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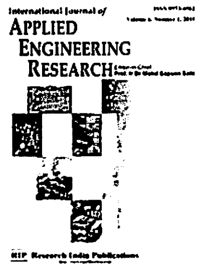

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Analyses of risks and labor competence in occupational safety and health at a palm oil mill (pt. X) Indonesia

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Abstract- In palm oil industry, Crude Palm Oil (CPO)processing activity has a very high rate of accident. The accident could happen starting from the the input of fresh fruit bunches (PFB) tothe clarification process. This study was aimed at assessing the implementation of K3 program at PT X. POM by comparing it with the ideal K3 according to Law Number 1 Year 1970 on corporate K3, identifying risks and competence of employees in occupational safety and health by listing down and scoring all risks that might occur.Results of risksidentification inone of Palm Oil Mill (POM) showed that the work risks in this company were considered to be significantly dangerous. It was also found that two stations, namely debunching and digesting stations, had the highest danger level and the highest probability for accident to happen. Data were processed and the controlling strategies to avoid accident were made. These strategies included identifyingthe causes, and assessing the accident probability, levels of damage, and possible consequences. Measurements taken by using a CPI method showed that the average competence of labors in CPO processing unit of POM inoccupationalsafety and healthwasgood. The assessment of 5 working stations at PT. X POM showed that three stations had above average scores and two stations had under average scores. The stations with the lowest scores in three aspects of competence were fruit debunching and boiling stations. Therefore, the three competence aspects of labors in these stations needed to be improved in order to enhance the labors' work performance. Results of the analyses of risks and labor competence in occupational safety and health showed that in the two stations, the risk of work accident was found to be the highest and the labors were found to have low competence. Alternative strategies that could be applied in order to lower the risk of work accident and to improve labors' competence in occupational safety and health were providing regular education and training, having adequate and continuous supervision, having work environmental control, and giving reward to good-performing labors and punishment to indisciplined labors.

Keywords- risk, competence, Occupational Health and Safety

1. Introduction

All job is always faced with risks of work accidents. Accidents at work cause not only losses to the labors but also to the company as when there is an accident happens to an employee, the productivity might cease temporarily. Not only in Indonesia, but also in other countries, work accident rate is still high. This is so alarming that companies should give extra attention to the occupational safety and health of their employees. Labors or employees are resources playing a very important role in production. Production process will run well to produce high quality products if it is run by well by labors and employees. In addition to employees, companies also use high-technology equipment to support production process. The use of various kinds of modern equipment and machines make employees unable to free themselves from the occupational health and safety risks.

The implementation of Occupational Safety and Health Management System is aimed at creating a secure, safe, and comfortable working condition free from the dangerous risks that might appear so that companies can have healthy and productive employees (Depnaker RI, 2000). The implementation of Occupational Safety and Health Management System in this POM was shown from the fact that most of the working labors were wearing/using protecting devices such as gloves, boots, earmuff, computer monitor anti radiation. However, some labors were found to ignore wearing/using this equipment as they felt it would interfere their movement. The occupational safety and health (K3) management system was expected to give real contribution to the industry and the employees so that the productivity of the industry could be improved and work accident could be minimized. The implementation of K3 program was expected to develop productive, healthy, and quality employees. K3 which is included in the company's hygiene and occupational health institution is often forgotten by businessmen although the program is made to advance and develop the industrilization process especially the work performance of the employees. Good and well-directed K3 implementation in an industrial institution will certainly give other impacts including qualified, skillful, and professional human resources (HR). In a free market era, the competitiveness of an industrilization process is getting more important and significantly determines the development in a certain country.

Efforts have been done to reduce work accident and improve the quality of K3. Regulations on K3 have already been made. However, work accident and work-related diseases are still found significantly. Therefore, this study was conducted to assess the condition of K3 in oil palm agroindustry by doing the analyses on labors' competence in the forms of skill, knowledge, and attitude related to the work risk levels. The study was expected to improve the productivity of CPO agroindustry in Indonesia, in general, and at PT X. POM, in specific. In addition, it was also

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expected to enhance the employees' work performance and to minimize the risk of work accident. This study was aimed at assessing the implementation of K3 program at PT X. POM by comparing it with the ideal K3 according to Law Number 1 Year 1970 on corporate K3, identifying risks and competence of employees in occupational safety and health by listing down and scoring all risks that might occur. The employees' competence was assessed by using a CPI method. Aternative strategies to minimize the risk of work accident and to improve the employees' competence in K3 were determined by evaluating the employess' competence and work risks in every work station.

2. Research Methodology

Site and Time of the Study
The study was conducted at PT X. Palm Oil Mill, Indonesiain March – July 2012.

Conduct of the Study
PT. X POM is a CPO processing plant. This plant is employing a lot of employees whose security, safety, and health need to be well taken care of as they significantly affect the production process. Therefore, analyses of occupational risk and employees' competence in K3 need to be done. For this purpose, the employees' competence was done by using a comparative performance index (CPI) method and occupational risk was assessed by using a descriptive method, This risk assessment included identification of all possible risks in each working station, the probability, danger rate, and an analysis to formulate an appropriate risk control.

For risk analysis, interviews were conducted with foremenand group leaders in each CPO processing station of PT X. POM. In the interview, questions were posed on what occupational risks that could possibly occur, the possibility of the risks to occur, and the danger rate of the risks. Results of the interviews were presented in tables before the occupational accident risk analysis was done. Results of this analysis were expected to show the causes od the accident so that controlling strategies to reduce the accident rate could be formulated. A deeep interview with experts was done to assess the weighting of all aspects of competence, including knowledge, skill, and attitude. The weighting was done by using an AHP method. Structured interviews with 31 employees was also done through questionnaires whose validity and realibility were proven. The questionnaires were distributed to assess the employees' understanding on K3 according to their knowledge, skill, and attitude. Data from the questionnaires were processed by using a CPI technique. Problem solving solution was formulated after the structure of the problems was found. For risk analysis, the steps of the study were given in Figure 1.

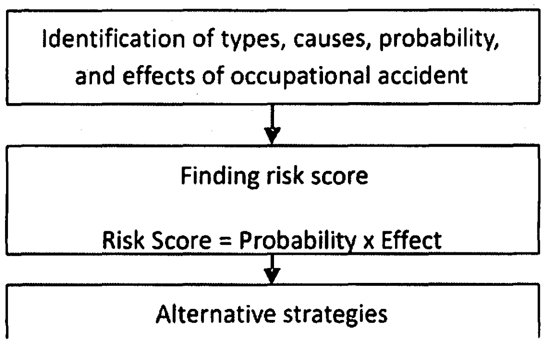

Fig 1. Steps of the study for risk analysis

For competence analysis, the steps of the study were given in Figure 2.

Table 1. Identification of occupational accident types in PT X. POM

No.	Work Station	Type of Possible Occupational Accident	Probability	Effect	Risk Level	Risk Score
1.	FFB Input	Struck down by FFB	1	5	5	18
		Punctured by FFB	4	1	4	
		Fall on carriage transfer area (±1 m)	1	4	4	
		Hit by lorry	1	5	5	
2.	Boiling	Boiler explosion	2	5	10	26
		Scalded with hot steam	2	5	10	
		Burn	2	3	6	
3.	Fruit Debunching	Struck down by lorry	1	5	5	21
		Struck down by FFB	1	5	5	
		Burn	2	3	6	
		Fall from balustrade (±10 m),	1	5	5	
4.	Pressing	Scalded with hot water	2	5	10	21
		Fall from balustrade (±4-8 m)	1	5	5	
		Slipped	2	3	6	
5.	Purifying	Scalded with hot oil	1	5	5	15
		Fall from balustrade (±4-8 m)	1	5	5	
		Scalded with hot water	1	5	5	
Average Risk Score						20.2

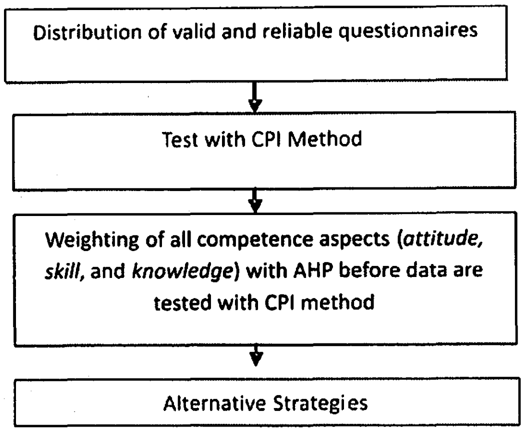

Fig 2. Steps of the study for analysis of employees' competence in K3

3. Results and Discussion

Based on the Regulation of Minister of Manpower Number Per.05/Men/1996, risk identification, risk assessment, risk control have to be done before an analysis of possible risk to occur is done. This process includes the identification of risks that may occur in a business activity. An accurate and complete risk identification is vital in risk management. Listing down as many possible risks as possible is an important aspect in risk identification. Techniques that can be applied in risk identification in CPO processing includes survey, interview, and historical information. Results of risk identification in CPO processing are given in the following table.

Notes:

a. Probability

1 = Occured very rarely or never at all

2 = Occured rarely or once or twice since the company was founded

3 = Occured several times since the company was founded

4 = Occured frequently or almost every week or month, e.g. punctured by FFB

5 = Occured very frequently, almost every day

b. Effect

1 = Very minor danger, e.g. punctured by FFB

2 = Minor danger, but unignorable

3 = Medium danger, e.g. blister

4 = Major danger, e.g. burn, bruise, fracture, acute bleeding, etc.

5 = Extreme danger, e.g. death

The above table shows kinds, probability, levels of danger, and effects of accidents that could happen in each work station. Risk score is probability multiplied with effect and is shown in the above table as the risk level. As shown in the table, the everage risk score in each work station was 20.2. the work stations with high risk scores were boiling, fruit debunching, and pressing stations. These work stations would be compared with the employees' competence score to formulate strategies to reduce risks and improve the employees' competence. The next step after risk identification was the analysis of risk causes by assessing the potential of the severity and probability of the risks.

After the causes and consequences of the risks were found, risk control was analysed to find ways of controlling the risks so that the dangers that might occur could be solved or reduced. CPO processing from oil palm need high capacity of manpower and machinery. Therefore, the dangers occur are mainly caused by physical factors such as getting crushed or hit caused by a fall from a height or fallen or collapsed goods. Identification of potential occupational dangers were collected from each work station to obtain occurences that could become potential sources of danger.

In order to assess the level of competence of respondents (employees) in K3, ranking was done by using a CPI method. The reference used as the assessment standard was Law Number 01 Year 1970 on Occupational Safety and Minister Regulation Number 05 Year 1996 on K3 Management System (SMK3). Weight of each assessed criterion was determined before ranking was done (Marimin, 2011). Weighting was done by using an *Analytical Hierarchy Process* (AHP). In AHP decision model, each hierarchical level was scored by using a pairwise comparison. According to Saaty (1983), for variuos problems, scales 1 to 9 are the best to express an opinion. Scales with nine units can describe the degree of one's capability in differentiating the intensity of interelemental relation. Below is a matrix of transformation determined by a CPI method.

Table 2.Matrikstransformasi CPI

Table 2. Matrix of CPI transformation

No	CPO Processing Work Station	Criteria			Score	Rank
		Attitude	Knowledge	Skill		
1.	FFB Input	120.65	116.05	112.90	116.05	2
2.	Boiling	100	100	100	100.00	5
3.	Fruit Debunching	110.87	105.16	109.97	109.61	4
4.	Pressing	122.10	115.47	114.37	117.23	1
5.	Purifying	103.26	118.05	114.37	110.99	3
Criteria Weight		0.35	0.14	0.51		

The likert scales which have been transformed and processed by using a CPI method are given in the above table. It was shown in Table 2 that employees in pressing station had higher competence in K3. This high competence was closely realated to what the employees in this stion has long done. In addition to working seriously, employees should not ignore K3 as it is an important matter and affects the company's productivity. Compared to those in other stations, employees in boiling station were found to have the lowest competence in K3. This was probably caused by the fact that the employees in boiling station had lower attitude, knowledge, and skill. Low educational level and inappropriate working attitude or indifferent attitude toward K3 were suspected to be the causes of this low competence.

Table3. Average employees' competence

No.	CPO Processing Work Station	Criteria			Score
		Attitude	Knowledge	Skill	
1.	FFB Input	120.65	116.05	112.90	116.05
2.	Boiling	100	100	100	100.00
3.	Fruit Debunching	110.87	105.16	109.97	109.61
4.	Pressing	122.10	115.47	114.37	117,23
5.	Purifying	103.26	118.05	114.37	110,99
Average Score		111.37	110.94	110.32	110.77

It was shown in Table 3 that the average score of employees' competence in K3 was 110.77. this sore was made as the competence standard for employees in PT X. POM. It was found that the competence rates of employees in pressing, FFB input, and purifying stations were above average while those of employees in boiling and fruit debunching stations were below average.

In addition, the average competence score for each aspect (attitude, knowledge, and skill) was also found. The average competence score for attitude was 111.37. Employees in FFB input and pressing stations were found to have good attitude competence with above average scores. Meanwhile, employees in boiling, fruit debunching, and purifying stations had below average competence scores. By using a CPI method, employees in three stations were found to have under average attitude as shown in Table 3.

Knowledge is an important aspect to assessthe employees' competence. Compared to other aspects, knowledge had the lowest wieght, 0.14. Skill and attitude had significantly high weights, namely 0.51 and 0.35, respectively. Although it had a small weight, knowledge had to be counted as without knowledge, an employee would not have skill and attitude as the later two aspects came from knowledge. It was found that the average score for knowledge was 110.94. Two work stations, namely boiling and fruit debunching stations, were found to have under average scores. The remaining three work stations were found to have above average scores.

Another important aspect is skill. This aspect is considered very important in the assessment of the employees' competence. Based on the AHP test which was done by interviewing three experts, it was found that skill had the highest weight. Therefore, skill was considered very important in assessing the employees' competence in K3. Skill aspect was found to have an average score of 110.32. Two work stations, namely boiling and fruit debunching stations were found to have under average competence scores.

From the above discussion, it was known that employees in boiling and fruit debunching stations had the lowest competence. They were also found to have under average scores for attitude, knowledge, and skill aspects. Based on the ranking made by using a CPI method, these stations were also found to be in the lowest ranks, namely ranks 5 and 6. Therefore, the employees' competence in these stations needed to be improved.

A risk analysis was done by making a list of possible occupational accidents, the causes, effects, and controlling strategies. Using this list, employees were able to know the occupational risks they might find in the station they were working at so that they could be working more carefully. Besides, companies should also put persuasive posters to remind their employees to work by adhering to SOP, wearing APD and to work with full circumspection. It was concluded that improving the employees' competence was the strategy to reduce the occupational risks. With higher competence, employees were able to reduce or even avoid possible occupational accidents. In addition, companies could also do a risk transfer by registering their employees in Jamsostek or other insurance programs so if somethings unexpected happened, they could be managed in an appropriate and quick way.

The alternative strategy to improve the employees' competence in K3 was providing the employees with trainings on SMK3 and SOPs. In order to improve knowledge, extension and dissemination of K3 should be done. Attitude could be improved by applying strict supervision, applying a reward-punishment system, giving extension on the importance of K3 and the consequences one may need to bear if he/she ignores K3, and giving motivation training so that employees could focus on their work, work more sincerely, and be more motivated to work better.

4. Conclusions and Recommendations

Conclusions

It was concluded that K3 in PT X. POM was not yet fully implemented. There were some things that needed improvement including occupational accident recording, employees' health examination, K3 flag, and K3 posters. SOP and APD documents were found appropriate and meet the requirements although they were not yet implemented.

The average competence of employees in PT X. POM was found to be good. By using a CPI method, assessment was done in 5 work stations. Results showed that employees in three stations had above average competence score and employees in two stations had under average competence scores. These two were boiling and fruit debunching stations. These two stations also had the lowest scores for the three aspects of competence. Therefore, all aspects of competence in these two work stations needed to be managed and improved so that the work performance of the employees and the productivity of the company could improve.

A risk analysis was done by making a list of possible occupational accidents, the causes, effects, and controlling strategies. It was shown that the occupational risks in CPO processing work stations were significantly high. Three work stations, namely boiling, fruit debunching, and pressing stations had high risk scores. It was concluded that improving the employees'competence was the strategy that could be made to reduce the accident risk. With higher competence, employees would be able to reduce or even avoid possible occupational accidents. In addition, companies could also do a risk transfer by registering their employees in Jamsostek or other insurance programs so if somethings unexpected happened, they could be managed in an appropriate and quick way.

Recommendations

In order to reduce or avoid occupational accidents, it was recommended that companies do risks transfer by by insuring their equipment and employees. In addition, records should be taken on any accidents happened and lost working hours caused by the accident. In order to improve the employees' competence, education and trainings should be given. These might include K3 extension, job trainings, and motivation trainings.

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