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Safety culture analysis based on safety climate factors at production unit of Pt. Bakrie Sumatera Plantations, TBK Indonesia

Ihsan T.[1*], Sophy Sakdiah D.[2], Andhita Regia R.[3], Derosya V.[4]

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[1*] Taufiq Ihsan, Environmental Engineering Department, Faculty of Engineering Universitas Andalas, Kampus Limau Manis Padang, Indonesia.

[2] Dita Sophy Sakdiah, Environmental Engineering Department, Faculty of Engineering Universitas Andalas, Kampus Limau Manis Padang, Indonesia.

[3] Rinda Andhita Regia, Environmental Engineering Department, Faculty of Engineering Universitas Andalas, Kampus Limau Manis Padang, Indonesia.

[4] Vioni Derosya, Agroindustrial Technology Department, Faculty of Agriculture Universitas Andalas Kampus Limau Manis, Padang, Indonesia.

Background: PT. Bakrie Sumatera Plantations Tbk (PT. BSP) was one of the largest rubber factories with environmental concern and a rubber exporter in Indonesia. This study aimed to analyze the assessment and influence of safety culture toward safety climate and company management at the Production Area of PT. BSP. **Method:** The data were collected by distributing questionnaires referring to Safety Climate Questionnaire to all workers in the production area (159 respondents). The questionnaire consisted of 41 questions/ statements in seven safety climate variables: communications and procedures, work pressure, management commitment, work relationships, training, safety rules, and safety behavior. **Result:** Based on the results of the questionnaire showed 93% of all statements in the questionnaire, get a good response from respondents. This result indicates that the safety culture in PT. BSP was good. The correlation analysis showed that safety culture at PT. BSP was influenced by work pressure (r = 0.758), management commitment (r = 0.717) and training (r = 0.617). Balanced work pressure allowed workers to complete their work without haste. This condition was undoubtedly supported by the commitment of proper management that raises workers' confidence in their safety. **Conclusions:** PT. BSP should make improvements by allowing all employees to discuss and advises on occupational health and safety improvement efforts at the factory as well as provide training to their employees equally.

Keywords: Production Unit, PT. BSP, Safety Climate, Safety Culture

Corresponding Author

Taufiq Ihsan, Environmental Engineering Department, Faculty of Engineering Universitas Andalas, Kampus Limau Manis Padang, Indonesia.
Email: taufiqihsan@eng.unand.ac.id

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Introduction

PT. Bakrie Sumatera Plantations Tbk (BSP) was one of the rubber factories in Indonesia, which was environmentally friendly by utilizing raw materials obtained from PT. BSP itself and was one of the exporters in the rubber industry, with a land area of 18.950 Ha. PT. BSP was able to produce 8,907.56 tons of Cenex, 13,542.50 tons of Crumb Rubber, and 4,919.4 tons of Rubber Block Skim. Large production conducted by PT. The BSP was balanced by the management of human resource as a frontline in rubber production and environmental management [1].

PT. BSP has been awarded a golden flag for the Occupational Health and Safety (OHS) Management System for its success in meeting 91% of 166 OHSMS audit criteria based on Government Regulation No. 50 of 2012. Application of Good Safety culture at PT. BSP was also proven by achieving a Zero Accident from the Ministry of Manpower and Transmigration of the Republic of Indonesia [2].

The success of PT. BSP in achieving the award cannot be separated from the development of management that affects OHS factors in reducing the number of accidents and occupational diseases, among others, perceptions of safety and implementation in the company. This perception was influenced by internal aspects such as management efforts in creating a safe working atmosphere, smooth communication between the management and workers, the presence of OHS training and the existence of safety rules [3-5].

Therefore, this research was conducted as an analysis of OHS implementation and safety culture, which has been applied by PT. BSP to find out whether the workplace safety climate has a significant impact on workers' safe behavior during work, and whether safety climate factors such as work and communication and procedures, workplace pressures, management commitments, relationships, training and safety rules, and other factors may result in the growth of safe working behaviors in the factory environment.

The research was also conducted to analyze whether proper management creates a working climate, improve and improve OHS Management System in the company so that later PT. BSP was able to become a pilot in the OHS field for other companies.

Method

Study design: This study was a prospective, randomized, and a community based cross-sectional.

Study setting: The Production Area of PT. Bakrie Sumatera Plantations TBK (PT. BSP) in Bunut, Kisaran, North Sumatera, Indonesia, which produces four products with rubber raw materials.

Study duration: The study was conducted from November 2018 to March 2019. Data collection was done during November and December 2018.

Study population and sample size: All workers at The Production Area of PT. BSP (159 workers) was the respondents of this study.

Study tool: The questionnaire used in this study was the Safety Climate Questionnaire (SCQ) [6,7] consisting of seven variables and 41 factors/ statements and has been adapted to the current conditions. The questionnaire was made with Likert scale that is 1 to 5 (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Frequently, 5 = Always).

Inclusion criteria: All workers at The Production Area of PT. BSP.

Exclusion criteria: Eligible respondents not willing to consent.

Procedure of data collection: The data was collected by distributing questionnaires at The Production Area of PT. BSP. All workers of the production area in PT. BSP were contacted and obtained permission for data collection during their working days or any other possible days when workers can gather.

Data analysis: Statements from respondents were grouped into variables and answers. The respondent's explanation was analyzed by T-Test, with a 95% confidence level using statistical software (SPSS).

Furthermore, Spearman Rank Interaction was conducted to see if there was any effect on performance improvement with the initial hypothesis that all would agree and give a good response to the company. All statistical tests were analyzed by using statistical software for windows.

Table 1 can be seen variables and factors used in this study.

Table-1: Safety Climate Factors

Communication and Procedures	
Code	Factors
1	Changes in work procedures and their effects on safety are effectively communicated to workers
2	Consultation with employees when there are changes to safety practices
3	Employees are notified of any change in procedures in the work environment
4	Safety policies related to work safety are effectively communicated to workers
5	Work-related safety procedures are complete and comprehensive
6	An effective management documentation system ensures the availability of safety procedures related to occupational safety
7	Safety issues are openly discussed between employees and managers / supervisors
8	Safety procedures are in accordance with the tasks performed in practice
9	Employees can discuss important policy safety issues
10	Employees may consult and advise on safety improvements
11	Employees can easily identify the relevant procedures for each job
12	Employees can express their views on safety issues
13	Employees are encouraged to support each other
Working Pressure	
Code	Factors
1	The timetable for completing realistic work projects
2	There is enough "thinking time" to allow employees to plan and execute their work to an adequate standard
3	The workload is quite balanced
4	There are enough employees to carry out the required work
5	Changes in workloads, which have been made in a short time, can be dealt with in ways that do not affect occupational safety
6	When working employees have enough time to carry out their duties
7	Issues arising outside of employee control can be dealt with in ways that do not affect worker safety
Management Commitment	
Code	Factors
1	Management is committed to safety
2	Management is committed to securing tools
3	Worker safety is central to values and management philosophy
4	Worker safety as an important part and organization of the company
Work Relationship	
Code	Factors
1	A good working relationship between workers in this organization/company
2	Employees are confident about their future with the organization/enterprise spirit of good
3	Employee trust management
4	Employee trust management
Training	
Code	Factors
1	Potential risks and consequences identified in safety training
2	Safety training is provided as well as specific skills
3	Safety training is conducted by people with relevant experience
Safety Rules	
Code	Factors
1	Safety rules may be followed without conflict
2	Safety rules are done without haste
3	Safety rules are always practical
Safety Behavior	
Code	Factors
1	I remind other workers about the dangers and safety of work
2	I always use safety equipment (self-protection tool)
3	Safety rules related to work safety are always practical
4	I put the materials and equipment in place
5	I work to follow the work in accordance with the instructions of supervisors
6	I am not joking with colleagues while working
7	I am not doing dangerous activities like running, throwing or jumping

Results

Respondents in this study were all workers in the production unit owned by PT. BSP, Tbk totaling 159 people. The characteristics of respondents were grouped as follows:

Based on the data obtained shows that 8.9% of respondents were under 20 years old, 60.4% are 20-30 years old; 20.2% were aged 30-40 years, 6.7% are 40-50 years old, and the remaining 3.8% are over 50 years old. It was clear that most respondents were productive workers (20-50 years). The majority of respondents who had work experience ≥1-≤ 10 years was 64%, 23.9% have worked 10-20 years, 9.4% have been working 20-30 years, and 2.6% has been working for more than 30 years. Respondents who have been working for a long time were expected to be able to carry out their work better.

Employee duration had a positive effect on employee professionals, meaning the longer the service life of the employee, the better the employee professional; and employee duration had a positive impact on employee performance, it means that the longer the service life of the employee, the better the employee performance and better prepared to face work stress [8-11].

Based on the data obtained shows that 54% of respondents are senior high school graduates, 25.8% diploma graduate or bachelor degree, 12.6% junior high school and the rest 7.6% are primary school graduates.

Education as an effort planned to influence others either individuals, groups, or communities so that they did what the educational offender expects [8,9,12]. Characteristics of Respondents can be seen in Table 2.

Table-2: Characteristics of Respondents

Characteristics	Category	Frequency	Percentage
Age (year)	≤20	14	8.9
	>20 s/d ≤30	96	60.4
	>30 s/d ≤40	32	20.2
	>40 s/d ≤50	11	6.7
	>50	6	3.8
Work Experience (year)	≥1 s/d ≤10	102	64.1
	≥10 s/d ≤20	38	23.9
	≥20 s/d ≤30	15	9.4
	>30	4	2.6
Education Level	Primary School	12	7.6
	Junior High School	20	12.6
	Senior High School	86	54
	Diploma/Bachelor Degree	41	25.8

Data processing followed by the recapitulation of the respondent's answer and t-test. If t arithmetic ≥ t table with a significance value ≥ 0.05), then there was a uniformity of safety culture that has been applied by the company with that done by workers and vice versa. The recapitulation results for hypothetical Factors initially rejected can be seen in Table 3.

Table-3: Hypothesis Rejected

Variable	t	Sig. (2-tailed)	Hypothesis	Result
Communication and Procedures	3.196	0.033	Employees can discuss important policy safety issues	Rejected
Communication and Procedures	3.340	0.029	Employees may consult and advise on safety improvements	Rejected
Training	2.948	0.042	Safety training is provided as well as specific skills	Rejected

Based on correlation analysis of Rank Spearman correlation between safety behaviors variable to six safety climate variables with a 95% confidence level (A p-value < 0.05 was considered statistically significant) can be seen in Table 4 below.

Table-4: The Correlation Value Between Variables

Variables	R	Sig
Communication and Procedures	0.573	0.071
Working Presssure	0.758	0.000
Management Commitment	0.717	0.000
Work Relationship	0.368	0.101
Training	0.617	0.014
Safety Rules	0.377	0.204

Discussions

Based on the data in Table 2 shows that 96 respondents aged 20-30 years or 60.4%. Furthermore, there were 20.2% of workers aged 30-40 years. This percentage means that almost all respondents were productive workers. The performance will decline with age. Older workers were considered less flexible and could not adapt to new technology, but once the old worker had the experience, a strong work ethic, and commitment to quality.

Age was inversely proportional to absenteeism, where older workers are less likely to stop working or more fatigue. Age also affected productivity, where the older the worker decreased, the more skill, speed, dexterity, strength, and coordination decreased with time. Based on the above studies, it can be said that the older the health workforce, the less the performance [13,14].

In Table 2, absolutely that the majority of respondents who have work experience 1 - 10 years are 64, %; and 23.9% of workers have worked 10-20 years. Respondents who have worked for a long time are expected to be able to carry out their work better.

The length of time an employee has a positive effect on employee professionalism, meaning that the longer the employee's working period, the better the employee's professionalism; and employee work time has a positive effect on employee performance, meaning that the longer the employee's service life, the better the employee's performance [15,16].

Table 2 shows that half of the respondents' education was high school level, and more than a quarter of the total respondents were a diploma or undergraduates. The education as any planned effort to influence others, whether individuals, groups or the community, so that they do what is expected by education practitioners.

From this limitation, it is implied that the elements of education are: (1) input is the target of education (individuals, groups, communities), and educators (education practitioners); (2) processes (planned efforts to influence others); (3) output (performing according to target or behavior) [17].

Based on data processing, 93% of statements had a good response from workers. However, there were three statements whose significance value is less than 0.05 (the hypothesis was rejected), that was for the employee's report to discuss safety issues, consultation, and advice for the management of workers regarding safety regulations and the existence of specialized safety-related training to employees. Three statements require improvement in the application of safety culture at PT. BSP.

The results of the analysis using statistical software, work pressure variables, management commitments, and training have a strong and positive correlation to safety behaviors. The working pressure was balanced so that workers did not complete their work with haste, good management commitment to generate employee confidence in the safety and the training, so that raises awareness of workers to safety to affect the safety behaviors.

A commitment was manifested in the form of policies that written, clear, and easily understood by all workers. However, a commitment was not only in the form of written policies, and it needs support and supported from management to prove that the company genuinely concerned work safety. This real effort could be discussed with attitudes and all actions related to work safety. [18, 19]. The causes of work in the industry, causing some workers to cut corners and take unsafe actions.

One of the more common tasks for lifting goods is usually done manually and poses a risk, and this occurred because some workers involved using lifting equipment require time and increased production. The training for employees was a process of teaching specific knowledge, expertise, and attitudes so that employees become more skilled and able to carry out their responsibilities better following standards [20].

This condition was undoubtedly supported by the commitment of proper management that raises workers' confidence in their safety. Besides, through the implementation of training, workers could raise awareness of safety. This situation affected the safety habits that exist in PT. BSP. The correlation of procedural and communication variables to safety behaviors was weak, as workers were familiar with the work and work environment, so workers were easy to make adjustments when there was a change in working procedures [21]. As for the variable working relationship and safety rules for the safety behaviors of the relationship was very weak.

Management and workers were committed to professional work and put aside personal issues, personal issues at work and home so as not to affect safety behaviors while working. Workers who had received safety training will be more aware of the risks of occupational injuries so that they will perform safe working procedures without being constantly reminded of safety regulations [22-26].

The PT. BSP had a team of Health and Safety Management Committee, whose task was to make policy, target, identify hazards and risks, conduct OHS training, install safety signs, provide PPE, conduct inspections and others, and ensuring that all PDCA cycles run continuously.

Workers were no longer required to engage in the creation of safety regulations, but it did not mean that employees can not advise if the existing rules were not appropriate to the conditions in the field — employees who have long worked at PT. BSP was involved in the manufacture or improvement of regulations in PT. BSP, the selection of old employees as one of the contributors of ideas was done because the old employees were considered to be more understanding and understand what risks will occur in the field [27-29].

In further research, factor analysis should be carried out to see the contribution of each dimension to the climate of safety.

Limitations

Since it is a cross-sectional study, enhancement, or declination in knowledge over time could not be studied. The knowledge level is studied only in a selected industry, so generalization was not possible.

Conclusions

Safety culture condition in PT. BSP was reasonably good, referring to SCQ, which shows 93% statement had a good response. Variables of work pressure, management commitment and training had a significant and robust correlation to safety behaviors.

Variable communication and procedures, and training on safety climate needed improvement efforts for PT. BSP, that was, it should involve its employees in making OHS rules, allowing employees to discuss OHS issues in the workplace and provide specialized training for workers.

What this study adds to existing Knowledge

In the aspects of Communication and Procedures, Working Press, Management Commitment, Work Relationship, Training, and Safety Rules, most of their knowledge discovered excellently, but detailed of all these aspects was a lack of many workers at the production area of PT. BSP. With this, it concluded that despite the majority of the workers of PT. BSP knows their responsibilities and knows climate safety, but further research is needed in more depth to be understandable.

Author's contribution

Taufiq Ihsan: Conceptualized the study, prepared protocols and conducted data collection, literature search, involved in data analysis, drafting and finalization of the manuscript.

Dita Sophy Sakdiah: Data collection and analysis the data.

Rinda Andhita Regia: Guided in the study design and in editing with revising the manuscript for intellectual relevance.

Vioni Derosya: Involved in data compilation, interpretation, drafting and translate the manuscript.

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