ABSTRACT

ASSESSMENT OF MATURITY LEVEL: A STUDY OF QHSE CULTURE

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Abstract. Occupational safety and health (OSH) has been a concern in industrial companies to reduce workplace accidents. One of the regulations is that each company with at least 100 employees must apply to the OSH Management System (*Sistem Manajemen K3*). However, the obvious is that not all businesses can use OHS procedures properly. Advance control and checking are required to actualize a successful and effective OSH Administration Framework. Additional power and monitoring are needed. A corporation can comprehend its current performance using the maturity level, which thoroughly measures safety performance. The most significant theoretical advancement in health and safety research in recent years has been called safety culture. This study's purpose is to present a model that measures the maturity of the quality, health, safety, and Environment (QHSE) culture in a particular area of Jakarta's logistics sector and offers suggestions for raising QHSE awareness. This article's methodological approach is qualitative, and an exploratory study purposefully supports the sampling technique. The theoretical reference is based on understanding the premises concerning safety culture and its components after reviewing the findings and discussing what confirmed that the safety maturity level is proactive but might use some adjustment. Results indicated that the evaluation approach proposed can help determine the safety maturity's current status, but its use requires that a few fundamental conditions be met.

Keywords: Safety Culture, Maturity Level, Risk Management, QHSE, Warehouse Management, Logistic, ASSESSMENT OF MATURITY LEVEL: A STUDY OF QHSE CULTURE.

INTRODUCTION

An occupational accident is an unwanted or unplanned event that causes harm to people, property (assets), or processes. An accident is also an unforeseen and uncontrollable event resulting in personal injury or environmental damage [1].

An accident is defined as an unintended or unplanned occurrence that may or may not result in property damage, personal injury, termination or interruption of work processes, or a combination of these conditions, according to Bird and Germain 1990 [2].

Based on data from the *Badan Penyelenggara Jaminan Sosial Ketenagakerjaan* (BPJSTK) Period year 2017 – 2021, if we see from the trend, year by year, the number of work accidents has increased relatively high. As the graph below, BPJSTK noted that the number of work accidents in Indonesia was 234,270 cases in 2021. This number increased by 5.65% from the previous year (2022), with 221,740 points [3].

Chart 1 - the number of work accidents in Indonesia

In the local regulation, *Undang – undang nomor 1 Tahun 1970* regarding occupational safety stated that every worker is reserved the right to protection for his safety in the workplace for the welfare and to increase production and national productivity [4]. Occupational safety and health (OSH) are all activities to ensure and protect the safety and health of the workforce through the prevention of occupational injuries and occupational diseases [5].

Therefore, a company had to implement, manage, monitor, control, and evaluate occupational safety and health. One of the ways to do this is to implement the OSH Management System; this is part of the organization's overall management system in the context of risk control related to work activities to produce a safe, efficient, and productive environment. Further control and monitoring are needed to realize the best implementation of OSH in a company. Measuring the safety maturity level of OSH implementation is one of the ways. Maturity models are based on guiding and measuring the process's implementation and improvement. The maturity level provides a comprehensive measurement of safety performance to help a company understand its current level of performance and the steps it can take to improve safety and profitability [6]. It is necessary to conduct an assessment of the companies with a way of identifying their strengths and weaknesses, allowing for continuous improvement.

This paper aims to present and assess a system for quantifying the QHSE culture maturity level in a logistics segment, offering recommendations that might help increase QHSE awareness levels.

In this circumstance, we propose the following: questions to guide our research towards desired goals: What is the safety culture maturity level in the segment observed by this study, and what recommendations can be made to increase the level?

The paper is organized into five parts. The first represents an introduction to the theme, followed by an explanation of the materials and methods used in the second part. The third part addresses the study's theoretical framework. Moreover the fourth is the results of the survey. The last piece of the paper presents our conclusions and due recommendations.

LITERATURE REVIEW

2.1 Safety Culture

Regarding the European Agency for Safety and Health at Work [7], the safety culture refers to how an organization's informal aspects can positively or negatively influence occupational safety and health positively or negatively. The roots of workplace accidents can be found in safety culture. A good safety culture influences a company's quality, reliability, competence, and productivity. Management's role in creating a good safety culture is critical. According to Perttula (2017), safety is not a constant value. It must continuously be enhanced in addition to being maintained. The workplace's safety culture describes how safety procedures are carried out [8].

Although the importance of safety culture is widely accepted, few organizations have successfully implemented effective safety culture improvement initiatives. One

reason is the absence of clear guidance on what a good culture looks like and how to create such a culture. Fleming (2001) used the concept of maturity to create a model for safety culture, aiming to help oil companies in the United Kingdom assess the maturity level of their cultures and what actions would be necessary to improve it [9]. Fleming's model (2001), with its five stages of safety culture maturity, is presented in Figure 1.

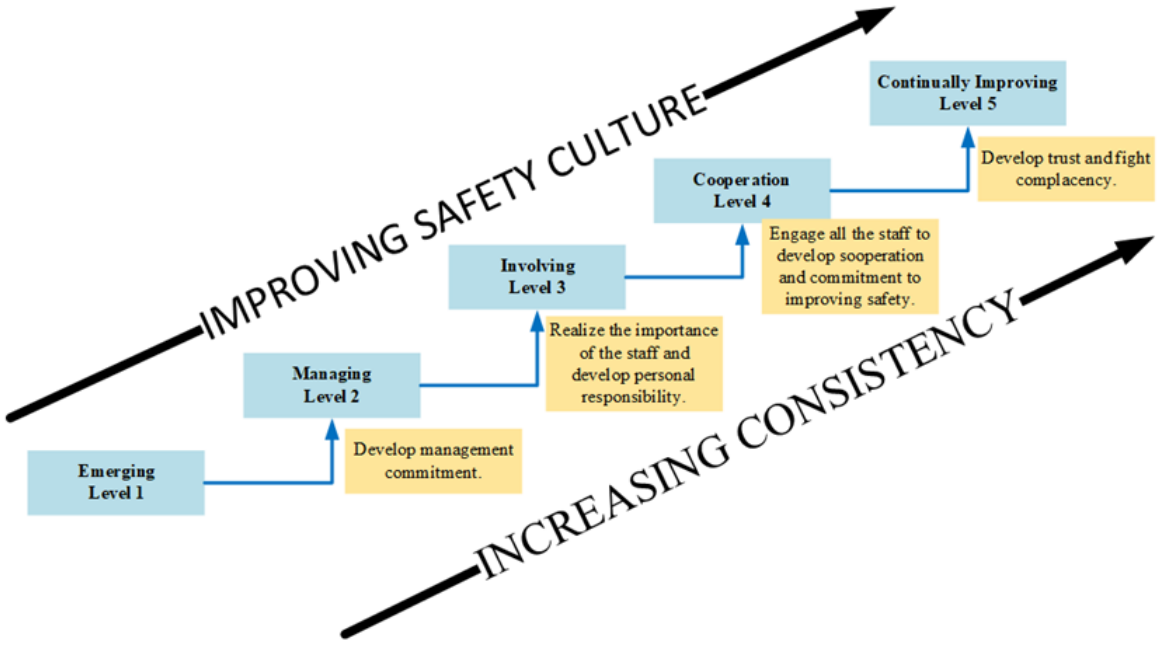

Figure 1 – Adapted from Fleming's safety culture maturity model
Source : Adapted from Fleming (2001).

It is worth pointing out that Fleming (2001) warns that his model is only applicable to organizations that meet the following criteria: having an adequate occupational safety management system; most accidents not being caused by technical failures; complying with occupational safety laws and regulations and using occupational safety as a way of preventing accidents. Hudson defines maturity models in safety culture, 2007 as continuous, varying from organizations with an unsafe culture ("pathological" organizations) to those that manage safety proactively ("generative" organizations) and those that are in an intermediate development stage ("bureaucratic" organizations) [10]. Furthermore, Hudson (2001) states five levels of progressive maturity [11], as pictured in Figure 2.

Table 1 – Culture maturity levels

Level	Behaviour
Pathological	It aims, at most, to comply with legislation.

Reactive	HSE actions are taken after accidents.
Calculative	The organization has a system to manage risks in the workplace but still lacks a systematic vision of HSE.
Proactive	Based on the organization's values, the leader conducts continuous improvements. The organization aims to anticipate problems before their risks.
Generative	The organization possesses the information necessary to manage its HSE system and constantly searches for better ways of controlling risks.

Source: Adapted from Hudson (2001).

Maturity models are descriptive, which point out essential (fundamental) attributes to characterize an organization on a particular level [12].

2.2 Selection of maturity indicators

A literature review was conducted to select the maturity indicators of a safety culture, and the five most frequently mentioned factors were chosen: information, organizational learning, Involvement, communication, and commitment [13].

The description of the five selected factors presented in the following table was done based on the authors presented below:

Table 2 - Safety Culture Maturity Indicators

Indicator	Definition	Authors
Information	It is characterized by the individuals' trust in the organization to report mistakes, accidents, and incidents – an essential aspect of constructing an informed culture. It also includes the indicators generated by the organization in order to monitor occupational safety performance	REASON, 1997[14]; HUDSON, 2001[11]; AIEA, 2002[15].

Operational learning	Characterized by how the organization treats the information received, how accidents and incidents are analyzed, whether corrective action is proposed and implemented, whether or not the staff is informed of the action, and whether there are ongoing efforts to improve safety processes.	AIEA, 2002[15]; REASON, 1997[14].
Involvement	Characterized by staff participation in safety issues, such as analysis of accidents and incidents; in the identification and analysis of workplace risks; in proposing and implementing work safety improvement measures; in the creation and revision of procedures related to their work; in planning their work; and in safety committees, meetings.	CHOUDHRY et al., 2007[16]; GORDON et al., 2007[17].
Communication	It is characterized by how communications on themes about occupational safety are done and if they are done in a convenient and timely manner, whether or not there is an open communication channel between employees and hierarchical superiors. It also pertains to whether or not said information reaches the company's employees, whether or not they understand it, and whether or not the organization monitors its effectiveness	COOPER, 1998[18]; GLENDON & STANTON, 2000[19]; OLIVE et al., 2006[20]; MEARNS et al., 2003[21]; WESTRUM, 2004[10].

Commitment	is characterized by the number of resources (time, money, personnel) and the general support allocated to occupational safety management, by the current status of occupational safety concerning production, by the existence of an Occupational Safety Management System containing: the organization's vision and goals; a definition of responsibilities; the organization's training policy and qualifications; procedures; rewards; sanctions; and audits. Genuine commitment means more than written policies and mentions the importance of occupational safety in speeches. There must be a rapport between what is said and what is done.	DEJOY et al., 2004[22]; FLIN et al., 2000[23]; AIEA, 2002[15]; OLIVE et al., 2006[20].

The interpretation of culture as a causal attitude is measurable, comprehending the organization's values, competencies, attitudes, and behaviors regarding safety [24].

Vongvitayapirom et al. state that most critiques made by managers concerning safety culture derive from how communications can be made visible and effective for the entire workforce [25]. The goal needs to be to increase the awareness of all employees regarding safety, which must be done through different communication methods with broad notions of technological improvement and cultural sensitivity.

For Hale, maturity scales are the stages organizations go through from the pathological to the constructive level [26]. However, it is hard to determine when pushing an organization from one stage to the next. It is possible; therefore, longitudinal studies are necessary to increase the organizational learning curve, pushing companies to reach maturity more swiftly and efficiently.

Gonçalves Filho and Waterson argue that the safety culture assessment is carried out using the maturity model or other methods such as questionnaires, questions, focus groups, and which one to use [12]. The authors also state that the flexibility provided by the maturity models might be considered a strength in comparison to other methods of assessment of QHSE culture.

METHOD, DATA, AND ANALYSIS

Resources of studies about the Maturity Model were collected and then formed into a diagram of the Maturity Level. The safety culture maturity level from Hudson

(2001), developed by Filho et al., will be used in this research. The five levels, from the lowest to the highest, were described as follows:

1. Pathological: workers are the cause of the safety problem; people should look after themselves with the mind-set to avoid safety as long as they do not get caught.
2. Reactive: Safety starts to be taken seriously by the organization, but the action would be done after the accident.
3. Calculative/Bureaucratic: safety has already been driven by the Management System to manage all hazards. Management is primarily driving safety and making regulations that the employee should follow.
4. Proactive: the performances have already improved. The anticipation of safety problems was made before they arose. The employee starts to have Involvement and initiative.
5. Generative/Sustainable: active participation occurs at all levels of the organization. OSH is already seen as how the company does business [27].

The scope of the research is to focus on warehouse management. The Questionnaire was created using Google Form and distributed directly to the respondents at the survey. The criteria are based on each step of the evolution of corporate culture maturity, according to Hudson [11]. The next step is constructing the questionnaire items based on the maturity level model as the parameter (five-level scale).

The next step is the determination of factors of safety culture. Factors determination was done by combining and simplifying several resources. According to several source and research, those factors are described as follow:

1. Commitment: support is given by the organization (OSH concerned), such as rules and procedures, planning, auditing, competency, and training.
2. Leadership: Describes the leadership of a supervisor or the superior who could influence the worker's safety performance at work. All managers (including senior supervisors) are very concerned about the OSH aspect, which could be proved by their consistency in the application and behavior of OSH in the field.
3. Responsibility: Describe the level of employee responsibility characterized by a sense of care and concern in maintaining the health and safety of themselves and others in the workplace.
4. Engagement and Involvement: how the organization leads the employee in participating in safety issues, accident analysis, reviewing procedures and rules, safety meetings, and safety committees.
5. Risk: It is a potential loss that can be caused when in contact with a hazard or the failure of a function.

6. Competence: Describe the ability of the employees at work based on their job description, which concerns safety aspects.
7. Information and Communication: The communication channel in the company between managers and employees, as well as between employees. Concerning open and frequent communication and social interactions. An organization's formal system allows its employee to inform about any near misses and accidents and the employee's confidence. It also complies with the shared perceptions among employees.
8. Organizational learning: learning culture, how the organization deals with the information, how the organization analyses the accident and near miss, and how the employee keeps informed about these.

A qualitative research methodology is used, and the sampling technique is purposive. Purposive sampling is a sampling technique of data sources with specific considerations. Namely, the data source represents what is expected, making it easier for researchers to explore the studied object or social situation. Not on multiple sample data sources. In qualitative research, the sample selection is not based on statistical calculations. The selected sample serves to obtain maximum information [28].

RESULT AND DISCUSSION

The Questionnaire is distributed to employees who work at a Logistics Company and focus on warehouse management. The sample taken is 35 respondents.

The identification of the current level of five topics, contemplated by questions with answers presented on a scale from one to five and each question assigned to the survey, was carried out as follows, according to the model proposed by Hudson (2001):

Table 3 - "Commitment" is almost entirely in the proactive stage. Question 4, was the one that presented the most significant percentage. Based on the answers given by respondents, the lowest percentage is 2.9% which is in the reactive stage. Commitment informs about rewards and punishment.

Table 3 - Commitment

No	Score	1	2	3	4	5
	Question	A	B	C	D	E
	Commitment					

A	1	The Commitment of Management in performing the work safety procedures			8.6 %	57.1 %	34.3 %
	2	OSH policy establishment informs of reward and punishment system			5.7 %	54.3 %	40.0 %
	3	Safety aspects consideration while cooperating without sourcing parties			17.1 %	54.3 %	28.6 %
	4	Company encouragement to work according to safety rules			11.4 %	62.9 %	25.7 %
	5	Commitment to ensure all types of jobs at the work area(operation and maintenance) comply the safety aspect		2.9 %	8.6 %	51.4 %	37.1 %
		Average		2.9 %	10.3 %	**56.0 %**	33.1 %

Table 4 - "Leadership" is in the Proactive stage, with some traces for the proactive stage. Some respondents choose the proactive stage for the questions "2. Ensure the work equipment meets the safety standard" and "4. Supervisor speeches concerning OSH".

Table 4 - Leadership

No	**Score**		**1**	**2**	**3**	**4**	**5**
	Question		**A**	**B**	**C**	**D**	**E**
B	**Leadership**						
	1	Supervisors inspection of safety to their work unit			31.4 %	48.6 %	20.0 %
	2	Ensure the work equipment meet the safety standard			45.7 %	42.9 %	11.4%
	3	Supervisor encouragement to work in safety			17.1 %	68.6 %	14.3 %
	4	Supervisor speeches concerning OSH			45.7 %	37.1 %	17.1 %
		Average			35.0 %	**49.3 %**	15.7 %

Table 5 - "Responsibility" is in the Proactive stage. We can look at the table for question number 2, "Employees reporting to near-miss incidents and hazards potential" more than half of the respondents answer the C, which means they fall into the proactive stage.

Table 5 - Responsibility

No		Score	1	2	3	4	5
		Question	A	B	C	D	E
C	**Responsibility**						
	1	Employee response to unsafe actions of his co-workers			22.9 %	57.1 %	20.0 %
	2	Employees reporting to near-miss incidents, and hazards potential		8.6 %	54.3 %	22.9 %	14.3 %
	3	Supervisors monitor during the overtime and holiday			28.6 %	51.4 %	20.0 %
	4	OSH workforce performance in taking the OSH role		2.8 %	22.9 %	54.3 %	20.0 %
		Average		5.7 %	32.2 %	**46.4 %**	18.6 %

Table 6 - "Engagement and involvement" is also in the Proactive stage. Based on the answers given by the respondents, there is a significant divergence between answers for D and E. Average for D is 45.7% and for E is 18.1 %

Table 6 - Engagement and Involvement

No		Score	1	2	3	4	5
		Question	A	B	C	D	E
	Engagement and Involvement						
	1	Employee contribution to work safety environment			31.4%	57.1%	11.4%

D	2	Open communication system concerning unsafe action and condition		8.6 %	45. 7%	28. 6%	17. 1%
	3	Employee participation in OSH coaching		2.9 %	20. 0%	51. 4%	25. 7%
		Average		5.8 %	32. 4%	**45. 7%**	18. 1%

Table 7 - "Risk" is in the Proactive stage, slightly divergent between answers D and E. The divergence gap is only 2.1%, which indicates that the company already has systems, but some employees did not perform them correctly.

Table 7 - Risk

No	**Score**		**1**	**2**	**3**	**4**	**5**
	Question		**A**	**B**	**C**	**D**	**E**
E	**Risk**						
	1	Availability of safety tools and sign		2.9 %	8.6 %	40. 0%	48. 6%
	2	Cleanliness of the work equipment			22. 9%	42. 9%	34. 3%
	3	Effectiveness of safety patrol to control risk and hazard findings		2.8 %	14. 3%	40. 0%	42. 9%
	4	Shift hand over information system	2.9 %		5.7 0%	51. 4%	40. 0%
		Average	2.9 %	2.9 %	12. 9%	**43. 6%**	41. 5%

Table 8 - "Competence" also has a proactive stage, even though the respondent's answer for question 2 is the highest. 62.9 % of respondents thought continuing education improves competence in controlling the risk.

Table 8 - Competence

No	**Score**	**1**	**2**	**3**	**4**	**5**
	Question	**A**	**B**	**C**	**D**	**E**

F	**Competence**						
	1	Clearness of job description(responsibility, task, position, competence required)		2.9 %	11. 4%	54. 3%	31. 4%
	2	Continuing Education to improve competence for risk control		5.7 %	62. 9%	14. 3%	17. 1%
	3	Training compatibility related to work typical		5.7 %	22. 9%	54. 3%	17. 1%
		Average		4.8 %	32. 4%	**41. 0%**	21. 9%

Table 9 - "Information and Communication" is the same stage as competence which is a proactive stage. The information about safety issues enhances the employee's awareness.

Table 9 - Information and Communication

No	**Score**		**1**	**2**	**3**	**4**	**5**
	Question		**A**	**B**	**C**	**D**	**E**
G	**Information and Communication**						
	1	Safety issues discussed in the work environment			48. 6%	31. 4%	20. 0%
	2	The information (billboards, posters, videos, bulletins, etc)about the near-miss incident (safety issues) to enhance the employees awareness	2.9 %		28. 6%	57. 1%	11. 4%
	3	Freedom to express the unsafe action and condition anytime without communication forum		2.9 %	31. 4%	45. 7%	20. 0%
	4	Clear and understandable work instructions and placed at the strategic locations		2.9 %	5.7 %	51. 4%	40. 0%
		Average	2.9 %	2.9 %	28. 6%	**46. 4%**	22. 9%

Table 10 - "Organization Learning" has been classified as the proactive stage. Question 1 was the one that presented the most significant percentage. It indicates that

the company has already been open and responsive to the following unsafe conditions and action reports.

Table 10 - Organization Learning

No		Score	1	2	3	4	5
		Question	**A**	**B**	**C**	**D**	**E**
H	**Organization Learning**						
	1	Company openness and responsiveness in following up on the unsafe conditions and action			22.9%	68.6%	8.6%
	2	Company intensity to analyze the cause of the near-miss	2.9%		28.6%	45.7%	22.9%
	3	Conducting a review of OSH Management System		5.7%	40.0%	34.3%	20.0%
		Average	2.9%	5.7%	30.5%	**49.5%**	17.2%

Based on the answer given by respondents, we see that the company is at a proactive level for all measurement indicators. It shows that the company already has a system and makes continuous improvements. So the companies can control any potential hazards and risks arising from the existing business processes. Although all indicators are at the proactive level, the answers from respondents indicate that there is still room for improvement to reach the generative stage. Some points that need to be improved are:

1. Commitment

   In this indicator, the points that need to be improved are the management of the OHS program sustainably, always controlling and evaluating the implementation of the company's commitments and policies so that continuous improvement can be achieved to create management with a culture of OHS.

2. Leadership

   In this indicator, the point that needs to be improved is that the supervisor must inspect so the company's management can see that leadership. Supervisors must actively follow existing OHS commitments and programs and provide input to

superiors and management. Existing safety standards must inspect existing equipment. The implementation of OHS briefings must be scheduled and initiated with a different topic for each briefing so that procedures and work instructions regarding OHS are appropriately socialized to the staff.

3. Responsibility

   Every employee must recognize unsafe actions and conditions. To create a safe culture and remind each other constantly to work safely. They were reporting near-misses through the Hiyari Hatto form to prevent potential hazards so that work accidents do not occur. It is crucial to focus and pay close attention to the duty of supervising overtime workers to ensure that everyone works safely and follows applicable regulations.

4. Engagement and involvement

   Employee participation is essential for creating an OHS culture in the company. Employees are expected to understand the importance of a safe work environment to minimize unsafe acts and conditions in the work area. It is suggested that workers can attend training or socialization held by the company.

5. Risk

   The provision of tools and safety signs is also an essential aspect that the company must consider in implementing the OHS management system. Equipment in the workplace must be clean and well-maintained using regular checks or inspections. Housekeeping is also one of the supports so that the equipment is well organized. The results of periodic inspections are expected to be followed up immediately to help the company make continuous improvements.

6. Competence

   Competence is essential for the work and the existing OHS management system. Clarity regarding the duties and responsibilities of personnel must be ensured to be understood by all existing employees. Socialization and education regarding the matters can help employees to carry out their work more efficiently.

7. Information and Communication

   They are expected that safety issues are always discussed in the daily working environment of each employee, equipped with OHS information and work

instructions that are complete, clear, and easy to find. In good and two-way communication, employees are expected to be able to express their opinions freely in communication forums.

8. Organization Learning

   The company's openness and responsiveness in following up on reports of unsafe conditions and actions will show the company's commitment to implementing the OHS management system. It is always recommended to see why the reasons behind near-miss incidents so that risk control and continuous improvement can occur.

Based on the answers from these respondents, we can also measure the level of maturity of the safety culture in the company. Based on the percentage contained in the company's maturity indicators, we identify that the company has organizational values and is supported by the company's policies and commitment to continuous improvement. So companies can anticipate problems before incidents occur.

One should not hold the false belief that this methodology applies to any professional. It is essential to know the theory and understand the effect of applying the tool and the representation of the target group sample. Frequent reassessment is also deemed necessary, as this is a topic of continuous evolution, as is a program. The level of organizational QHSE cultural maturity is not measured just for observation. Implementing a specific action is expected, and assessing its efficacy after the action is carried out. Based on the papers read during the exploration process and the author's own experience, we present some recommendations for increasing the level of the elements that make up the maturity model of a company's safety culture:

1. Mission, Vision and Policy: Companies must express it through their highest leadership figure.
2. Code of ethics: The Company must establish and disclose it. Recruitment process: Employers must assess whether concern with QHSE is a value held by the candidate.
3. Training process: Add QHSE value to all training processes.

4. QHSE Induction: Should be applied to all new workers, and periodically to old ones.
5. QHSE Guidance: All workers must go through the guide first.
6. Personal and Collective Protective Equipment: Its use should be seen as a value, not a demand.
7. Monitoring and identification of workers on probation: New workers should be monitored until they are appropriate.
8. Supervisory role: Position level is responsible for instructing workers on what is expected of them regarding QHSE and monitoring its implementation.
9. Meetings: Must be held, and open questions should be encouraged.
10. Risk analysis: All workers must be able to assess and identify risks to maintain their own integrity.
11. Contingency plans: All workers should be aware of their unit's contingency plans.
12. Lessons learned: Must be shared, and precautions implemented. Campaign: Companies should hold regular QHSE awareness campaigns.
13. Communication: Open communication between different levels of the organization should be encouraged, with a focus on mutual trust rather than punishment.
14. Change management: All processes in the work that require unplanned changes must be stopped and undergo new planning.
15. Performance indicators: The Company must not use operational performance indicators that can affect the level of worker safety. Conformity assessment and implementation of requirements: Companies must monitor new requirements (whether internal, legal or contractual) or changes made to those requirements.
16. Safety Operational Stand Down: Must be done with management participation to validate safety practices, breaking the paradigm of operational continuity.
17. Audit and Inspection: To create and implement regular tools to assess process efficacy, and conduct audits to meet requirements.

CONCLUSION

The conclusion that can be made after doing the final project research regarding safety culture maturity level are as follow:

1. The framework for developing a safety culture maturity level is the development of 5 levels. It starts from the lowest to the highest. Each level will be determined based on a reflection of these factors. Development of a questionnaire following the company's conditions from several sources and references by the object of research, namely Warehouse Management in the Logistics industry.
2. The questionnaire development was extracted from the framework that has been made. It consists of 31 questions, each with five options representing the level of safety culture maturity. The Questionnaire was developed in simplified writing, using communicative, straightforward language, and in *Bahasa*, and the options are randomized to maintain the objective assessment. Weighting between the aspects of safety culture was conducted to give a fair assessment. The Questionnaire developed has already been tested for its validity and reliability.
3. The result of the maturity level of Warehouse Management safety culture in the Logistics industry is proactive. The maturity level results are also interpreted in each factor and section.
4. Recommendations for improvement are given to each safety culture factor based on the indicator value. Priority for improvement should be applied to the factors with the lowest score. Generally, improvements are needed to develop the current department to achieve a generative level of safety culture.

IMPLICATION/LIMITATION AND SUGGESTIONS

This paper's objective is to present and evaluate a quantification system for the maturity level of QHSE culture in the Warehouse Management segment of the Logistics industry, presenting recommendations that might be implemented to increase the level of QHSE awareness. The authors' limitations in this study are that collecting many data from participants takes time, and compiling data is not as simple as plotting it on a graph. The sample used is only 17.5% of the population due to the limited time for researchers to distribute and process the questionnaire results. In this sense, this paper

suggests that, in order to measure safety culture maturity, several essential prerequisites must be met:

1. The model implementation to be followed, its well-defined elements, and the proposed methodology to measure it. Implementation of an audit with measurable results of the organization's ability to comply with the prerequisites, for example, to conduct cross-sectional analysis between the model elements. Among the evaluation, points are the tendency of workers to report anomalies. It shows lower than expected results. On a proactive level, one would expect strange incidents to be reported, regardless of their severity.
2. In addition to logistics, the framework created in this study can be used in other business industry areas. It should be implemented throughout the company. However, the framework must be adapted to the conditions of the company.
3. The questionnaire instrument can be developed to have other safety culture factors, but the aspects must remain the same. It is also better to increase the number of questions to assess more deeply and accurately.

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