SAFETY CLIMATE EVALUATION IN INDONESIAN SHIP BUILDING INDUSTRIES

Bachelor Final Project
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Abstract*: Safety culture is an important but often neglected concept. Recently the awareness about safety culture has increased, especially around high risks industries all over the world. Unfortunately, mostly Indonesian safety researches focus on a technical approach, without considering cultural aspects. *In this final project, safety culture is assessed by using a questionnaire, interviews, and observations in two ship building companies entitled PT X and PT Y. The results show that based on the questionnaire result, both companies have a good safety climate with levels over 2.5 (on a scale of 1-4). Using the triangulation method it is found that there is poor safety climate level in relation to the workers' safety priority and risk non acceptance in both companies. Root cause analysis of the problem identify two root causes in PT X: 1) management has less consideration related to safety and 2) management has less ability to make the simple but effective safety rules. Two root causes are also found in PT Y: 1) lack of commitment to make reward and punishment systems from the management and, 2) management has less consideration related to safety matters. Recommendations such as improvement plans are generated. For PT X, the recommendations are that management should increase their safety considerations and the simplicity in designing safety rules. While for PT Y, the recommendations are that a reward and punishment system should be run and management should increase their safety consideration.

Key words— Occupational Health and Safety, Safety Culture, NOSACQ-50, Interview, Observation, Problem solving.

I. INTRODUCTION

All companies will always try to prevent themselves from accident. Based on many historians and scientists there are some theories of accident causations [1]. The first stage is the technical period, the second stage, is human error period, the third stage is sociotechnical period, the recent stage is safety culture period. Either safety culture or safety climate attracts a broad number of industries and sectors today [2]. Many industries have started in considering safety culture as accidents causation since the Chernobyl nuclear power plant accident in 1986 [3].

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Every organization has safety culture in different levels [4] .It is generally accepted that strong safety culture becomes the effective prevention of accidents [3]. Furthermore, good safety culture and safety climate will also contribute in meeting business goal [2].

Indonesian industries have also considered their safety cultures. Unfortunately, recent safety researches in Indonesia are mostly focused on technical factor. Yassierly, (an ergonomic researcher) stated that recent ergonomic researches in Indonesia are still dominated by ergonomic applications in physical problem [5]. On the other hand, Indonesian work accident has high level. In 2007, Indonesia was stands at the 52th rank among 53 countries in occupational health and safety level [6]. In addition, Muji Handaya (General Director of Labor Inspection and Development of Indonesian Republic), said that work accident rate in Indonesia has decreased in the previous 3 years, but the death rate has not [7]. Among many kinds of high risk industries, construction industries have high accident rate. There are about 49 construction workers who are killed during working time each year [8]. Among many construction companies, Indonesian ship building companies have big roles. Recently, there are high needs of Indonesian flag ships to fulfill the Azaz sabotage [9]. It means that Indonesian ship building companies have to improve themselves, including their safety culture, in order to have high productivity to fulfill the needs.

There are some steps needed to improve safety culture:

> *'In order to improve the level of safety culture and safety climate it is important to: (AIChE)*
> *1. Determine the current level of safety climate.*
> *2. Decide what level of safety climate wanted.*
> *3.Create a plan to achieve the safety climate wanted.'[2]*

Unfortunately, measuring safety culture requires a lot of time. Therefore, it will be easier to measure/assess safety climate which is quick change [10].

There are many questionnaires to assess safety climate. NOSAQC-50 will be used as the questionnaire as it is valid, reliable, and has clear theoretical basis [11].

For short, it can be stated that safety climate assessment is important to improve the safety culture in Indonesian Ship Building Industries.

There are some goals in this research:

1. Assess the safety climate to get the recent level of safety climate (culture)
2. Find the problem related to safety climate level assesses
3. Creating action plans based on the main root causes found
4. Make the conclusion about the implementation of NOSACQ-50 framework in the company

In this research, the assessment process is done by using 3 methods, which are questionnaire (using NOSACQ-50), interview, and observation. Either interview or observation methods done based on the questionnaire items (which contains of 7 dimensions), so that all methods use the same basic and therefore, can be used to validate each other. There are 7 dimensions of safety climate in NOSACQ-50 which becomes the basic of every method used.

Table 1 Safety Climate Dimensions of NOSACQ-50

	Diemension
1	Management safety priority and ability
2	Management safety empowerment
3	Management safety justice
4	Workers' safety commitment
5	Workers' safety priority and risk non-acceptance
6	Peer safety communication learning and trust in safety ability
7	Workers' trust in efficiency of safety systems

II. DATA COLLECTING AND PROCESSING

A. *Company profile*

There are two companies assessed in this research, named PT X and PT Y. Both of them are ship building companies

PT X is a government owned ship building company which runs its business in ship building and services. This company proves its quality by having both of *ISO* 9001: 2008 and *OHSAS* 18001 : 2007 certification.

PT Y, is a private owned ship building and repair service company that meet the International standards regulations. This company is having cooperation with Damen Shipyard Gorinchem (The Netherlands). This company has ISO 9001:2008 certification by Lloyd Register and meet the standard needed the Welder's Performance Qualification (WPQ) checks.

B. *Questionnaire result*

The questionnaire used is NOSACQ-50, which is a brand new tool to assess safety climate. The questionnaire result is then reliability checked to prove the reliability of the result.

Table 2 Reliability Calculation

	Cronbach's alpha coefficients for each dimension						
	Dim 1	**Dim 2**	**Dim 3**	**Dim 4**	**Dim 5**	**Dim 6**	**Dim 7**
Managers	0.744	0.602	0.486	0.614	0.602	0.797	0.600
Workers	0.608	0.712	0.492	0.744	0.687	0.725	0.710

1 Dim=Dimension

2 A Cronbach's alpha coefficient > 0,7 is considered ideal. (Pallant, 2007) [2]

In the table can be stated that for managers and workers result, some dimensions are not ideal, especially dim 3 which has Cronbach's alpha coefficient not more than 0.5. Every statement from questionnaire result which is not ideal should be stated with caution.

The next step is safety level calculation, when all questionnaire results are then calculated to get the level of safety climate in both companies.

Table 3 Safety Climate Level in PT X

Site	n	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7
1. Construction	15	3.09	3.10	3.12	3.30	2.90	3.14	2.99
2. Outfitting	15	2.94	2.72	2.76	2.96	2.79	2.86	3.13
3. Electric	15	3.05	3.16	3.01	3.41	2.93	3.29	3.12
4. Machinery	15	2.93	2.90	2.90	3.04	2.71	2.85	3.00
5. Maintenance and Facilities	15	3.05	3.13	3.16	3.37	2.92	2.92	3.01
6. PT X	75	3.01	3.00	2.99	3.22	2.85	3.01	3.05

Table 4 Safety Climate Level in PT Y

Site	n	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7
1. Maintenance and Facilities	15	3.42	3.36	3.33	3.64	3.57	3.33	3.59
2. Yard Service	15	3.25	3.13	3.14	3.16	2.81	3.18	3.19
3. Construction	15	3.11	2.88	3.06	3.13	3.17	3.19	3.23
4. Outfitting	15	3.11	3.10	3.04	3.26	2.88	3.19	3.37
5. Mechanic	15	3.19	3.22	3.21	3.23	2.91	3.13	3.27
6. PT Y	75	3.22	3.14	3.16	3.28	3.07	3.20	3.33

Based on NOSACQ-50 guide, the safety climate level above 2.5 is considered as good [12]. The result above shows that PT X and PT Y (overall) have good level of safety climate

Furthermore, to capture the deeper analysis, the p value calculation is then done to compare the variation of safety climate level for two objects compared, as well as to find any sub climate exist. The p-value which is less than 0.05 is considered significant and therefore shows the existence of sub climate [12]. There are some combinations used for comparing the safety climate level result.

Table 5 Safety Climate Level Variation of Safety Climate Level between PT X and PT Y

Site	n	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7
PT X	75	3.01	3.00	2.99	3.22	2.85	3.01	3.05
PT Y	75	3.22	3.14	3.16	3.28	3.07	3.20	3.33
p-value		0.000	0.036	0.004	NS	0.001	0.001	0.000

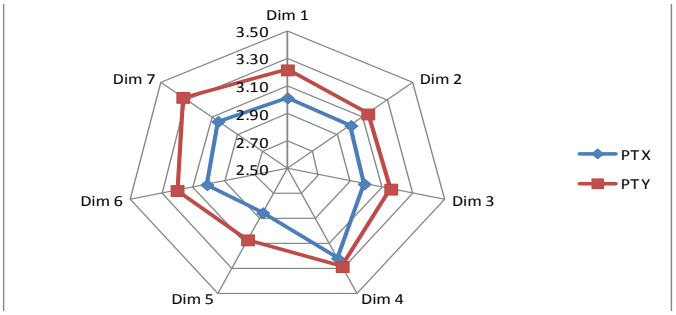

Figure 1 Spider Diagram Illustrated the Variation of Safety Climate Level in each dimension between PT X and PT Y

Based on the variation result above, it means that PT Y has significant higher safety climate level compared to PT X, in almost all dimensions (except dimension 4).

Table 6 Variation of Safety Climate Level between Construction Sector and Other Sectors in PT X

Site	n	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7
1. Construction	15	3.09	3.10	3.12	3.30	2.90	3.14	2.99
2. Others	60	2.99	2.98	2.96	3.20	2.84	2.98	3.07
p value 1:2		NS	NS	NS	NS	NS	NS	NS

None of safety climate level between Construction Sector and other sectors which are different significantly. So, no sub climate exists in Construction Sector of PT X.

Table 7 Variation of Safety Climate Level between Outfitting Sector and Other Sectors in PT X

Site	n	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7
1. Outfitting	15	2.94	2.72	2.76	2.96	2.79	2.86	3.13
2. Others	60	3.03	3.07	3.05	3.28	2.87	3.05	3.03
p value 1:2		NS	0.017	0.001	0.010	NS	NS	NS

It can be stated that there are a sub climates exist in Outfitting Sector of PT X (dimension 2, 3 and 4), since they have significant lower safety climate compared with others sector.

Table 8 Variation of Safety Climate Level between Electric Sector and Other Sectors in PT X

Site	n	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7
1. Electric	15	3.05	3.16	3.01	3.41	2.93	3.29	3.12
2. Others	60	3.00	2.96	2.98	3.17	2.83	2.94	3.03
p value 1:2		NS	NS	NS	NS	NS	0.000	NS

It shows that there is sub culture exist in Electric Sector of PT X (Dimension 6), since Electric Sector has higher significant safety climate level compared to others sectors.

Table 9 Variation of Safety Climate Level between Machinery Sector and Other Sectors in PT X

Site	n	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7
1. Machinery	15	2.93	2.90	2.90	3.04	2.71	2.85	3.00
2. Others	60	3.03	3.03	3.01	3.26	2.89	3.05	3.06
p value 1:2		NS	NS	NS	NS	0.034	0.046	NS

Based on the illustration above, there is one sub climate exist in Machinery Sector (dimensions 5 and 6), which have significant lower safety climate level compared to other sectors

Table 10 Variation of Safety Climate Level between Maintenance and Facilities Sector and Other Sectors in PT X

Site	n	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7
1. Maintenance and Facilities	15	3.05	3.13	3.16	3.37	2.92	2.92	3.01
2. Others	60	3.00	2.97	2.95	3.18	2.84	3.04	3.06
p value 1:2		NS	NS	0.019	NS	NS	NS	NS

It can be stated that there is one sub climates exists in Maintenance and Facilities Sector since it has significant higher safety climate level compared to other sectors.

Table 11 Variation of Safety Climate Level between Maintenance and Facilities Unit and Other Units in PT Y

Site	n	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7
1. Maintenance and Facilities	15	3.42	3.36	3.33	3.64	3.57	3.33	3.59
2. Others	60	3.17	3.08	3.11	3.19	2.94	3.17	3.27
p value 1:2		0.012	0.011	NS	0.001	0.000	NS	0.007

The illustration above shows that there are sub climates exist in Maintenance and facilities Unit of PT Y (significant higher safety climate level for almost all dimensions (except dimensions 3 and 6)).

Table 12 Variation of Safety Climate Level between Yard Service Unit and Other Units in PT Y

Site	n	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7
1. Yard service	15	3.25	3.13	3.14	3.16	2.81	3.18	3.19
2. Others	60	3.21	3.14	3.16	3.32	3.13	3.21	3.37
p value 1:2		NS	NS	NS	NS	0.023	NS	NS

It can be stated that there is sub climate in Yard Service significant lower safety climate level for dimension 5.

Table 13 Variation of Safety Climate Level between Construction Unit and Other Units in PT Y

Site	n	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7
1. Construction	15	3.11	2.88	3.06	3.13	3.17	3.19	3.23
2. Others	60	3.24	3.20	3.18	3.32	3.04	3.21	3.36
p value 1:2		NS	0.003	NS	NS	NS	NS	NS

Based on the illustration above, it means that there is sub climate exist in Construction Unit of PT Y. Construction unit has significant lower safety climate level compared to the rest units for dimension 2.

Table 14 Variation of Safety Climate Level between Outfitting Unit and Other Units in PT Y

Site	n	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7
1. Outfitting	15	3.11	3.10	3.04	3.26	2.88	3.19	3.37
2. Others	60	3.24	3.15	3.19	3.29	3.12	3.21	3.32
p value 1:2		NS	NS	NS	NS	NS	NS	NS

It means that there is no sub climate in Outfitting Unit of PT Y since there is no significant safety climate level exists in that unit.

Table 15 Variation of Safety Climate Level between Mechanic Unit and Other Units in PT Y

Site	n	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7
1. Mechanic	15	3.19	3.22	3.21	3.23	2.91	3.13	3.27
2. Others	60	3.22	3.12	3.14	3.30	3.11	3.22	3.35
p value 1:2		NS	NS	NS	NS	NS	NS	NS

As it is in outfitting unit, there is also no sub climate exists in mechanic unit compared to other units in PT Y.

C. Interview Result

There are some questions related to the questionnaire items for being interviewed, which represent all dimensions. Interview results are shown as percentage. The more the percentage is, the more the interviewees' agreement to the question which indicate the good level of safety climate.

Table 16 Overall PT X Interview Result for Each Dimension

SITE	INTERVIEW RESULT						
	DIM 1	DIM 2	DIM 3	DIM 4	DIM 5	DIM 6	DIM 7
Construction	100%	100%	100%	50%	100%	100%	100%
Outfitting	0%	100%	100%	100%	50%	100%	100%
Electric	0%	100%	100%	100%	100%	100%	100%
Machinery	100%	100%	100%	100%	0%	0%	100%
Maintenance and Facilities	100%	100%	100%	100%	100%	100%	100%
PT X	60%	100%	100%	90%	70%	80%	100%

Overall, the interview result shows a good level of safety climate for all dim in PT X.

Table 17 Overall PT Y Interview Result for Each Dimension

SITE	INTERVIEW RESULT						
	DIM 1	DIM 2	DIM 3	DIM 4	DIM 5	DIM 6	DIM 7
Maintenance and Facilities	100%	100%	50%	100%	50%	100%	100%
Yard service	100%	100%	0%	100%	0%	100%	0%
Construction	100%	100%	100%	100%	100%	100%	100%
Outfitting	0%	100%	0%	100%	0%	100%	100%
Mechanic	100%	0%	0%	100%	100%	100%	100%
PT Y	80%	80%	30%	100%	50%	100%	80%

Overall the interview result of PT Y shows varied level of safety climate which is lower than PT X's safety climate level.

D. Observation Result

Some item of the questionnaire then observed to show what really happened in practice. The result of the observation is shown as percentage. The more the percentage is, the more the indication of good safety climate level found based on the questionnaire items observed, and vise versa. Some related pictures are shown to illustrate the percentage result.

Table 18 Observation Result of Construction Sector PT X

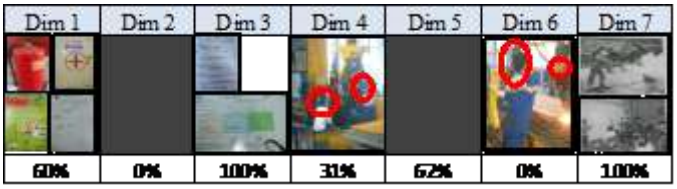

Table 17 Observation Result of Outfitting Sector PT X

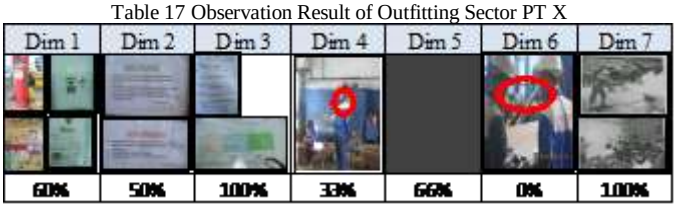

Table 19 Observation Result of Electric Sector PT X

Table 20 Observation Result of Machinery Sector PT X

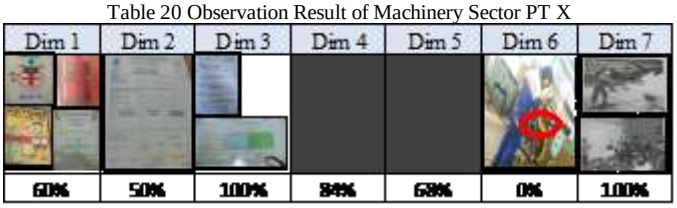

Table 21 Observation Result of Maintenance and Facilities Sector PT X

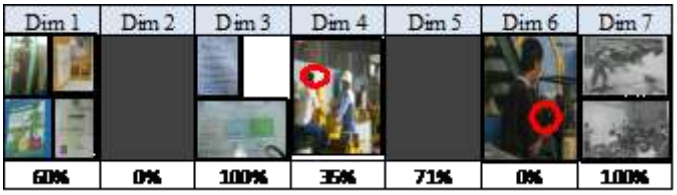

Table 22 Overall Observation Result PT X

SITE	OBSERVATION RESULT						
	DIM 1	DIM 2	DIM 3	DIM 4	DIM 5	DIM 6	DIM 7
Construction	60%	0%	100%	31%	62%	0%	100%
Outfitting	60%	50%	100%	33%	66%	0%	100%
Electric	40%	0%	0%	39%	77%	0%	100%
Machinery	60%	50%	100%	84%	68%	0%	100%
Maintenance and Facilities	60%	0%	100%	35%	71%	0%	100%
PT X	56%	20%	80%	44%	69%	0%	100%

Over all the observation result of PT X shows varied level of safety climate

In addition, observation is also done for PT Y, which result are as follows:

Table 23 Observation Result of Maintenance and Facilities Unit PT Y

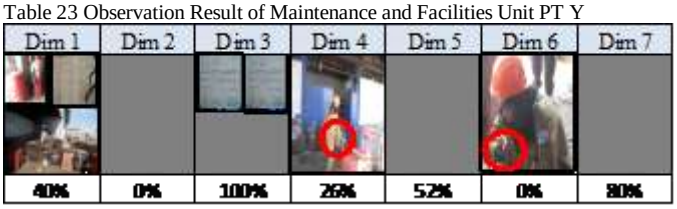

Table 24 Observation Result of Yard Service Unit PT Y

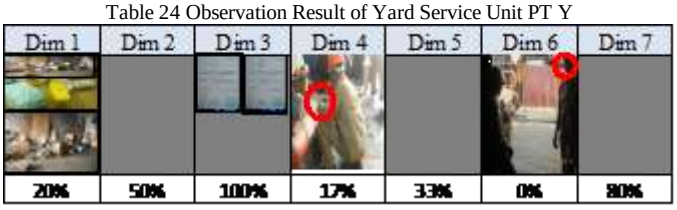

Table 25 Observation Result of Construction Unit PT Y

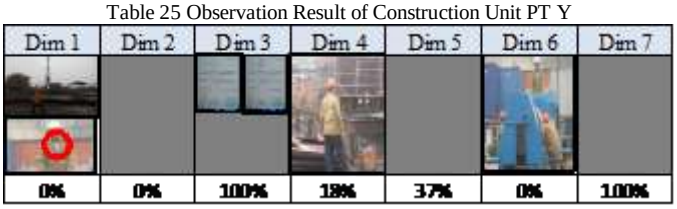

Table 26 Observation Result of Outfitting Sector PT Y

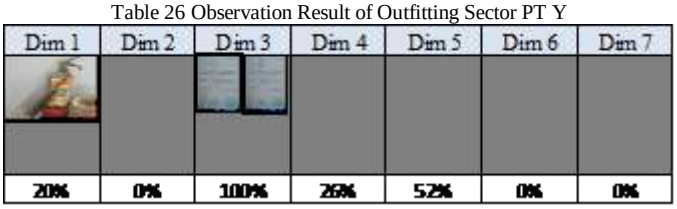

Table 27 Observation Result of Mechanic Sector PT Y

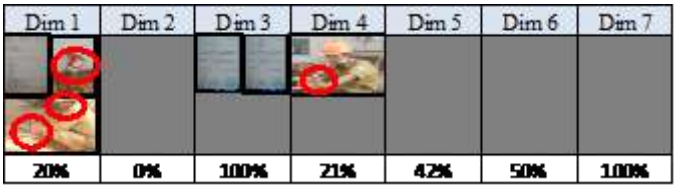

Table 28 Overall Observation Result PT Y

SITE	OBSERVATION RESULT						
	DIM 1	DIM 2	DIM 3	DIM 4	DIM 5	DIM 6	DIM 7
Maintenance and facilities	40%	0%	100%	26%	52%	0%	80%
Yard service	20%	50%	100%	17%	33%	0%	80%
Construction	0%	0%	100%	18%	37%	0%	100%
Outfitting	20%	0%	100%	26%	52%	0%	0%
Mechanic	20%	0%	100%	21%	42%	50%	100%
PT Y	20%	10%	100%	22%	43%	10%	72%

Over all the observation result of PT Y shows varied level of safety climate, which is lower than PT X for almost all dim.

E. Trangulation result

In the triangulation process, the result from questionnaire, interview, and observation then cross validated, so that found what really happened based on all methods used.

Table 29 Triangulation Result for PT X

Result								
Questionnaire	Interview		Observation		Deviation (absolute)			Average deviation
	Original	Converted	Original	Converted	(Interview-questionnaire)	(Observation-interview)	(Observation - questionnaire)	
3.01	60%	2.80	56%	2.68	0.21	0.12	0.33	0.22
3.00	100%	4.00	20%	1.60	1.00	2.40	1.40	1.60
2.99	100%	4.00	80%	3.40	1.01	0.60	0.41	0.67
3.22	90%	3.70	44%	2.33	0.48	1.37	0.89	0.91
2.85	70%	3.10	69%	3.06	0.25	0.04	0.21	0.17
3.01	80%	3.40	0%	1.00	0.39	2.40	2.01	1.60
3.05	100%	4.00	100%	4.00	0.95	0.00	0.95	0.63

Table 30 Triangulation Result for PT Y

Result								
Questionnaire	Interview		Observation		Deviation (absolute)			Average deviation
	Original	Converted	Original	Converted	(Interview-questionnaire)	(Observation-interview)	(Observation - questionnaire)	
3.22	80%	3.40	20%	1.60	0.18	1.80	1.62	1.20
3.14	80%	3.40	10%	1.30	0.26	2.10	1.84	1.40
3.16	30%	1.90	100%	4.00	1.26	2.10	0.84	1.40
3.28	100%	4.00	22%	1.65	0.72	2.35	1.64	1.57
3.07	50%	2.50	43%	2.30	0.57	0.20	0.77	0.52
3.20	100%	4.00	10%	1.30	0.80	2.70	1.90	1.80
3.33	80%	3.40	72%	3.16	0.07	0.24	0.17	0.16

The triangulation result is then compared to NOSACQ-50 rule of thumb for interpreting the NOSACQ-50 result:

- > 3.30 : a good level allowing for maintaining and continuing developments
- 3.00 – 3.30 : a fairly good level with slight need of improvement
- 2.70 – 2.99 : a fairly low level with need of improvement
- < 2.70 :a low level with great need of improvement (NRCWE, 2011) [12].

It showed that no dimension that has result in the same range of NOSACQ-50 rule of thumb interpretation. Therefore, the deviation average result will be used to approach which dimension that at least has the lowest deviation average (which also means the dimension with "most same" result in every method used). The triangulation result shows that dimension 5 has least deviation average result, for both companies triangulation result. And the result lays from fairly low to fairly good level of safety climate (for PT X) and from low until fairly good (for PT Y). Therefore the poor level of dimension 5, is considered the most possible to be real phenomenon or problem happened, and it can be improved trough the improvements plans.

F. Problem solving methods

To solve the problem, the causes are then generated. The causes are identified as NOSACQ-50 items of the dimension which shows the problem that is happened (dimension 5). In order to find the effective problem solving, not all causes will be solved, only causes that have the high contribution which will be processed. To find the high contributed causes, the pareto calculation then done:

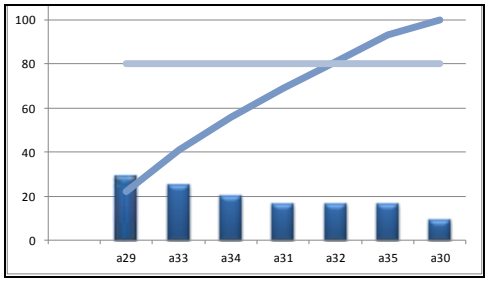

Figure 2 Pareto Analysis for PT X

Table 31 The most contributed causes for PT X

	Item to be Solved
a29	The workers regard risks as unavoidable
a33	The workers accept risk-taking especially if the work schedule is tight
a34	The workers consider that their work is unsuitable for cowards
a31	The workers accept dangerous behaviour as long as there are no accidents
a32	The workers break safety rules in order to complete work on time

It can be inferred that there are 5 most contributed causes (item 29, A33, A34 31, 32). All that causes are then processed trough brain storming analysis and root cause analysis to find the main root cause.

For short, the root cause are the found as follows:

Table 32 the Relevant Root Causes Found for PT X

	Root Causes Found
1	Management has less consideration related to safety matters
2	Management is not able to make the simple and effctive safety rules

While PT Y pareto analysis is illustrated below:

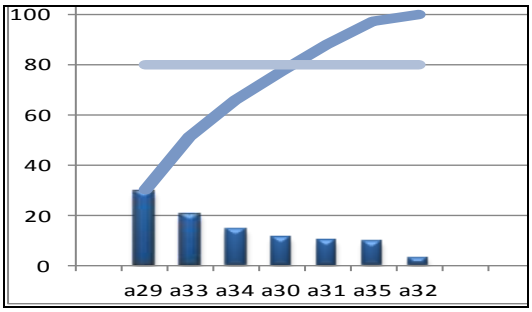

Figure 3 Pareto Analysis for PT Y

Table 33 The most Contributed Causes for PT Y

	Item to be Solved
a29	The workers regard risks as unavoidable
a33	The workers accept risk-taking especially if the work schedule is tight
a34	The workers consider that their work is unsuitable for cowards
a30	The workers consider minor accidents as a normal part of their daily work
a31	The workers accept dangerous behaviour as long as there are no accidents

It can be inferred that there are 5 most contributed causes (item 29 A33, A34, 30, 31) in PT Y. All that causes are then processed trough brain storming analysis and root cause analysis to find the main root cause.

For short, the root cause are the found as follows:

Table 34 the Relevant Root Causes Found for PT Y

	Root Causes Found
1	There is no reward and punishment system in the safety rules
2	Management has less consideration related to safety matters

G. Recommendation

Based on the relevant root causes, some recommendations are then generated for PT X which are described below:

1. Management should increase their safety consideration more. They should show clearly that they really care with worker safety, so that workers will trust them related to safety matter, and they will obey the rule. High safety consideration can be showed by :

a. Reform the p2k3 team. Actually, PT X had a team named p2k3, who has responsibilities to make sure safety system in every workplace.
b. Strictly in running the reward and punishment system.
c. Never bored in warning the workers who do the unsafe action.
d. Strictly in running the safety rule
e. Directly handle every risk found in workplace.
f. Treat every worker who gets an accident fairly.

2. Management should be simple but effective, in designing safety rule. The simpler the system is, the more the worker will obey it, as long as it's effective.

While for PT Y, the recommendation is described below:

1. Management should make a reward and punishment system which gives strong punishment for them who break safety rules, and great reward for them who obey the safety rule. This system should be run strictly.

2. Management should increase their safety consideration more. They should show clearly that they really care with worker safety, so that workers will trust them related to safety matter, and they will obey the rule. High safety consideration can be showed by doing some steps below :
   a. Have a good communication with all worker and also HSE department.
   b. Provide safety facilities, especially the clinic. PT Y has no clinic until now, while clinic has important role.
   c. Organize the p2k3 team well
   d. Never bored in warning the workers who do the unsafe action.
   e. Strictly in running the safety rule
   f. Directly handle every risk found in workplace.
   g. Treat every worker who gets an accident fairly. Never blame the worker directly, and try to find the root cause as detail as possible, directly mend something that needs to be mend.

III. ANALYSIS AND INTERPRETATION

A. Questionnaire result analysis

In the reliability result, shows that some dimensions, either for workers or managers as respondents, shows the unreliable result. The unreliable result may happenned because the language used. NOSACQ-50 is not originated in Indonesian language, but it was translated into so many languages. The different interpretation may happened when it was translated, even though there is already a statement of the Indonesian translation NOSACQ-50 validity, since NOSACQ-50 is brand new tool, many uncertainties may happened.

The safety climate level of PT X is considered high. It may happened because of its long experience of existence, where PT X established since more than 100 years ago and certified in safety matters, so safety aspect is not something totally neglected there. While safety climate level of PT Y shows the higher level. Even some of dimension has level up to 3.33 which indicates a good level. Actually this finding seems contrary as PT Y even doesn't have OHSAS certification (still in applying OHSAS certification). This contrary finding may happened because of something that is beyond the control of this research

Sub climate is found happened in either PT X or PT Y. It means that the perception of safety climate is not well shared in both companies. Therefore they have to mend their share system. The one with significant high level of safety climate should share their perception to other who has significant lower safety climate level.

B. Interview result Analysis

Interview result of PT X varies for each sector, but overall, PT X has high level of safety climate based on interview. Then overall, interview result in PT Y shows a slightly lower level compared to PT X. It may happened because PT X has more experience and certifications than PT Y, in many things, included safety climate perception sharing.

C. Observation Result Analysis

Observation result shows that PT X has higher level compared to PT Y. This may happened because of the certification ownership (PT X has OHSAS ans ISO certification, then PT Y is still in progress of OHSAS certificating process) and also the experience it had.

D. Triangulation analysis

The triangulation analysis shows the different result for each method in both company. This may happened because of something missing in the method used. The most possible cause is the interview method which are too short with too few questions asked and the observation time which is also too short. Based on triangulation done, in both companies is then found same problem which is not really good level of dim 5 which is worker perception regarding how they: - prioritize safety before production - do not accept risk-taking or hazardous conditions.

E. Problem solving analysis

Probem solving in this research done by using pareto analysis, brain storming ,and why why chart. The result showed 2 root causes (for each company) that need to be solved, all of them is focused on management. This findings makes sense since management is the controller of safety. However, since safety involves either workers or managers, they both have to show the good cooperation to achieve the exelent safety matter in the company.

F. Recommendations analysis

The recommendation given is also tend to be applied for management side, with the same reason as problem solving analysis

IV. CONCLUSSION

The conclusions of this research are:

1. The finding of this research proves that ship building worker has less consideration related to safety. They have relatively low safety priority and risk acceptance.
2. The result shows that safety climate research is very complicated and therefore, it needs more carefulness and more time to do.
3. All tools used for safety climate research, have to be fit with the object of the research since safety climate is something specific

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