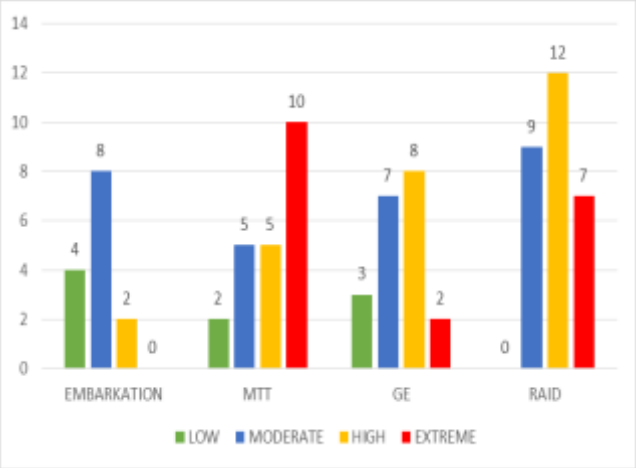

Figure 3. Risk Level at the Amphibious operation

From the results of data processing, based on the value of the risk score in Amphibious Operations Exercise activities, it is known that the highest risk potential is in the Raid stage with a risk score of 297, followed by the Movement Towards Target Stage with a risk score of 273, then the General exercise stage stage with a risk score of 169 and the next stage with a risk score of 169. Embarkation with a risk score of 73 (figure 4).

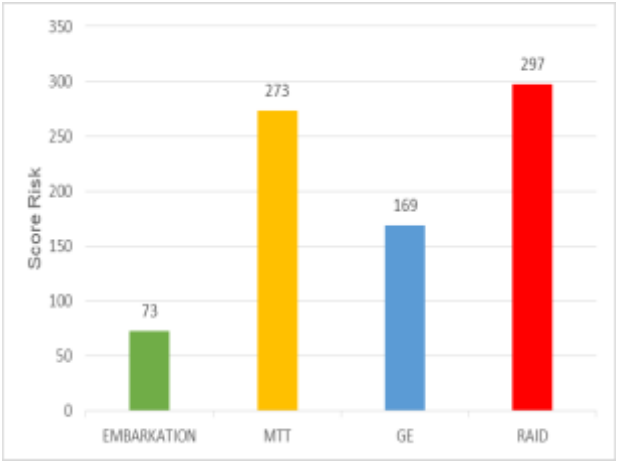

Figure 4. Risk Score at the Amphibious operation

Overall, the Amphibious Operations Exercise can be said to be an activity that has a fairly high risk. The percentage of risk level for Amphibious Operation Exercise as a whole is presented in Figure 5 below:

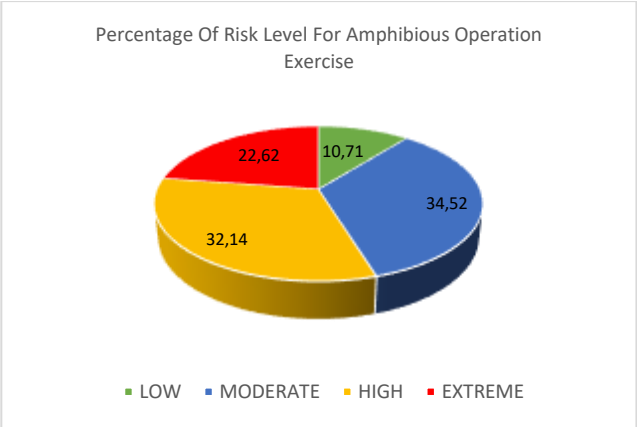

Figure 5. Percentage of Risk Level

3.2 Risk Control and Mitigation

Based on the incidence of potential accidents during the amphibious operation exercise, several main causes that have the potential to cause accidents can be taken. Furthermore, from these causes, risk control is carried out. The risk management and control approach is carried out with a risk management approach according to the ISO 45001:2018 standard, namely Elimination, Substitution, Technical Control, Administrative Control, and Use of Personal Protective Equipment (PPE). Some recommendations for risk mitigation that can be done to control the risks that occur are shown in the following table 5:

Table 5. Proposed Risk Control

No.	Causes of Risk	Risk Control
1	Indifference/Apathy	**Administration** -Awareness and character building, work briefing, self-motivation.
2	negligent	**Administration** -Awareness and character building, work briefing, self-motivation.
3	Don't Know How To Operate	**Administration** -Job training, professional development, placement of operating procedures on each aircraft, job checklists, job briefings.
4	Less Skilled	**Administration** -Job training, professional development, placement of operating procedures on each aircraft, job checklists, job briefings, instilling self-motivation in soldiers.
5	Corrosion	**Substitution and *Engineering Control*** -Replacement of damaged materials, training in material maintenance, work briefings, increasing professionalism, strict supervision of repairs so that replacement materials meet standards, fulfillment of work equipment for installing corrosion control technology on ship hulls such as Zinc anode, ICCP and others.

No.	Causes of Risk	Risk Control
6	Material Age	**Elimination, Substitution and Administration** - Elimination / prohibition of operating defense equipment that is more than 40 years old. Replacement of damaged or old materials, supervision and internal audit of the implementation of defense equipment maintenance.
7	Material Quality	**Substitution and Administration** -Replacement of low-quality materials, internal audit of defense equipment maintenance implementation, strict supervision of repairs so that replacement materials meet standards.
8	Inappropriate Treatment Techniques	**Administration** -Job training, professional development, fulfillment of maintenance procedure instructions in each work department, technical maintenance checklist, job briefing, instilling self-motivation in soldiers.
9	Maintenance Not Routinely Implemented	**Administration** -Professional development, work briefing, instilling self-motivation in soldiers, supervision and internal audit reporting on aircraft maintenance and defense equipment.
10	Broken/Not Working Well	**Substitution, Administration and *Engineering Control*** - Replacement of damaged aircraft or components, Modification or repair of damaged aircraft, Design of *safety device* or sensor *safety devices* on aircraft, *Checklist* and reporting of aircraft technical conditions on a regular basis, implementation of *final checking* on each aircraft to be operated, fulfillment of critical spare parts on each aircraft
11	Bad weather	**Administration** **-** Carry out operational planning carefully and measurably, always *update* the weather news
12	Not According to Shipping Procedures	**Administration** -Job training, professional development, fulfillment of shipping procedure instructions in each work department, shipping procedure *checklist* , work *briefin g* , instilling self-motivation in soldiers
13	Lack of Discipline	**Administration** **-** Development of awareness and character, work *briefing* , self-motivation, development of work professionalism.
14	Natural Condition	**Administration** - Carry out careful and measurable operation planning, always *update* the latest conditions in the operating area.
15	Marine Pollution	**Administration** **-** Carry out operational planning carefully and measurably, always *update* the latest conditions in the operating area, coordinate and communicate with relevant *stakeholders* regardi ng the situation in the operating area.
16	Fear of facing fire when the fire is still small	**Administration,** Awareness and character building, work *briefing* , self-motivation cultivation, work professionalism development, regular fire handling training to form soldiers' mentality
17	Aircraft Operation Not According to Procedure	**Administration, -** Job training, professional development, compliance with operating procedure instructions on each aircraft, aircraft operating procedure *checklists* , work *briefi ngs* ,
18	Number of Apar Less	**Administration** - Fulfillment of the number of fire extinguishers that are lacking, periodic reporting of the condition of extinguishers, internal audits and supervision of the implementation of the distribution of extinguishers
19	Expired fire extinguisher	**Substitution and Administration** -Replacement of *expired* APARs , *service* of non-standard APAR conditions, periodic reporting of the condition of extinguishers, internal audits and supervision of the distribution of extinguishers.
20	Number of Apar Less	**Administration and PPE** -Job training, professional development, fulfillment of shooting procedure instructions in each work department, shooting procedure *checklist* , work *briefin g* , always working with PPE.
21	Expired fire extinguisher	**Administration, PPE** **-** Job training, professional development, fulfillment of safety procedure instructions in each work department, *checklist* of security procedures, work *briefing* , always work using PPE.
22	Not in accordance with shooting procedures	**Administration and PPE** **-** Using PPE, work safety training, professional development, work briefing, supervision of the implementation of discipline in the use of PPE, fulfillment of PPE needs for all soldiers, giving strict action against personnel who do not wear PPE

No.	Causes of Risk	Risk Control
23	Not Conforming to Security Procedures	**Administration, PPE** **-** Job training, professional development, compliance with safety procedure instructions in each work department, *checklist* of security procedures, work *briefing* , strong reprimand and firm action against non-compliant personnel, supervision of the implementation of work safety rules and procedures, always working using PPE.
24	Not Using Safety Equipment	**Elimination, *Engineering control* and PPE** -Eliminate sources that cause slippery floors, install anti-slip in vulnerable workplaces, wear *safety shoes.*

4. CONCLUSION

Based on the results of the research that has been done, it can be concluded that the Amphibious Operations Exercise is an activity that contains quite a risk. Thus, the Navy must carry out careful planning and carry out appropriate risk management so that every Amphibious operation activity can run smoothly and safely so that zero accidents can be realized within the Navy.

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