



UDC 359

STRATEGIES TO INCREASE WORKERS' AWARENESS OF OCCUPATIONAL SAFETY AND HEALTH FACTORS IN THE WARSHIP REPAIR INDUSTRY

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ABSTRACT

The success of the warship repair industry is inseparable from occupational safety and health factors. This study aims to identify and analyze the factors influencing the Warship Repair Industry at the Indonesian Navy Second Fleet Command, analyze the implementation of safety and health measures in warship repairs, and examine strategies to enhance worker awareness of occupational safety and health factors at the Indonesian Navy Second Fleet Command. This research utilizes a mixed-method approach, combining qualitative and quantitative methods, with the research subjects being work units and providers involved in warship maintenance and repair. Sampling was conducted purposively, with data collection techniques including observation, questionnaires, and in-depth interviews. Internal and external factor analysis was then carried out using the SWOT method. The study focused on work units and providers involved in warship repair at Koarmada II, such as the Warship Maintenance and Repair Department of Indonesian Navy Second Fleet Command (Disharkap Koarmada II), the Material and Supply Department of Indonesian Navy Second Fleet Command (Dismatbek Koarmada II), the Maintenance and Repair Facilities in Surabaya (Fasharkan Surabaya), the East Region Material Maintenance Unit (Satharmattim), and the East Region Material Readiness Unit (Satlaikmattim), as well as providers who won the warship repair tenders. Issues regarding work outcomes and completion times can be resolved by prioritizing strategies that emphasize occupational safety and health.

KEY WORDS

Occupational safety, health, warship repair industry, SWOT analysis.

Warship repair activities at the Indonesian Navy Second Fleet Command are carried out based on Law No. 16 of 2012 concerning the defense industry (Presiden Republik Indonesia, 2012). These activities aim to support the national defense equipment (Alutsista) needs so that dependence on other countries is eliminated. The implementation guidelines have been regulated in the organization and procedure manual of the Navy's Material and Supply Department.

According to Law No. 16 of 2012 concerning the defense industry, the empowerment of the national defense industry is conducted to achieve self-reliance in the defense industry, thereby supporting national defense equipment needs and eliminating dependence on other countries.

The work units involved in the maintenance of ships in the Koarmada II region include (Desember, 2020):

- Warship Maintenance and Repair Department of Indonesian Navy Second Fleet Command (Disharkap Koarmada II);
- Material and Supply Department of Indonesian Navy Second Fleet Command (Dismatbek Koarmada II);
- Maintenance and Repair Facilities in Surabaya (Fasharkan Surabaya);
- East Region Material Maintenance Unit (Satharmattim);
- East Region Material Readiness Unit (Satlaikmattim).

The success of warship repairs is closely related to occupational safety and health factors, including worker competency, availability of lifting and transport equipment, work tools, existing infrastructure, work methods, understanding of material properties, and



procurement of goods and services, which must be efficient, effective, transparent, open, competitive, fair and non-discriminatory, and accountable (Sahron & Budiani, 2020).

The Occupational Health and Safety Management System (OHSS) provides guidelines to prevent workplace accidents during the execution of tasks, which could result in material losses and harm to workers, potentially delaying the completion of warship repairs, as shown in Table 2. Furthermore, the procurement system for goods and services offers guidance on acquiring the necessary goods and services needed.

Table 1 – Recapitulation of Maintenance and Repair at Disharkap Koarmada

No.	Task	Year			Follow-Up Repairs		
		2018	2019	2020	2018	2019	2020
1	Sewako	448	396	420	103	108	103
2	Platform	1.178	1.089	835	521	477	431

Source: Authors, data processed from various sources, 2021.

Table 2 – Impact of Workplace Accidents in Warship Repair Workshop in Surabaya, 2019-2021

No.	Incident Description	Impact	Year
1	Face struck by grinder stone fragments during aircraft disassembly in the machine workshop.	Serious injury to 1 person, outpatient care at the hospital for 1 month. Reduced personnel, delayed work targets, significant losses, production disruption.	2019
2	Right hand cut by grinder blade during DPK pump disassembly in the machine workshop, causing a deep cut.	Serious injury to 1 person (requiring stitches), outpatient care at the hospital for 1 month. Reduced personnel, delayed work targets, significant losses, production disruption.	2019
3	Fell from a height of 2 meters at the dock in Lawang while installing a crane motor due to a broken safety rope, resulting in a sprained right foot and a scratched left hand from the crane pole.	Serious injury to 1 person, outpatient care at the hospital for 1 year. Reduced personnel, delayed work targets, significant losses, production disruption.	2019
4	Right foot scratched by a metal plate in the electrical workshop, causing a cut on the heel, despite wearing safety shoes.	Serious injury to 1 person (requiring stitches), outpatient care at the hospital for 1 month. Reduced personnel, delayed work targets, significant losses, production disruption.	2019
5	Hit by the back cover of a cannon when the cannon's spring broke, causing the victim to be thrown 10 meters backward and hit a wall.	Serious injury to 1 person, outpatient care at the hospital for 1 year. Reduced personnel, delayed work targets, significant losses, production disruption.	2020
6	Head struck by an iron rack while arranging repaired pump motors awaiting verification in the electrical workshop, causing bruising and a cut on the head.	Serious injury to 1 person (requiring stitches), outpatient care at the hospital for 1 month. Reduced personnel, delayed work targets, significant losses, production disruption.	2020
7	Electrocuted by a 220V electrical current in the weapons workshop office during cannon control repair, due to an ongoing test by another team, resulting in shock and a fall causing bruising and a sprained foot.	Serious injury to 1 person, outpatient care at the hospital for 1 month. Reduced personnel, delayed work targets, significant losses, production disruption.	2021

Source: Interviews with victims/officers from each workshop (Herlambang, 2022).

Policies that play a crucial role in optimizing the maintenance and repair of warships include implementing procurement contracts for goods and services (Hakim & Suhardono, 2020). Procurement of goods and services is a key focus because it marks the beginning of the maintenance and repair process of warships, leading towards their operational readiness (Pangaribuan et al., 2020).

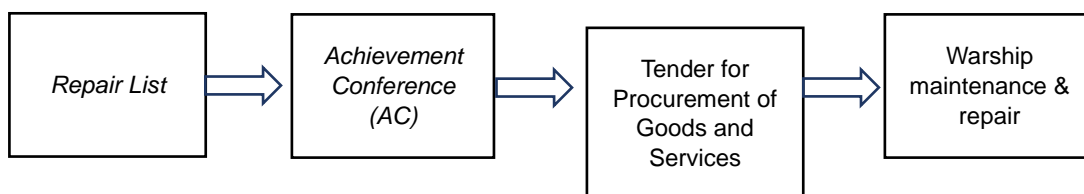


Figure 1 – Ship Maintenance and Repair Process Author's Source, 2021 (Source: Interviews with victims/officers from each workshop, Herlambang, 2022)



The research focuses on strategies to enhance workers' awareness of occupational safety and health factors in the warship repair industry. This research is based on data collected about the research object, emphasizing material aspects related to warship repairs. The data consists of primary and secondary data.

Primary data collected directly through: a. Measurements, questionnaires, and interviews b. Documentation.

Secondary data collected indirectly from: a. Records and books b. Supporting documents such as maps, graphs, etc., related to the results of observations and questionnaires.

Respondents for the questionnaires are selected from personnel involved in warship repairs and contractors who have won tenders for warship repairs, as detailed in Table 3.

Table 3 – Research Respondents

No.	Research Respondent	Area / Work Unit	Population	Sample Size (22% of Population)
1	Navy Personnel	Satharmattim	63	14
2	Navy Personnel	Satlaikmattim	62	13
3	Navy Personnel	Disharkap Koarmada II	98	22
4	Navy Personnel	Dismatbek Koarmada II	87	19
5	Navy Personnel	Fasharkan Surabaya	177	40
6	Navy Personnel	ABK KRI	484	105
7	Academics	STTAL	189	41
8	Contractor	Repair Workers	30	6
Total			1190	260

To calculate the minimum sample size required using Slovin's formula with a 10% margin of error (Sugiyono, 2017). Since the study used 260 respondents, which is greater than the minimum required sample size of approximately 92.25, the sample size meets the modeling requirements.

Table 4 – General Characteristics of the Sample

Respondent characteristics	Percentage	
Age	15 -30 Years	18,84 %
	31 – 45 Years	45 %
	46 – 55 Years	36,16 %
Gender	Male	77 %
	Female	23 %
Employment Status	Military	93,5 %
	Civilian	6,5 %
Work Experience	0 – 10 Years	18,85 %
	11 – 25 Years	64,23 %
	26 Years and Above	16,92 %
Education	High School	75,76 %
	Post-High School	24,24 %

Source: Author, Data processed from questionnaire results, 2023.

Table 5 – Respondent characteristics based on where the sample was taken

Work Unit	Average Age (Years)	Male (%)	High School Education (%)	Average Work Experience (Years)	Field Position (%)
Satharmattim	44	92,86	92,86	21	42,8
Satlaikmattim	29	100	100	13	100
Disharkap	41	72,73	63,64	20	31,82
Dismatbek	44	78,95	73,68	23	5,26
Fasharkan Surabaya	47	95	87,50	25	65
the crew members of the Indonesian Navy's warships	34	100	90,45	13	74,26
Academics	42	92,68	24,39	18	34,14
Contractor	50	66,67	66,67	30	83,33

Source: Authors, data processed from questionnaire results, 2023.



METHODS OF RESEARCH

This research employs a sequential mixed-method approach, starting with a quantitative survey followed by in-depth qualitative interviews.

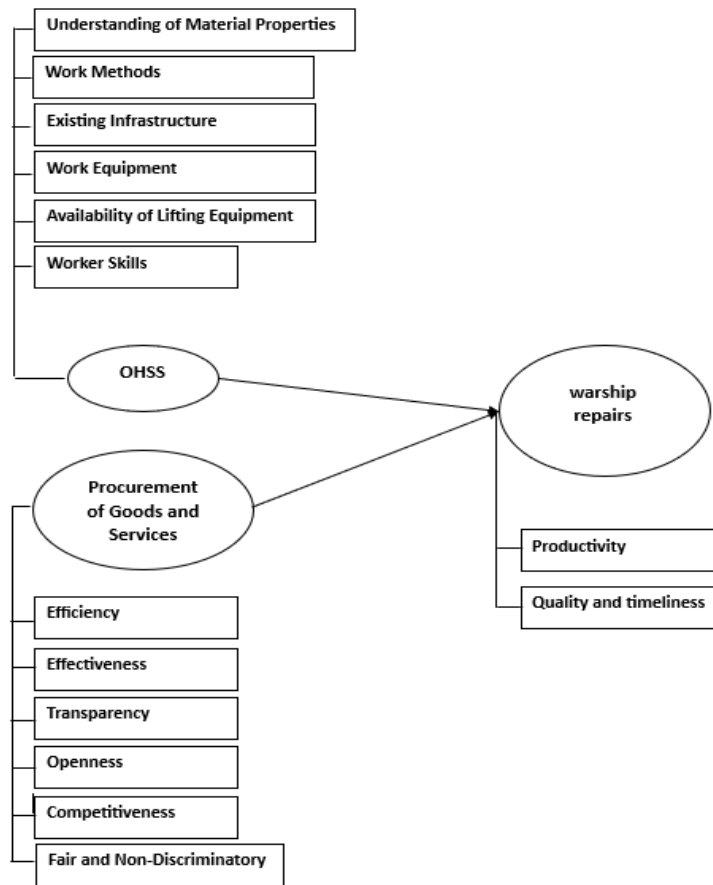


Figure 2 – Concept Model & Research Variables on Strategies to Enhance Worker Awareness of Occupational Safety and Health Factors in the Warship Repair Industry (Source: Author, 2022)

RESULTS OF THE STUDY

Based on the analysis of SEM data, the researchers mapped the problems related to the indicators in the occupational safety and health management system and the principles of procurement of goods and services, which will be used as references for conducting in-depth interviews with competent informants in warship repairs.

Based on the questionnaire data obtained from respondents in Table 2, a model fit test was conducted, resulting in data as shown in Table 4.

Table 6 – Model Fit Test

Goodness of Fit Index	Expected Value	Result	Conclusion
P-value Chi Square	≥ 0.05	0.000	Not fit
GFI	≥ 0.90	0.808	Not quite fit
AGFI	≥ 0.90	0.745	Not quite fit
NCP	Small	422.063	Not fit
CFI	≥ 0.90	0.825	Not quite fit
RMSEA	≤ 0.08	0.112	Not quite fit
RMR	< 0.05	0.031	good fit
TLI	≥ 0.95	0.792	Not quite fit
CMIN	≤ 0.05	551.063	Not fit

Source: Authors, data processed from AMOS Software, 2023.



Explanation:

- *P-value Chi Square*: The smaller the *p*-value, the better the fit between the theoretical model and the sample data;
- *Goodness of Fit Index (GFI)*: Measures the relative amount of variance and covariance. A higher GFI indicates a better fit;
- *DF (Degree of Freedom)*: Refers to the number of independent values or quantities which can be assigned to a statistical distribution;
- *Adjusted Goodness of Fit Index (AGFI)*: Similar to GFI but adjusted for the degrees of freedom, providing a better fit measurement for models with different degrees of freedom;
- *Noncentrality Parameter (NCP)*: A fixed parameter related to degrees of freedom, used to measure the difference between the population covariance matrix and the observed covariance matrix;
- *Comparative Fit Index (CFI)*: An indicator used to determine the degree of fit of a variable compared to a baseline model;
- *Root Mean Square Error of Approximation (RMSEA)*: A criterion for covariance structure modeling that considers errors close to the population;
- *Root Mean Square Residual (RMR)*: Represents the average of all standardized residuals;
- *Tucker-Lewis Index (TLI)*: An index used to determine the acceptability of a model.

Based on the SEM data analysis, the researchers mapped out the issues related to the indicators in the occupational safety and health management system and the principles of procurement of goods and services (Peraturan Presiden Republik Indonesia Nomor 54 Tahun 2010 Tentang Pengadaan Barang/Jasa Pemerintah, 2010). These will be used as references for conducting in-depth interviews with competent informants in warship repairs. The data obtained include:

1. Worker Skills:

- **Internal Factors:**
 - Financial capability of the provider company to increase its workforce;
 - Ability of the provider company to pay qualified skilled workers;
 - Limited availability of workers with the necessary skills for warship repairs that can be recruited by the provider company.
- **External Factors:**
 - Skilled workers are mostly absorbed by more established companies;
 - Skilled workers are not interested in working in the warship repair sector;
 - Higher education and vocational institutions do not prepare ready-to-use workers with warship repair skills;
 - Training programs for warship repair techniques are not yet available.

2. Availability of Lifting Equipment:

- **Internal Factors:**
 - Not every repair area can accommodate lifting equipment;
 - Limited number of lifting equipment owned by the provider company;
 - Workers are reluctant to use portable lifting equipment due to the inconvenience in moving to the work location.
- **External Factors:**
 - Workers rely more on manual labor for moving items;
 - Use of lifting equipment outside the location to support the movement of equipment within the room;
 - Workers try to utilize the available lifting equipment.

3. Work Equipment:

- **Internal Factors:**
 - Work equipment is available for carrying out work on warships;
 - Work equipment is of good quality;
 - Work equipment is appropriate for its intended use.
- **External Factors:**
 - Work equipment is purchased from technical tool stores;
 - Work equipment is ordered from manufacturers of the equipment to be repaired;
 - Work equipment is easily available online.

4. Existing Infrastructure:

- **Internal Factors:**



- The condition of the shipbuilding infrastructure is generally adequate;
- The strength of the shipbuilding infrastructure is difficult to predict because most warships are old;
- The functionality of the shipbuilding infrastructure has deteriorated.
- External Factors:
 - Infrastructure inspections are conducted with a small sample size, resulting in less accurate results;
 - Infrastructure inspections are carried out in areas suspected of damage;
 - Infrastructure inspections are conducted thoroughly.
- 5. Work Methods:
 - Internal Factors:
 - Work methods are based on experience in ship repairs;
 - Established repair methods are in place;
 - Work methods are developed based on real field conditions.
 - External Factors:
 - During warship repairs, workers follow the work methods according to instructions;
 - Workers adhere to work methods at the beginning of the job;
 - Workers may overlook safety factors due to the confined repair area.
- 6. Understanding of Material Properties:
 - Internal Factors:
 - Workers understand the properties of materials;
 - Not all workers understand the properties of supporting materials;
 - Some workers lack knowledge of material properties.
 - External Factors:
 - High caution is observed in the handling of all materials;
 - Movement of materials that do not contain chemicals or gases;
 - Handling and placement of hazardous materials.
- 7. Efficiency:
 - Internal Factors:
 - Limited budget allocation for repairs that match technical specifications and material damage;
 - Repairs and replacement of materials are conducted only on severely damaged ship equipment;
 - Reduction in warship repair costs.
 - External Factors:
 - Spare parts replacement offers are adjusted to the available budget;
 - Efforts are made to avoid replacing materials that are still in good physical condition;
 - Costs of warship repair services are minimized.
- 8. Effectiveness:
 - Internal Factors:
 - Knowledge of the properties of the materials used;
 - Understanding of the repair history of equipment;
 - Understanding the causes of equipment damage.
 - External Factors:
 - Replacement of spare parts is based on operating hours without re-evaluating the physical condition of equipment;
 - Spare part catalogs provide complete information;
 - Criteria for replacing spare parts are based on discussions with job supervisors.
- 9. Transparency:
 - Internal Factors:
 - Information about job obstacles is not communicated;



- Information on specific damage to equipment is incomplete;
 - Data on equipment and layout on the ship is not provided.
 - External Factors:
 - Additional costs for obstacles are included in the offer;
 - Detailed analysis and cost estimation of equipment damage based on the maximum level of damage;
 - Information about the layout of equipment that is difficult to repair is not of interest to suppliers.
10. Openness:
- Internal Factors:
 - Database on suppliers is limited based on experience with similar jobs, and not all suppliers can complete all types of work;
 - New suppliers involved in procurement struggle to show loyalty within the framework of national interests;
 - Concerns about incomplete work and leakage of confidential information on warships.
 - External Factors:
 - Difficulties in obtaining permits for warship repairs, such as security clearances;
 - Suppliers act only as contractors and use subcontractors for warship repairs;
 - Suppliers subcontract parts of the work to others based on internal agreements without formal contracts with the project management.
11. Competitiveness:
- Internal Factors:
 - Price evaluation based on the lowest reasonable price;
 - Winning tenders with the lowest bid;
 - Preference for suppliers with experience in similar work.
 - External Factors:
 - Suppliers offer repair prices by disregarding quality to win tenders;
 - Suppliers adjust their offers based on the available budget;
 - Offers are based on previous contracts that have been obtained.
12. Fair and Non-Discriminatory:
- Internal Factors:
 - Providing all suppliers with the opportunity to participate in tenders;
 - Allowing suppliers to submit the widest range of price offers for a job;
 - No priority is given to suppliers who already have expertise in completing specialized tasks.
 - External Factors:
 - Suppliers are dispersed across various regions, making verification difficult;
 - Suppliers choose to become subcontractors due to complex administrative procedures.

From the thirteen variables in the warship repair industry, the following seven variables support strategies to improve worker awareness of occupational health and safety factors in the industry (NISAA & Rahaju, 2019):

- Worker Skills in OHSS: Focus on developing workers' skills to understand and implement the Occupational Health and Safety Management System (OHSS);
- Work Equipment in OHSS: Ensuring that the equipment used in ship repairs meets the safety and health standards set by OHSS;
- Work Methods OHSS: Adopting and implementing work methods that are safe and in accordance with the safety procedures outlined in OHSS;



- Understanding of Material Properties in OHSS: Enhancing workers' understanding of the properties of materials used in ship repairs, including risks and safe handling practices;
- Effectiveness in Procurement of Goods and Services: Ensuring that the procurement process supports safety by selecting materials and equipment that meet safety standards;
- Competitiveness in Procurement of Goods and Services: Balancing competitiveness with the need for quality and safety in the procurement of goods and services for ship repairs;
- Accountability in Procurement of Goods and Services: Implementing good accountability practices in the procurement process to ensure transparency and compliance with safety standards.

Table 7 – SWOT Procurement of goods and services for Warship Repair

No	Variable	Internal	Type	External	Type
1	Worker Skills	Limited number of skilled workers for warship repairs	W	Higher education and vocational institutions do not prepare workers with warship repair skills	T
2	Availability of Lifting Equipment	Not every repair area can accommodate lifting equipment	W	Workers rely more on manual labor for moving items	T
3	Work Equipment	Equipment is appropriate for its intended use	S	Equipment is easily available online	O
4	Existing Infrastructure	The strength of shipbuilding infrastructure is hard to predict due to the age of most warships	W	Infrastructure inspection is conducted with a small sample size, resulting in less accuracy	T
5	Work Methods	Established repair methods are in place	S	Workers may overlook safety factors due to confined repair areas	T
6	Understanding of Material Properties	Understanding of material properties used	S	Handling and placement of hazardous materials may ignore safety factors	T
7	Efficiency	Limited budget allocation for repairs that meet technical specifications and material damage	W	Replacement offers adjust to the available budget for damaged parts	T
8	Effectiveness	Knowledge of material properties used	S	All spare part catalogs provide complete information	O
9	Transparency	Information on specific equipment damage is incomplete	W	Equipment damage details are analyzed and calculated based on maximum damage levels	O
10	Openness	Database on suppliers is limited based on experience with similar jobs and not all suppliers can handle all types of work	W	Suppliers subcontract parts of the work they are not skilled in based on internal agreements without formal contracts with the project management	T
11	Competitiveness	Uses price evaluation based on the lowest reasonable price	S	Suppliers offer repair prices by ignoring quality to win tenders	T
12	Fair and Non-Discriminatory	Allows all suppliers to submit price offers for a job	W	Suppliers are spread across regions, complicating verification	T
13	Accountability	Certification and experience in procurement demonstrate the accountability of the committee or team	S	Not all suppliers participating in tenders have the capability and experience to complete the work	T

Source: Authors, data processed from in-depth interviews, 2023.

Note: S: Strength; W: Weakness; O: Opportunity; T: Threat.

Additional requirements for procurement documents applicable to all service providers:

1. Workforce Commitment (Farhan, 2022):
 - Commitment to using 90% experienced workers, proven by uploading work experience documents.
 - 10% interns, proven by uploading collaboration documents with educational institutions.
2. Equipment Modification/Ownership:



- Commitment to modifying or owning lifting equipment suitable for the work area on the warship to reduce manual labor, proven by uploading equipment usage diagrams.
- 3. Ownership of Work Equipment:
 - Proof of ownership of appropriate work equipment by providing ownership documents.
- 4. Work Method and Safety Equipment(Dewanti, 2019):
 - Attach work methods and diagrams of safety equipment owned.
- 5. Repair Commitment Document:
 - Attach a document committing to making repairs in accordance with the results of Verification I, with costs not burdening the provider.
- 6. Legal Waiver for Re-Tendering(Santoso, 2018):
 - Attach a document committing not to make legal claims if a re-tender is conducted due to failure to reach an agreement on Verification I.
- 7. Administrative Branch Commitment:
 - Attach a document committing to opening an administrative branch close to the warship repair project location until the warranty period ends.

Table 8 – SWOT Matrix for Strategies to Improve Worker Awareness of Occupational Health and Safety in the Warship Repair Industry

SWOT	Internal	
External	<p>Strengths (S) Work Equipment in Accordance with Its Purpose: Ensuring that all equipment used is appropriate and suited to its intended function. Existing Repair Methods: The procedures and methods for carrying out repairs are already established and in place. Certification and Experience in Procurement: Certification and experience in the procurement of goods and services demonstrate the accountability of the committee or procurement working group (pokja).</p>	<p>Weakness (W) Limited Skilled Workforce for Warship Repairs: There is a shortage of skilled workers capable of repairing warships. Limited Budget Allocation for Equipment Repair: Budget constraints limit the repair of equipment to meet technical specifications and address material damage. Limited Database on Providers: The database of suppliers is very limited, based on their experience with similar jobs, and not all providers have the capability to complete all types of work.</p>
<p>Opportunities (O) Detailed Analysis of Equipment Damage: The damage to equipment is analyzed and assessed based on the maximum level of damage. Easy Access to Tools Online: Tools and equipment are readily available for purchase online. Complete Spare Part Catalogs: All spare part catalogs for ships provide comprehensive information.</p>	<p>S-O Using Tools for Ship Repairs: The use of tools for repairing warships can be easily obtained through online purchases. Optimal Repairs with Complete Information: Repairs can be conducted optimally according to methods or stages of repair by utilizing comprehensive information on spare parts. Certification and Experience in Procurement: Certification in procurement and experience in the field of warship repairs can support the completion of work, especially in preparing procurement documents.</p>	<p>W-O Skill Limitations in Repair Analysis: Limited skills in analyzing repairs can be assisted by comprehensive information about the equipment being repaired. Budget Constraints and Equipment Use: Limited repair budgets can be greatly supported by using appropriate equipment, as it helps prevent material damage during dismantling and installation.</p>
<p>Threats (T) Neglect of Safety Due to Work Area Constraints: Workers ignore safety factors due to the cramped repair area. Lack of Skilled Workers: Higher education institutions and vocational schools do not prepare workers with the necessary skills for warship repairs. Dangerous Material Handling and Placement: The handling and placement of hazardous materials neglect safety factors.</p>	<p>S-T Proper Equipment and Protective Gear: Using equipment and personal protective gear according to their intended purpose can prevent workplace accidents. Effective Repair Methods: The repair methods for warship equipment can assist less skilled workers in completing tasks and avoiding workplace accidents and material loss.</p>	<p>W-T Limited Expert Availability: The shortage of warship repair experts provides an opportunity for graduates from higher education and vocational schools to collaborate. Budget Constraints: Limited allocation of funds offers a chance to focus on specific tasks, which can help prevent accidents. Supplier Database Limitations: The limited database of suppliers can be leveraged by utilizing existing suppliers with experience in material handling and placement for ship repairs.</p>



To maximize the procurement of goods and services, based on the SWOT analysis, the following implementation model is proposed:

1. Involvement of Repair Consultants:
 - The Procurement Service Unit (ULP) / Procurement Working Group (Pokja Pengadaan) must involve ship repair consultants and crew members who have operated or currently operating the equipment being repaired to prepare a damage report that forms the basis for the procurement document.
2. Commitment Maker Review:
 - The Commitment Maker (PPK) will review the results of the supplier selection report before issuing the Procurement Order (SPPBJ) to ensure: a. The selection process was conducted according to established procedures. b. The winning bidder/supplier has the capability to execute the contract.
3. Verification with Winning Bidder:
 - The Commitment Maker (PPK) will conduct verification with the winning bidder after the dismantling of the equipment to be repaired. This will be documented in a verification report used as the basis for the contract and all verification-related costs will be borne by the government.
4. Re-Tendering:
 - If an agreement is not reached, a re-tender will be conducted using the verification report as the procurement document reference.
5. Subcontractor Verification:
 - The Commitment Maker (PPK) will verify subcontractors who will partner with the winning bidder, and the subcontractor contract will be included as an addendum to the main contract.
6. Procurement Model:
 - The procurement model for warship repair will follow Presidential Regulation No. 54 of 2010 without using implementing regulations such as ministerial regulations or guidelines. The procurement model does not include the seven requirement models that must be filled out in the procurement document.

CONCLUSION

Based on the series of research activities, evaluations, and overall analysis, the following conclusions can be drawn:

a. Factors Influencing the Warship Repair Industry at Koarmada II:

The factors affecting the warship repair industry at Koarmada II include both occupational safety and health and the procurement of goods and services. These elements are crucial in ensuring the success and efficiency of ship repair operations.

b. Implementation of Safety and Health in Warship Repairs:

The implementation of safety and health measures in warship repairs needs to be enhanced. Improving these measures is essential to ensure that repairs are completed according to the agreed-upon schedule in the contract and that all safety and health standards are met.

c. Strategies to Increase Worker Awareness of Safety and Health Factors:

Add Clauses to Procurement Documents: Include additional requirements in the procurement documents that must be met by the providers. These include:

- Workforce Qualification: Ensuring that 90% of the workforce involved in each task are experienced workers, with supporting documentation of their work experience, and 10% are trainees, with evidence of collaboration with educational institutions;
- Equipment for Lifting and Handling: Modifications or ownership of lifting and handling equipment suitable for the work area on warships, which helps reduce the reliance on manual labor. This should be supported by uploaded images of the equipment;
- Appropriate Work Equipment: Proof of ownership of suitable work equipment;



- Safety Methods and Equipment: Submission of work methods and images of safety equipment;
- Repair Adjustments: Carry out repairs in accordance with the results of the initial verification, and avoid legal claims in the event of a retender;
- Administrative Support: Establishing an administrative branch near the warship repair project location until the end of the warranty period.

By implementing these strategies, it is expected that worker awareness of safety and health factors will be significantly improved, leading to more effective and compliant repair processes within the warship repair industry.

REFERENCES

1. Desember, I. G. K. H. (2020). Strategi Maintenance, Repair Dan Overhaul (MRO) Kapal Perang TNI Al dalam Mendukung Kesiapan Operasi Laut di Fasharkan Lantamal V Surabaya. *Jurnal Teknologi Daya Gerak*, 3(2).
2. Dewanti, A. R. (2019). Analisa Pengaruh Kepribadian dan Faktor Personal terhadap Perilaku Keselamatan di Perusahaan Galangan Kapal. *Politeknik Perkapalan Negeri Surabaya*.
3. Farhan, M. F. (2022). Peran Nasionalisme dalam Kemandirian Bangsa dan Kemandirian Industri Pertahanan. *Jurnal Global Citizen: Jurnal Ilmiah Kajian Pendidikan Kewarganegaraan*, 11(2), 52–58.
4. Hakim, A., & Suhardono, E. (2020). Implementasi Kontrak Pembangunan Kapal Perang Angkut Tank (At) 1 Dan 2 Oleh Pt. Dok Dan Perkapalan Kodja Bahari (Persero) Dalam Mendukung Kemandirian Alutsista Tni-Al the Implementation of Contracts for the Construction of Tank Carriers 1 and 2 To Support. *Jurnal Strategi Pertahanan Laut*, 6 Nomor 2(June), 97–110. <http://prokimal-online.blogspot.com/>.
5. Peraturan Presiden Republik Indonesia Nomor 54 Tahun 2010 Tentang Pengadaan Barang/Jasa Pemerintah, (2010).
6. NISAA, I. M., & Rahaju, T. (2019). Implementasi Program Keselamatan Dan Kesehatan Kerja (K3) Pada Divisi Kapal Perang Pt. Pal Indonesia. *Publika*, 7(4).
7. Pangaribuan, M., Aritonang, S., & Anwar, S. (2020). Manajemen Operasi PT. Janata Marina Indah Semarang Dalam Melakukan Perbaikan Kapal Perang TNI Angkatan Laut. *Industri Pertahanan*, 2(1), 21–46.
8. Presiden Republik Indonesia. (2012). UU Nomor 16 Tahun 2012. 39–37, 66, עלון הנוטע.
9. Sahron, A., & Budiani, M. S. (2020). Hubungan antara job demands dengan persepsi terhadap safety performance pada karyawan divisi kapal perang Pt. Pal Indonesia (PERSERO). *Character: Jurnal Penelitian Psikologi*, 4(07), 215–228.
10. Santoso, L. (2018). *Dinamika Hukum Kontrak Indonesia*.
11. Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Bandung: PT Alfabale. PT Alfabe.