



Effect of Safety Management from Training of Safety Curriculum for Supervisors in a Food Production Company in Kamphaeng Phet Province

Anan Julkaiwansutjarit^{1*}, Sarisak Soontornchai² and Sudaw Lertwisuttipaiboon²

¹Industrial Environment Management, Sukhothai Thammathirat Open University, Bangphut, Pakkred, Nonthaburi, 11120

²School of Health Sciences, Sukhothai Thammathirat Open University, Bangphut, Pakkred, Nonthaburi, 11120

* Corresponding author. E-mail address: anan.julkaiwansutjar@gmail.com

Received: 7 June 2019; Revised: 15 July 2019; Accepted: 19 July 2019

Abstract

The purposes of this quasi experimental research were: (1) to investigate the safety working condition problems and accident statistics in a food production company; (2) to explore safety attitude and safety behavior levels among supervisors in the company; (3) to compare knowledge before and after the safety training for supervisors in the company; and (4) to compare the effect of safety management by supervisors after training at the company in Kamphaeng Phet Province. The study samples were all 40 supervisors attending the safety training involving rotating machines for supervisors which this training curriculum assigned for in-house training.

The findings of this research indicated that: (1) the first accident priority of the company in 2017 was due to the hit/cut/nip frequently related with rotating machine working; (2) most supervisors had high level of safety attitudes, and very high level of safety behaviors; (3) average post-test score of supervisors was significantly higher than that of pre-test. ($p < 0.05$); and (4) one month monitoring of the working condition improvement indicated that supervisors had opinion about safety condition improvement at the very good level and the rotating machine guard condition had been investigated for safety machine working. A total of 1,503 machines had been repaired by using the machine guard.

Keywords: Safety management, Safety training, Rotating machine

Introduction

From statistics of accident or illness due to work in the annual report 2017 of the Office of Compensation Fund classified by severity and type of accident, there were many workers who got injury from accident due to machinery reach to 11,788 persons (13.66%) out of 86,278 workers with accident. This statistic accident data shown that there were 42 workers with fatal accident, 668 workers with loss of organs, and injury with sick leave over 3 working days up to 5,275 workers. The main cause of most accidents due to working involving rotating machine with insufficient conditions and careless of workers (the Office of Compensation Fund, 2017). Once employees have any accident there had any reasons with inevitable effects to both the employees and employers. Any employees who has injury or illness may be injured, disabled, or fatal effects as well as side effect to their family and also his employer in terms of money and property. Therefore, safety is not responsibility of only either employers or employees but also everyone to control and prevent any accidents (Sutummasa, 2007).

Therefore, researcher was intended to study about the effects of safety management from training of safety curriculum for the supervisors in a food production company in Kamphaeng Phet Province. This research started with survey of the safety working condition problems and accident statistics in a food production company, measure of safety attitude and safety behavior levels among the supervisors, conduct the safety training involving



rotating machines, and then assign all supervisors to investigate the rotating machine guard condition for repairing and improving machine guard condition for secure safety working condition due to rotating machine to prevent any accidents and opportunities towards improvement of their safety management system.

Methods and Materials

This was a quasi-experimental research. A safety curriculum training curriculum assigned for in-house involving rotating machine for the supervisors was selected for this study. This research had conducted during October, 2018 until January, 2019. All data were collected in the company with all employees which gave opportunity for improvement themselves. All relevant employees with ethical manner without personal identification and with signing of consent form before collecting data. All survey data were kept confidentially and summarized as overview report.

The study samples were all 40 supervisors out of 465 employees (Data on August 1, 2018) attending the safety training involving rotating machines for supervisors with such training curriculum assigned for in-house training.

The research tools used were; (1) training pre- and post-test (2) a questionnaire on attitude and safety behaviors for safety working; and (3) a questionnaire on working condition improvement with rotating machines. Content validity of the tools was reviewed by 3 experts and with reliability levels of 0.712, 0.819 and 0.819, respectively.

Data were analyzed using descriptive statistics as percentage, mean, standard deviation, and paired sample dependent t-test with statistical significant level at 0.05

Results

1. Investigation of the safety working condition problems and accident statistics

From data analysis of accident statistics in the food production company during the year 2016 - 2017, the results were shown in the table 1

Table 1 Type of accidents in the food production company (2016 and 2017)

Type of accident	Year 2016		Year 2017	
	Frequency	Percent	Frequency	Percent
1. Hit/Cut/Nip	15	23	7	30
2. Bump/Pull	15	23	4	18
3. Sharp edge	10	16	3	13
4. Slip/Fall down	9	14	3	13
5. Fall from high level	5	8	3	13
6. Chemical- corrosive/heat-cold	8	12	2	9
7. Others	2	4	1	4
Total	64	100	23	100



From the table 1, it was found that the most priority types of accidents in the food products company were the hit/cut/nip of 23% and 30% in 2016 and 2017, respectively. It is implied that accidents tended to increase while the workers working with the machine rotary especially cleaning activities, change of production line, and maintenance.

2. Study on safety attitude and safety behavior levels among supervisors in the company

All 40 supervisors were asked to answer the questionnaire of safety attitude and safety behaviors and the results were as follows:

2.1 Personal characteristics information

Most of the supervisors were male, aged between 31 – 40 years (62.5%), working experience over 16 years (45.0%), and working in production unit (60.0%) (Table 2)

2.2 Safety attitude levels

Table 2 Safety attitude levels among the supervisors (n=40)

Safety attitude items	\bar{x}	SD	Attitude Level
1. All employees shall receive training in occupational health and safety for safety working	4.60	0.460	Very High
2. You feel safe when wearing personal protective equipment (PPE) while working	4.60	0.496	Very High
3. The accident prevention is everyone’s responsibility and all has to perform	4.55	0.504	Very High
4. Safety training is able to increase safety knowledge and preventing the accidents.	4.53	0.506	Very High
5. You are confident that you have high working experience so you can shortcut or ignore some working steps without any accidents.	3.65	1.099	High
6. You think that in-house safety rules can skip or do not need to follow all, particularly, some items you think are not necessary.	3.50	1.34	High
7. You think that accident investigation is to blame and punish employees rather than suggest or fix the problems.	3.28	1.062	Moderate
Average Score	4.128	0.190	High

From the table 2, most supervisors had high level of safety attitudes with average score of 4.128. The highest safety attitude average score was 4.60 about all employees shall receive training in occupational health and safety for safety working and you feel safe when wearing personal protective equipment (PPE) while working.

2.3 Safety behavior level

Table 3 The Analysis of Safety behavior levels among the supervisors (n=40)

Safety behavior items	\bar{x}	SD	Behavior Level
1. You work cautiously	4.90	0.304	Very High
2. You notify superior immediately when machine damaged or abnormal condition	4.82	0.385	Very High
3. You wear appropriate uniform at work.	4.65	0.533	Very High

**Table 3** (Cont).

Safety behavior items	\bar{x}	SD	Behavior Level
4. You check machine before machine before operation.	4.58	0.501	Very High
5. You follow the safety rule strictly.	4.42	0.594	Very High
6. You usually trial and error when you do not understand the working procedure	3.93	1.347	High
7. While working , you usually think about other things.	3.70	1.091	High
Average Score	4.463	0.127	Very High

From the table 3, most supervisors had very high level of safety behaviors with average score of 4.463, the highest safety behavior average score was 4.90 about You work cautiously, followed by You notify superior immediately when machine damaged or abnormal condition.

3. Comparison of knowledge before and after the safety training for supervisors

The safety curriculum training related with rotating machine which this training curriculum assigned for in-house training and using the research tool was training pre-test and post-test that had full score at 10 and data analysis by paired sample dependent t-test statistics by determining significant level at 0.05

Table 4 The comparison of knowledge before and after the safety training

Group	N	\bar{x}	SD	t	df	Sig.
Before	40	7.13	1.137	-12.186	39	0.000
After	40	9.10	0.778			

* Sig. < .001

From the table 4, the data analysis results shown that the supervisors had higher average score of post-test higher than that training pre-test score with statistical significance at 0.05

4. The comparison of effect of safety management by supervisors after training in the company

4.1 The investigation of rotating machine guard condition for safety working

After supervisors received the safety training involving rotating machines then assign all supervisors to survey and investigate the rotating machine guard condition in order to repair and improve machine guard condition, the result shown as the table 5

Table 5 The investigation of rotating machine guard condition for safety working

Machine type	Rotary	Conveyor	Mixer	Pump	Blower	Agitator	Others
Production unit	37	0	0	484	5	300	6
Support unit	27	323	0	243	10	53	15
Total	64	323	0	727	15	353	21
Overall	1,503 machines						

(Summary survey data on 12th. January,2019)



From the table 5 shown that there were 1,503 machines (76%) out of 1,972 machines such as 64 rotary valves, 323 conveyors, 727 pumps, 15 blowers, 353 agitators, and 21 other rotating machines needed repairment. However, good cooperation with maintenance team were planned to repair them within March,2019 with cost approximately 5 million baht.

4.2 Monitoring of the safety working condition improvement with rotating machines

After the supervisors received the safety training after 1 month the opinion about safety condition improvement were then interviewed, the result shown as the table 6

Table 6 The average opinion level of safety improvement with rotating machine working (n=40)

Safety improvement condition	Opinion Score Level		
	\bar{x}	SD	Meaning
1. You think that safety knowledge involving rotating machine could prevent or reduce accidents at work with rotating machine.	4.55	0.50	Very Good
2. You think that your section unit had surveyed and followed up the rotating machine guard to improve safety working with rotating.	4.43	0.55	Very Good
3. You have good understanding about investigation of rotating machine guard and plan for repairing.	4.27	0.64	Very Good
4. While installation or maintenance of rotating machine, you think that your section unit has been used the safety device for Log-out/Tag-out (LOTO)	4.18	0.68	Good
5. You think that your section had enough machine manual or machine operation procedure for using it	3.80	0.82	Good
Overall	4.29	0.41	Very Good

From the table 6, the result of opinion monitoring of the working condition improvement from all 40 supervisors who received the safety training after 1 month indicated that supervisors had opinion about safety condition improvement at the very good level with average score of 4.29, the highest safety condition improvement score of the supervisors was that safety knowledge involving rotating machine could prevent or reduce accidents at work with rotating machine with average score of 4.55, followed by section unit had surveyed and followed up the rotating machine guard to improve safety working with rotating with rotating average score of 4.43 and the lowest average score of 3.80 (good level) about section had enough machine manual or machine operation procedure for using it

Discussion

1. The investigation of the safety working condition problems and accident statistics

The investigation of accident statistic in the food production company shown that the first accident priority of the company was due to the hit/ cut/ nip frequently related with rotating machine working in the year 2017 (30%) in accordance with the statistics of accident or illness due to work by office of workmen’s compensation fund in the annual report (2017). Classified by severity and type of accident, the majority of victims who got injury accidents due to machinery reach to 11,788 persons (13.66%) and the main cause of accidents had classified by insufficient machinery including the carelessness of the workers in accordance with Domino Theory



of Heinrich (1950) which stated that all accidents are caused by 1) unsafe acts and 2) unsafe condition (Simachokdee & Chalermjirarat, 2004)

2. The exploration of safety attitude and safety behavior levels among the supervisors in the company

Most supervisors in the food production company had high level of safety attitudes, the highest safety attitude score was that all employees should receive training in occupational health and safety for safety working, followed by the supervisors feel safe when they wear the personal protective equipment (PPE) while working in accordance with research study of Laungwasutha (2014) who found that the safety knowledge while working related to the safety attitude with statistical significance and the increase of safety attitude could increase when the superiors had understanding the necessity or safety training need in the workplace and wearing the personal protective equipment (PPE) to protect against hazards that may occurred.

Most supervisors in the food production company had very high level of safety behavior, the highest safety behavior score was that supervisors do careful operation for safety working, followed by the supervisors notify the superior immediately when they found machine damaged or abnormal condition in accordance with research study of Chaikar (2014) which found that the correlation of safety knowledge and safety attitudes will enhance good safety behaviors to correct machine tools and equipment for improving safety working condition

3. The comparison of knowledge before and after the safety training for the supervisors

After the safety curriculum training, the average post-test score of the supervisors was significantly higher than that of pre-test with statistical significance at 0.05 in accordance with Phormchuy (2011) who said that the evaluation process identifies the values of training courses that have been undertaken by objectives or not. Evaluation can be done before training, currently training, and after training has finished in accordance with Ketpromar (2015) who found that employees, departments, service technicians have more knowledge after training with statistical significance at 0.05.

4. The comparison effect of safety management by the supervisors after training in the company

The working condition improvement after the supervisor received the safety training found that all supervisors investigated the rotating machine guard condition in order to repair and improve machine guard condition for safety working involving rotating machine. A total of 1,503 machines had been repaired after 1 month monitoring of the working condition improvement. It was indicated that supervisors had opinion about safety condition improvement at the very good level, the highest safety condition improvement score of employee at supervisor level was think that safety knowledge involving rotating machine could prevent or reduce accidents at work with rotating machine, followed by section unit had surveyed and followed up the rotating machine guard to improve safety working with rotating in accordance with Ruengwasutha (2014) who found that knowledge of workplace safety in relation to the safe work practices of the employees. Therefore, the supervisors could learn from the training to reduce accidents in the future.

Conclusion and Suggestions

Conclusion

This quasi-experimental research, researchers selected the safety curriculum training related with rotating machine for all 40 supervisors which this training curriculum assigned for in-house training. The research tools used were; (1) training pre-test and post-test (2) an attitude and safety behavior questionnaire for safety



working; and (3) a questionnaire on working condition improvement with rotating machines. The findings of this research indicated that: (1) the first accident priority of the company in 2017 was due to the hit/cut/nip frequently related with rotating machine working; (2) most supervisors had high level of safety attitudes, and very high level of safety behaviors; (3) average post-test score of supervisors was significantly higher than that of pre-test. ($p < 0.05$); and (4) one month monitoring of the working condition improvement indicated that supervisors had opinion about safety condition improvement at the very good level and the rotating machine guard condition had been investigated for safety machine working. A total of 1,503 machines had been repaired.

Suggestions

1) The government should consider how to support and promote an establishment to enhance the safety working standard in order to reduce the accident due to work and implement a strong safety culture towards achievement of organization vision policy to the zero accident.

2) The relevant persons such as safety officer, section head, and manager should consider ways to promote employees to have positive thinking of safety attitude such as encouragement of safe behaviors, recognition of the hazard identification from risk behaviors and enhancement of employees to comply with the safety rule for safety working.

3) The training needs of safety curriculum should be reviewed systematically and relate to safety problems such as accidents statistic type and safety risk assessment with opportunities to improve and develop safety curriculum in accordance with actual context of organization to make more effectiveness of safety management.

4) The results of safety curriculum training shown that our employees have more knowledge significantly, therefore, safety curriculum training should be conduct continuously to review safety knowledge periodically for safety working.

Acknowledgments

Gratefully thanks to Assoc. Prof. Dr. Sarisak Soontornchai and Assoc. Prof. Dr. Sudaw Lertwisuttipaiboon who are thesis advisors from School of Health Sciences, Sukhothai Thammathirat Open University, Dr. Jutharat Rakprasit who gave suggestion for this research and thank you to any concerns whom kindly support, advice and encourage author.

References

- Chaikar, S. (2014). *Safe work behavior among staff working for S.E.I. Interconnects Products (Thailand) Co. Ltd.* Chon Buri: Private Management, Burapha University.
- Compensation fund (2017). *Annual report B.E.2560 compensation fund*. Retrieved from <https://www.oic.or.th/sites/default/files/publication/files/oic-ar2017-eng.pdf>
- Heinrich, H. W. (1950). *Industrial accident prevention*. New York: McGraw-Hill.
- Ketpromar, S. (2015). *Evaluation of Training Curriculum on Copier Maintenance Skills of Service Technical in Ditto (Thailand) Company Limited*. Bangkok: Industrial Education, King Mongkut's Institute of Technology Ladkrabang.



- Laungwasutha, T. (2014). *Knowledge, Attitudes and Safety Practices in the Workplace of Employees a Case Study of Cotco Metalworks Co, Ltd, Rayong Province*. Bangkok: National Institute of Development Administration, NIDA.
- Phormchuy, S. (2011). *Project evaluation report writing (2)*. Nonthaburi: chatuporn design.
- Simachokdee, W., & Chalermjirarat, W. (2004). *Engineering and management of safety in factories*. Bangkok: Technology Promotion Association (Thailand-Japan).
- Sutummasa, S. (2007). *Occupational health and safety management*. Nonthaburi: Sukhothai Thammathirat Open University.

