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Accident rate manufacturing plant: A case study at the pulp and paper industry in east coast Malaysia

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ABSTRACT

The purpose of this study is to analyze the accident rate in the last 12 months in Pulp and Paper Industries in East Coast Malaysia. Researcher believed that the level of safety climate has a relationship with the accident rate. Therefore, this study was undertaken to analyze the rate of accidents in the Pulp and Paper Industries in last 12 months. The study was conducted using questionnaires where the questionnaire was distributed to 100 respondents consisting of managers, executives, engineers, clerical and technicians in the organization. Software Statistical Package for Social Science (SPSS), version 16.0 is used to analyze the result. The finding of the study was found the rate of accidents at low levels (17 out of 98 respondent's injury). This study shows that workers in Pulp and Paper Industries in Malaysian has a strong awareness and have a positive attitude and behaviour on issues related to safety. Therefore, the level of awareness of safety climate able to enhanced the safety.

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1. Introduction

This section discusses the background research of level safety climate in Pulp and Paper Industries. Therefore a study is in Pulp and Paper Plant. To ensure safety, a key pillar in the organization, particularly at the Pulp and Paper, the researchers will study the level safety climate. In this study, researchers will describe the problem statement, research questions, research objectives, the scope of the study, and significant conceptual and operational definitions in the context of safety climate and accident rates. Safety climate is important to be aware of the good and thoroughly by the organization in reducing the rate of accidents at work. In addition employees should always be in a safe working condition.

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Furthermore, employer shall ensure the employee a safe work environment and healthy. Not so survivor lives but also company property can be saved. Therefore, researchers thought it was necessary to study the safety climate. International Labour Organisation (ILO) has revealed that the majority of employees in the world are not aware of workplace safety standards and guidelines by world safety agencies [1]. Cross-cultural differences are believed to restrict world safety agencies' efforts to share and adapt the best safety management practices [2]. Most poor countries have no exposure or development concerning safety management; for example, in the developing countries, the data demonstrate that the frequency of workplace accidents has been 10 to 20 times higher than in the developed countries. This is further supported by Hamalainen *et al.* [3] who found a significant difference in accident rates between developed and developing countries. They added that while many organisations within developed countries are taking a zero accident policy, organisations within developing countries bring a new state of affairs. Among the Southeast Asia countries, Malaysia has been ranked as having the third lowest of accident rate (14,000 cases) and fatality rate (18.3 percent), after Brunei (7,658 accident cases, 10.0 percent fatality rate) and Singapore (7,452 accident cases, fatality rate of 9.8 percent) [3].

2. Literature Review

2.1 Pulp and paper industry east coast

Pulp and Paper Industry East Coast was established in 1996. Throughout the history of newspaper publishing in Malaysia and Singapore the supply of newsprint has been wholly dependent on availability and dictated by the global demand of larger countries. Thus, pulp and Paper Industry East Coast was established to meet local demands and provide world-class, premium grade newsprint primarily for newspaper publishers in Malaysia, Singapore and the region. Pulp and Paper Industry East Coast vision is to be a competitive newsprint provider in terms of cost, efficiencies, quality and service thus creating prime value for their stakeholders.

Pulp and Paper Industry East Coast produces newsprint from old newspapers (ONP), old magazines (OMG) and telephone directories. The mill site is located in East Coast Malaysia. There are total 67 hectares of mill areas and the build-up areas about 15 hectares. The plant finished construction and first ran in year 1999. Pulp and Paper Industry East Coast was co-owned by private company from Malaysian. There was total investment of RM 2 billion in this company.

Pulp and Paper Industry East Coast was the largest and the only local supplier of newsprint which holds 70% of local newsprint market. Pulp and Paper Industry East Coast also become the largest collector of old newspaper and old magazines in Malaysia.

Pulp and Paper Industry East Coast used deinking-bleaching techniques to produce superior pulp without use of chlorine. The mill produces 270000 tons per year of mixed waste and 280000 tons per year of newsprint. Pulp and Paper Industry East Coast receives and treats up to 19000 m³/day of water from the Sg. Pahang. The pipe is connected 10km away from the mill to the Sg. Pahang. All the effluent would be treated and return to the river.

The technology of paper machine and stock preparation is from Voith Germany and the raw water and effluent treatment plant is supported by Ahlstromaquaflow, Finland. All the electrical and automation system is from ABB. Pulp and Paper Industry East Coast is a 100% recycling Newsprint Mill and has achieve EMS ISO 14001. All the waste produced from the plant has to be treated properly before disposed and scheduled waste disposal policy has strictly applied to all worker and plant operation. This is to ensure the environment safety and reduce hazardous chemical release to the environment.

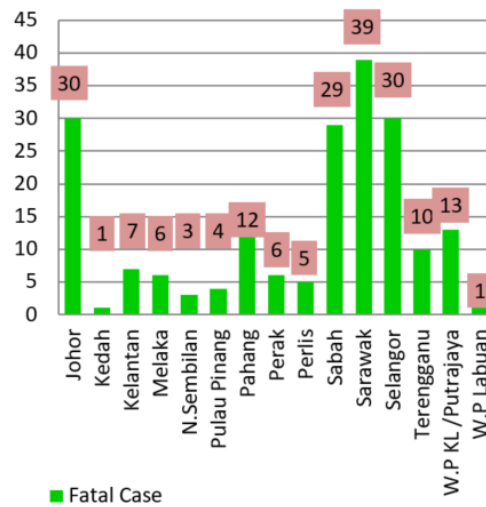


Fig. 1. Fatal case by state in 2014

Figure 1 shows fatal accidents by state in Malaysia. State's highest recorded cases of fatal accidents is the State of the thirty-nine cases. While Johor and Selangor recorded thirty cases and finished second. State which recorded the third occurrence of fatal accidents is the state of the twenty-nine cases. Wilayah Persekutuan, Kuala Lumpur and Putrajaya were thirteen cases. Followed by Pahang was twelve cases. While Kedah, Kelantan, Malacca, Negeri Sembilan, Penang, Perak, Perlis, Terengganu and Perlis recorded the drain were ten cases.

According to the Social Security Organisation (SOCSCO) and the labor office in 2014, four types of companies that recorded the highest accident rates are agriculture, forestry and fisheries; manufacturing; sub and construction. When compared among the four types of enterprise, manufacturing had the highest accident rate.

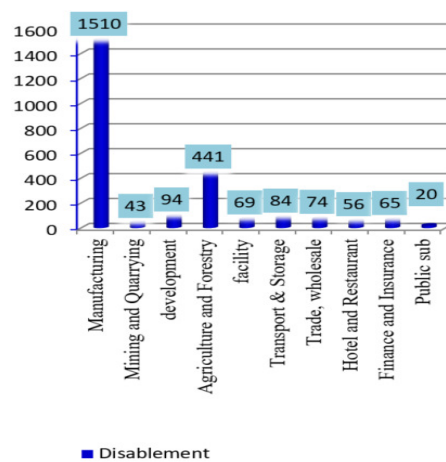


Fig. 2. Occupational Accidents By Sector By Category Without Permanent Disablement Up to December 2014

Figure 2 shows that, occupational accidents by sector by category without permanent disablement up to December 2014. The manufacturing sector showed the highest cases of 1510 cases. Agricultural sector the cases 441. There were 94 cases in the construction sector.

For the transport sector was 84 cases. In the trade sector was 74 cases. Facilities / utilities were 69 cases. Finance and insurance recorded a total of 65 cases. Hotels and restaurants recorded 56 cases. Mining and quarrying by 43 cases and the latter is a public service of 20 cases only. According to reports from workers' compensation insurance, however, the rate of accidents per 1,000 people decreased, although the number of accidents increases. This may be due to the focus and the attention given by the employer against accidents and also on increasing the amount of compensation to be paid to the victims [4]. According to the Enforcement Operations Integrated into the Minister of Public Works Project Site Supervision of PWD by the Construction Industry Development Board Malaysia (CIDB) in 2014, there were four accidents that lead to loss of life and serious injuries were reported. This all took place in April 2014. According [5], he revealed that the investigation of industrial accidents caused by human negligence. In addition, due to system problems and flaws of process system design and operation will cause an accident. In other words a weakness by the machine is one of the causes of the accident. Accidents are costly and it is too expensive when measured in monetary terms.

2.2 Safety climate

Dov Zohar [6] triggers the safety climate in the sector industrial. The study was conducted on twenty workers in twenty industrial organizations in Israel. He examined the perceptions and attitudes of employees related to safety climate.

In a research conducted by Chan *et al.* [8], they compared the perception of climate safety of workers, supervisors and managers in the sector of repair, maintenance, minor alteration and addition (RMMA), supervisor of the lowest mean scores. The study was conducted in Hong Kong. Results showed that a positive attitude on the job and receive safety regulations can reduce the likelihood of accidents.

According to Ghahramani and Hamid [9] who conducted a study at the University of Tehran and Urmia, Iran Azerbaijan, there are seven factors in assessing the safety climate dimensions. Among them is a commitment and communication security, participation and security training, positive, practical safety, security competence, safety procedures, accountability and responsibility, and the last is the support of the environment.

Baek *et al.* [10] carried out research in a chemical manufacturing plant in Korea. The study was conducted on six hundred forty-two mills but of one hundred ninety-five only to give feedback of thirty decimal four percents. He found that the level of knowledge of climate security and the period of time sub influence on the climate of safety.

In addition, Bahari [11] has done research on the manufacturing sector in Malaysia. There are three factors that affect climate security. Among these are the actions of the management, support of management and the latter is a safety climate priority.

According to Zohar [6], climate security is a summary of the perception by employees share about their work environment. Furthermore, Zohar [12] stated that their perception about the organization's security policy, procedures as a practice also known as climate security. Based on descriptions by scholars and trigger the security climate, the researchers found that safety climate is a key pillar to the safety and health at work. Based on the safety and health policies and procedures in the workplace easier for employees to understand and work with the right methods. In addition, workers also will feel they are in safe working condition. Copper and Phillips [13] assert that the

security climate is sharing the perception of workers and the implementation of safety management within the organization. In the field of worker safety climate can share your thoughts and opinions with employers to ensure that workplaces and work activities they are in a safe condition.

3. Results and Discussions

Figure 3 shows the bleeding has the highest accident total of 17 respondents have experienced injuries. It's caused by a minor accident while performing the task. The accident happened accidentally. The bleeding caused by injury is while on duty. Both are injured as many as 16 respondents. This is caused by small bleeding while working. This bleeding is not serious and requires early treatment and can obtain the first-aid kit (First Aid Kit). The third is a swelling of 12 respondents. This is caused by an accident that occurred in the workplace. Victim accidentally stepped on a hard object while performing the task. This led to workers experiencing swelling in the legs. The fourth is a sprain of 9 respondents. This is due to the current skid through the smooth cement surface. The Pulp and Paper Industry East Coast, when employees of contractors wash the floor, there is a smooth cement surface and they do not put up signs. There is a permanent employee who through the area on their feet slipping and causing a sprain. Fifth is crushed a total of 8 respondents. This is caused by hitting the barriers that are in Pulp and Paper. The sixth is the bumps were 7 respondents. This is because the employee violated the iron found in engine areas. This cause by iron is no label. Seventh is cracked a total of 5 respondents. This is caused by bumping or trapped in the machine. Besides, there are workers who dropped out of high machine. This causes the employee also fractured leg. The eighth is shocks, burned and torn up to 4 people. This is caused by the bite of wasp, a small fire and torn pants from slipping while on duty. Last is the loss of a total of 2 respondents. This is due to the employees who had been involved in a serious accident before. Members referred to is the loss of arms and legs. While others respondents involved no accident. If you look to the high accident rate due to bleeding by 17 respondents, the researchers felt that the need to improve the Standard Operating Procedure (SOP) existing.

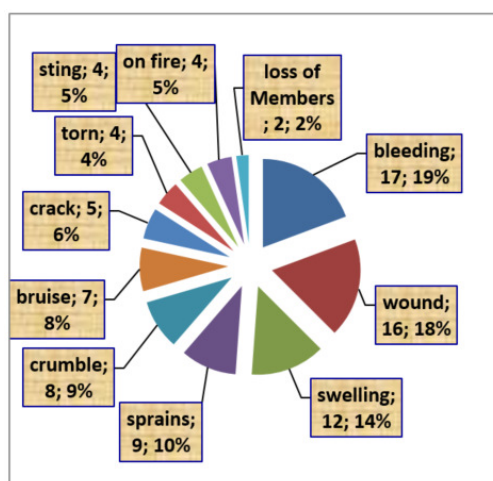


Fig. 3. Type of Accident



Fig. 4. Images of accidents broken bones, Date of accident: 13/08/2014, Injuries: broken bones in the middle finger and ring finger, Caused by: Finger trapped in the latch turnaround (turn buckle).



Fig. 5. Images of accidents foot Left Destroyed, Date of accident: 08/17/2014, Injuries: broken left toe, Due to the machine table low pressure (Table Lowering Press) and hit the leg



Fig. 6. Figure accident bones cracked and broken hand, Date of accident: 06/10/2014, Injuries: The bones cracked and broken right hand, Due to the Machine A turning back (turn backward)

Table 1

Reliability Statistics -Cronbach's Alpha

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.899	.899	23

According to De Vellis [14], the Cronbach Alpha value which reached 0.7 points and above is calculated reliability. After a pilot test carried out, the results obtained for statistical reliability

Cronbach Alpha is 0.899. While conranch alpha based on the standards is 0.899. The number of questions is 23 questions asked to a sample.

The total number of 23 and Cronbach Alpha reliability result is 0.899. Grand total question number is 53 questions.

3.1 Safety Management (15 questions)

In this study, a total of 15 questions about security management by the Pulp and Paper Industry East Coast. Occupational Safety and Health Act 1994 states that any employer, whether public, private and statutory authority necessary to protect as far as practicable the health, safety and welfare of the people working for them. It relates in particular to aspects of the preparation and maintenance of plant and systems of work that are safe. Where the safety aspects can not be underestimated by employers, rather it should focus on the safety of workers. If the number of accidents can be reduced, thus saving the cost can be reduced as well.

In addition, the Pulp and Paper Industry East Coast will respond to the government in ensuring zero accidents among employees. Security management is necessary to take care so that no accidents occur. This is due to the occurrence of the accident by 9 cases occurred in 2014. Therefore it is reasonable questions must be wasted compared to other dimensions.

(1) General Liability Employers

Under common law, employer responsibilities to keep the system working and safe workplace, plan and equipment and the provision of a safe working and instructions are clear and reasonable. Occupational Safety and Health Act 1994 has codified the common law principles to allocate under section 15 duty of the employer. Among them include,

(A) To provide and maintain plant and systems of work that are safe and without risk to health

(B) Establish measures to guarantee the safety and health in the use or handling, storage and transport of plant and substances.

(C) To provide information, instruction, training and supervision necessary to ensure the safety and health of workers.

(D) Ensure that the working premises and the entrance and exit safely

(E) To provide and maintain a safe working environment

(2) Establishing Liability Policy

Under Section 16 also requires employers to make a basic safety and health of their industry. Employers should provide appropriate san as often review the written statement of general policy. Policy or Policies Occupational Safety and Health organization is divided into three main components:

(A) A statement of general policy.

(B) A statement of the organization and responsibilities of personnel

(C) A statement of stacking steps to maintain the safety and health at work.

Pulp and Paper Industry East Coast, there are two main reasons principle occupational safety and health should be provided. First, it is required by the provisions of the law. Second, it should remind all employees of the joint commitment to providing a safe workplace and healthy. According to Ismail Bahari [15], this policy can be used as evidence of negligence of the employer if what is stated in the policy are not fulfilled.

3.2 Personal involvement (5 questions)

The Pulp and Paper Industry East Coast, a safe workplace a priority for the staff. Therefore, every worker should have the responsibility, attitudes and willingness to work safely in order to ensure their health and safety is assured. Personal involvement by employees is necessary to ensure that the work they do is safe from any hazards and prevent accidents.

According Satapah [16], the Occupational Safety Health Act 1994 provides for the responsibility of employee with employers in dealing with injuries. According to section 24 (1) AKKP 1994, the employee is obliged as follows:

(A) To take reasonable care for the safety and health of themselves and others who affected by his acts or omissions at work.

(B) Cooperate with the employer or other person in the discharge of a duty or requirement prescribed by the Act and Regulations made there under.

(C) To wear or use any equipment or clothing provided by the employer at any time for the purpose of preventing any risk to safety and health.

(D) To comply with any direction or occupational health and safety measures introduced by the employer or another person through the Act or regulations made there under.

The Pulp and Paper Industry East Coast, personal involvement is important because of the need for close cooperation between workers and employers. With the advent of this work can help reduce and eliminate workplace accidents. In 2014, there were 5 cases of accident statistics, help early treatment. This is caused by small accident. Among them is a stepping drain cover, do not wear safety glasses and leg banging iron. This is what requires the personal involvement of workers so that accidents do not happen again.

3.3 Communication (5 questions)

Communication is essential to convey information. Communications jobs, safety and health through communication vertically and horizontally is to avoid accidents and occupational diseases so that the production process can be done safely.

Vertical communication occurs on a reciprocal basis between the supervisor and the employee or supervisor with management. Horizontal communication is the communication between supervisors or line managers that union work. Communication is occurring reciprocal cross between a manager at work with supervisors in other union work. Communications jobs, safety and health can work using different media either orally or in writing.

While at the Pulp and Paper Industry East Coast, communication is an important channel for conveying information, especially in the aspect of safety. This communication is through oral, written and e-mail. The management and the safety of workers always remember to comply with the safety on the job. Security officials constantly monitor and observe workers whether they work safely. If there are employees not to comply with the safety, security officers have the power to stop the project. After the security officer will notify the manager so that corrective measures can be improved. Once satisfied, then the next task can be done.

3.4 Responsibility of Individuals (2 questions)

Section 25 AKKP 1994, the obligation to state employees not to interfere with or misuse anything provided or done in the interest of safety, health and welfare of workers. In these provisions, require workers to pay attention to and comply with all health and safety instructions issued by the employer.

In addition, employees are encouraged to work together with employers to promote occupational safety and health program.

The Pulp and Paper Industry East Coast, every employee has a responsibility to ensure that the tasks to be performed are kept secure. If there is a risk of danger, they will inform to superiors. It is the responsibility of the individual as they are susceptible to the risk of accidents in the workplace. Once corrective measures are taken, they can perform the task with the utmost caution.

3.5. Safety standards and goals (3 questions)

According to section 16, Safety and Health Act 1994 (Act 514), the employer must provide a safe working environment and healthy for all workers and individual under its area of control in accordance with the provisions of law relating to occupational safety and health during, industry codes of practice, standards and other requirements relevant. This standard aims to ensure that issues of safety, health and welfare are given the same priority status with the ultimate goal of Pulp and Paper Industry East Coast.

While at the Pulp and Paper Industry East Coast, the management has the basic safety standards and objectives, it aims to eliminate personal injury or occupational disease caused by the activity of the company. Pulp and Paper Industry East Coast will provide safe working conditions for all persons on site including employees and contractors. Pulp and Paper Industry East Coast will also ensure the safety of all visitors to the site. It also developed a safety programs, teach safe work practices and full compliance with all safety regulations and statutory health related.

Managers and supervisors are responsible for the health and safety of the persons working under their direction and for the elimination of hazards in their work area.

3. Conclusion

Based on the survey responses, it was found bleeding is the highest accident in Pulp and Paper. The highest type of accident that happens is bleeding by 17 respondents. The second is injury by 16 respondents. Although the amount is small but the employer and employee must be vigilant so that any accident would not have happened. Therefore it is necessary to take security measures in the company so that the accident which caused the bleeding will not happen again. This may be caused by the negligence of the workers themselves, and no engine failure procedure Operating System or System Operating Procedure (SOP). Among bleeding is hand caught in the machine, the machine head banging, feet slipping on the stairs, falling from a high place and hand were injured when hit by a sharp object such as a blade and a saw blade.

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