

Identification The Behaviour of Laboratory Assistant As the Effort To Develop Safety And Health In University (Study Cases In Laboratory Under Industrial Engineering Department, University of North Sumatera)

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Abstract--- Human has put the major concerns to safety and health in order to minimize adverse effect that resulted from work and work surrounding. Furthermore, manufacturing technology has succeeded to decrease the risk of machinery and work surrounding which cause bad effect to human. However, this change becomes ineffective when the human have bad behaviour in workplace. Many research have shown that the human error have caused the majority of accident in workplace. This human error resulted from bad behaviour which has been implemented by worker. University as the place to form the behaviour of educated people in the world, has had the responsibility to promote safety and health in workplace. But, the fact describe that the university does not promote safety and health in university surrounding. This was proven by many accidents like fire, body injuries and sick related to work happened in university surrounding. As the result, many educated people who were graduated from university have bad behaviour in workplace. This research was taken in laboratory under industrial engineering department. Laboratory as the place to practice the theory which learned in the class has many potential hazard. Based on the preliminary research, many students did not realize the potential hazard. The methodology of this research is used laboratory as object of research. There are 8 laboratories under industrial engineering where all the assistant will be measured their behaviour. The research focused on general safety and health, ergonomic hazard, mechanical hazard, electrical hazard, extreme temperature hazard, fire hazard, noise and vibration hazard and fall, accelerated object, vision hazard.

Keynote: Occupational Safety Health, Student Behaviour, Laboratory assistant, Behaviour Rating

I. Introduction

In 2013, the fire accident happened in University of North Sumatera (USU). This accident located in biology laboratory under Faculty of Mathematics and Sciences. Although, this accident was under investigation from police, there are some reasons that can be a factor causing the accident. One of them was

failed to follow standard operational procedure (SOP). The behaviours of student who used this laboratory might influence why this happened. Furthermore, many research have shown that the human error have caused the majority of accident in workplace. This human error was resulted from bad behaviour which has been implemented by worker. According to [1] in Malaysia, the major contributor for construction accident was human behaviour. Malaysia tried to accommodate this issue in Malaysia Vision 2020. In order to improve safety, employer need to adapt more holistic tactics and approaches which focus not only in physical environment improvement but also on forming employee's behaviours, attitudes and beliefs. [2] investigated the factor that contributed to safety behaviour on 18 construction sites in Ireland. Nowadays, researcher is focusing their attention to develop safety and health in companies. The University has received limited attention.

This accident has opened the eye of academics that many places in university have potential hazards. Based on the preliminary research, laboratory is one of the place that has potential hazards. It can be seen clearly that laboratory is the place for many machines, equipments, materials, chemical substances, etc which can cause any harm to student. Unfortunately, these potential hazards are not realized by students, lecturers and people who actively work in university. This condition happened because of lack of knowledge, lack of training and lack of rule. In University of North Sumatera, students do not get any safety and health issue while starting their degree in university. This is magnified by less faculties and departments have given safety and health course in their curriculum. This condition leads the student to have minimum knowledge of safety and health. [3] confirms that the lack of knowledge, training, lack of supervision and lack of rule implementation has contributed to increase probability of accident.

This research focus on investigation of beginning behaviour from laboratory assistants. In University of North Sumatera, laboratory assistants have significant role for running the laboratory. Laboratory assistant as people who had responsible for activity in laboratory is important to be identified their behaviour. This

identification is used as guidance to develop safety and health in laboratory.

Literature Review

II.1. Definition of Occupational Safety and Health

According to [4], Occupational safety and health is the effort for protecting worker and people who actively in workplace from hazard to achieve safety and health situation so every source of production can be used in safety and efficient manner. Adding this definition, workplace is the place that can be close, open, dynamic, static for the worker to do their activity.

Occupational safety and health has the objective which is to give the knowledge and information about occupational safety and health problems emerged in workplace[5]. The problem related to occupational safety and health can be divided into three main problems which are:

- **Incidentally accident**
- **Dangerous condition**
- **Bad behaviour**

[6]defined occupational safety and health as thinking process to give the effort that can be used to protect body and soul of worker and human.

II.2. Factors Influencing Safety Performance

Nowadays the companies are under pressure of government regulation. This regulation pushes the companies to improve their safety performance. Many researchers have focused their work to investigate the factors that can influence the safety performance. Some factors have been detected to have significant contribution to safety performance. [7]have found four significant factor that affect the safety performance which are:

1. Condition of workplace
Condition of workplace can easily affect the worker performance. The mood of worker, the concentration is influenced by workplace. Arrangement of stuff without safety consideration has caused accident to worker. For example people easy to get a falling object. The workplace is full of stuff can make people difficult to move. The bad air circulation can make people uncomfortable.
2. Light arrangement
The workplace with bad light arrangement can cause worker difficult to see the document. The human error can appear easily in this situation.
3. Procedure for using the equipment.

Standard operational procedure is necessary in workplace. This can be guidance for worker mainly for new worker which unfamiliar with the equipment. The wrong procedure while using the equipment can lead to accident.

4. Fistically and Mentally condition

The energy life cycle of worker can easily disturb the safety performance. Worker in tired condition will have difficulties to focus and concentrate. The unstable mood of worker will distract the motivation, thinking process and concentration. This will lead to increase of risk.

[8]has investigated the factors that compliance to safety at processing area in Petrochemical Industry. Management commitment, employee involvement, safety communication, effective safety training and effective safety feedback have been identified as significant factors. [9]; [10] have found that occupational safety and health can be improved by arranging organization, job factors, human and individual characteristics in manner. Furthermore in production process, human resources are the most important component. The similar condition should be applied in maintaining occupational safety and health. The comfort workplace can increase the sense of security for employees during working or dealing directly with work environment [11].

II.3. Behaviour

As the human emerge to be significant factor influencing safety performance. The further research needs to investigate this issue. Human behaviour is one aspect of human influencing safety performance.

[12]has proved that in most accident events, people who got injuries are workers with riskier behaviour. If the accident is seen more details, the behaviour occurs related to accident had not caused injury when previously experienced.

According to [13] behaviour can be identified as everything a person does that are observable and measurable. The behaviour which consists of core activities that need to be done to follow occupational safety and health requirements can be described as safety behaviour. This behaviour support safety practices and activities [14].

[15]reported safety behaviour can be the key to reduce the injuries at the workplace and indirectly influence the event outcome before accidents occurred.[16]has investigated the employee behaviour by observing and evaluating the unsafe working behaviours such as not wearing personal protective equipment.

Behaviour relate with knowledge and attitude. Changing the behaviour will mean changing the knowledge and attitude. Study or learning is a process to change the behaviour. According to [17] the output of learning process is behaviour changing. Attitude is mentally condition which has been forming from experienced with all objects[18]. Attitude is resulted by learning process.

[19]has reported world health organization (WHO) has grouped the type of behaviour changing into three types including natural changing, planned changing and readiness to change. The strategy to change the behaviour can be grouped into three which are:

- Using power and push
- Providing the information
- Discussion and participation

Rewards can be effective way to change the behaviour. [20]has found the rewards such as positive feedback, holiday, and money can have positive impact to safety performance.

III. Methodology of Research

The research was using case study as methodology to identify the behaviour of student. Case study was conducted in laboratory under Department of Industrial Engineering.

The framework of research can be seen in figure 1.

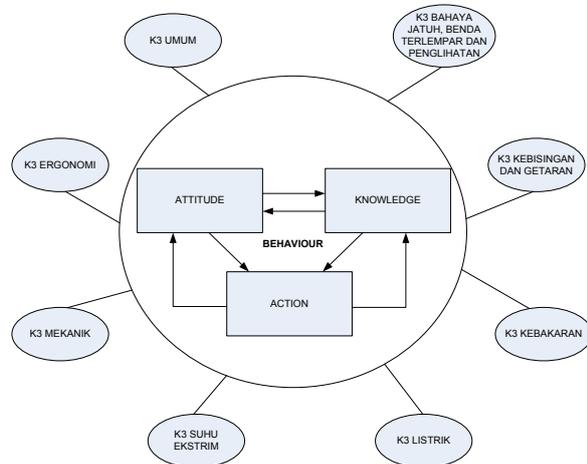


Fig 1. Research Framework

The population in this sample is the laboratory assistant from 8 laboratories which are: manufacturing process laboratory, statistic laboratory, production system laboratory, ergonomic laboratory, facility layout laboratory, technical drawing laboratory, computation laboratory and core laboratory.

Every assistant from these laboratories was surveyed by using questionnaire. There are 8 topics that were included in questionnaire including general safety

health, safety health for fire, safety health for mechanics, safety health for ergonomics, safety health for high temperature, safety health for electrical, safety health for noise and vibration and safety health for falling, accelerated object and vision. The questions in questionnaire were grouped into three major topics which are: knowledge, attitude and action.

Following this, the rating method was built in order to evaluate the result. The weighting for every question was applied based on average of total questions. As the result the value for every topic can be calculated. The rating interval is between 0 to 10. The criteria were applied to value the rating. The grouping of interval based on the criteria which are:

- 2 : Very Bad
- 2.01 - 4: Bad
- 4.01-6: Sufficient
- 6.01-8: Good
- 8.01-10: Very good

IV. Result and Discussion

IV.1. Manufacturing Process Laboratory

Manufacturing process laboratory is the place to study the forming of material from original shape into desired shape. Many machines are located in this laboratory including lathe machine, drilling machine, cutting machine. This indicates many potential mechanical hazards in manufacturing process laboratory. There is evaporation machine which produce high temperature while processing. This indicates that extreme temperature hazards exists in this laboratory.

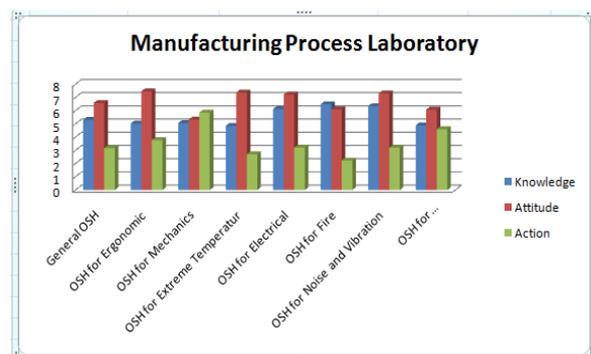


Fig 2. The result for Manufacturing Process Laboratory

The survey has shown the laboratory assistant has the knowledge at sufficient level. Although, considering the high risk because of mechanical and extreme hazards in this laboratory, the laboratory assistant should have knowledge at good level mainly for OSH for Mechanics and OSH for Extreme Temperature. In

term of attitude, laboratory assistant in this laboratory showed the attitude at good level. Only in mechanics the attitude level is below compared to other attitudes. In term of action, the survey has shown all assistants do not have experience with hazards such as extreme temperature, electrical, fire and noise. This indicates the assistants do not know how to handle the potential hazards.

IV.2. Statistic Laboratory

The activities in statistic laboratory do not require many machining and equipment. Many activities is run by using computer. For example sampling, quality control, regression, etc. This indicates not many hazards are exists in this laboratory.

The survey has figured the level of knowledge laboratory assistants are below manufacturing process assistant. Almost all the knowledge is at bad level. On contrary with knowledge, the attitudes are at good level. This indicate the assistant know how to response to occupational safety health. In term of action, the volatile result has been identified. Although all the results are at bad level except for OSH for ergonomic. The worst result is identified during action to fire hazards.

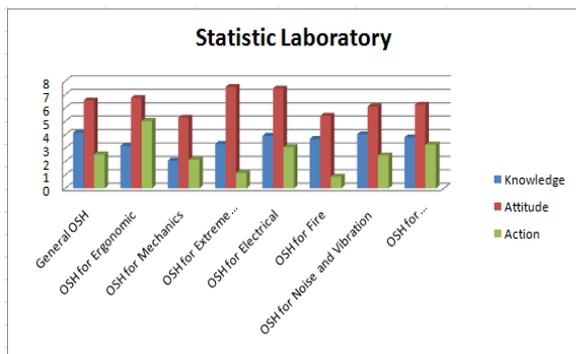


Fig 3. The result for Statistic Laboratory

IV.3. Facility Layout Laboratory

The students in this laboratory have faced the design activities. Many design tasks are existed in this laboratory which start from flow process chart design until facility layout design. Major activities in this laboratory are assisted by computer. This indicates the potential hazards are rarely found in this laboratory.

The survey has figured, the laboratory assistants have sufficient knowledge. The lowest has been found on knowledge for extreme temperature. The worst condition has been found during examining the action. The similar condition with statistic laboratory assistant happened to facility layout laboratory assistant in term of action. The actions are at bad level except for OSH for Falling, Accelerated object and vision. On contrary with knowledge and action, the

attitude of assistant are at good level, only for mechanics has been found to be lower compared to other results.

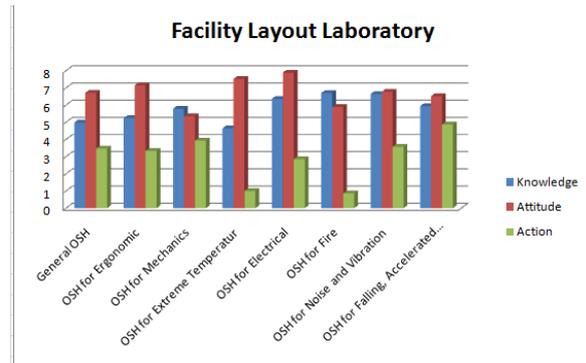


Fig 4. The Result for Facility Layout Laboratory

IV.4. Technical Drawing Laboratory

The objective of this laboratory is to introduce how to draw object technically and follow the rule. The major activities in this laboratory are draw the objects which is similar with facility layout laboratory. This indicates the potential hazards are rarely found in this laboratory.

The survey has shown, the laboratory assistant obtained the worst result comparing to other laboratory. Nearly all topic are at bad level except one for attitude in OSH for ergonomic. This indicates, in term of knowledge, attitude and action, the laboratory assistant need comprehensive review.

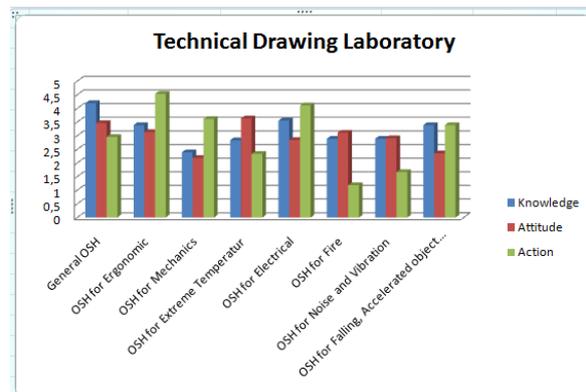


Fig 5. The Result for Technical Drawing Laboratory

IV.5. Ergonomic Laboratory

Ergonomic laboratory is the place for practising ergonomic theory. Many measurement activities are done in this laboratory. For example measurement of body for anthropometry, measurement the physical strength for fisiology, etc. The activities with potential hazards might be found only during measurement of physical strength. This indicates not many potential hazards in this laboratory.

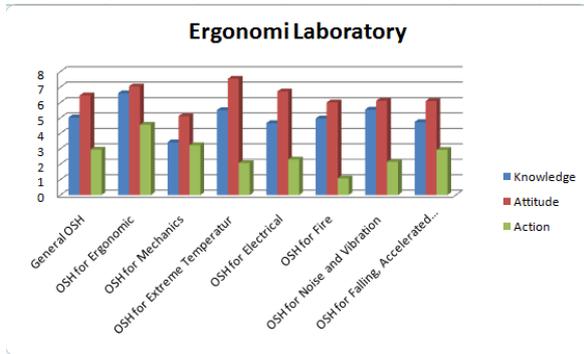


Fig 6. The Result for Ergonomic Laboratory

The survey has shown the knowledge are at sufficient level and the attitude are at good level. The one aspect that needs more attention is the action. The result indicate that the laboratory assistant do not have much experience with hazards.

IV.6. Computation Laboratory

The activities in this laboratory mainly run in computer For example programming activities, simulation activities. This indicates the laboratory nearly free from potential hazards.

The survey has figured the similar condition with other laboratory. The level of knowledge are at sufficient level. The lowest one are found in OSH for extreme temperature. in term of action, the assistant obtained the bad level. Even for fire and extreme temperature are at very bad level. This indicates the laboratory assistants do not know how to handle fire and extreme temperature hazards.

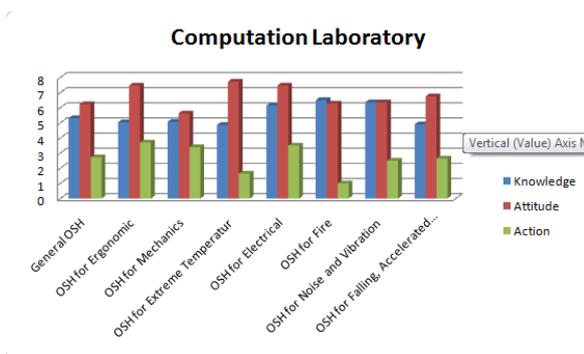


Fig 7. The Result for Computation Laboratory

IV.7. Core Laboratory

The activities in this laboratory are mainly to introduce various types of tools that can be used for measurement. This laboratory provides assisted tools for production. This indicates the laboratory nearly free from potential hazards.

The survey has shown the different characteristic with other laboratories. The level of action is higher than the level of knowledge except for general OSH and

OSH for fire. Even in OSH for ergonomic and OSH for mechanics the level of action far higher than the level of knowledge. In term of attitude, the laboratory assistant has obtained the fine result where nearly all attitudes are at good level except for OSH for mechanics and OSH for noise and vibration.

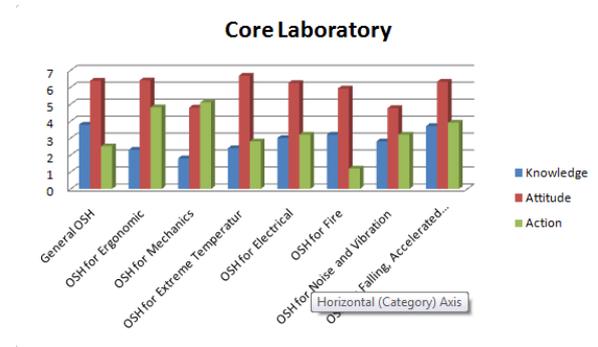


Fig 8. The Result for Core Laboratory

IV.8. Production systems Laboratory

One machine for metal foundry has located in this laboratory. This machine is used to make aluminum products. This machine generates high temperature which is more than 500⁰ C. This indicates this laboratory has extreme temperature hazard. Except the using of this machine, the other activities are mainly computation based. For example, the activity in production planning and controlling are focusing to build aggregate plan, master production schedulling (MPS) and master requirement product (MRP) which these activities are computer based.

The survey has shown the laboratory assistant obtained bad result for knowledge and action. Nearly all result for knowledge are at bad level. This indicates the laboratory assistant has insufficient knowledge to implement occupational safety and health in production systems laboratory. The lowest result have found in OSH for mechanics. The similar result happened for action. Majority of result are at bad level. Even action in OSH for fire is at very bad level. This indicates the laboratory assistant are not capable to handle fire accident. Considering the existing extreme temperature in this laboratory, the result indicates the needs of quick response to increase the knowledge and the action for handling potential hazards. On contrary with knowledge and action, the attitudes of laboratory assistant are at good level.

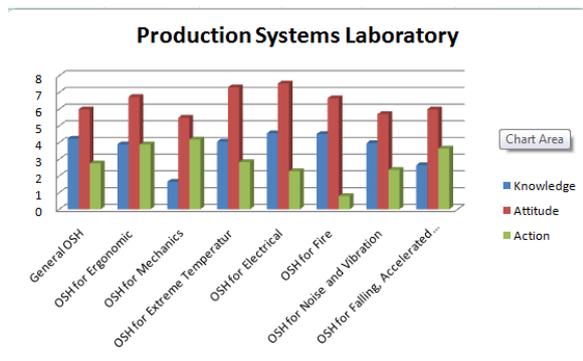


Fig 9. The result for Production Systems Laboratory

V. Conclusion

This research has identified the beginning behaviour of laboratory assistant. The behaviour can be explained as interaction of knowledge, attitude and action. As the knowledge can be add by gaining more experience from action. People need the knowledge and attitude before doing the action and the attitude are consideration process using the knowledge. The research identified the weak side of the behaviour in term of occupational safety health from laboratory assistant. The weak side can be improved by different strategies. For example the knowledge side can be fixed by running the training. The attitude side is improved by increasing the supervision. The practising can be alternative way to improve action. Based on the result, the conclusions are:

- Every laboratory assistant has different characteristic of behaviour.
- This result can be a input to design the training for laboratory assistant and any other way to improve occupational safety and health.
- Indicating the student need to introduce to occupational safety and health since very beginning mainly for student in engineering faculty, mathematics and sciences faculty, agriculture faculty and other faculties that have laboratory with machine, equipment and chemical substances.

However the further research needs to improve the rating method and valuation method. It is important to investigate the changing process of behaviour. The comparison between the beginning behaviour and the end behaviour after implementing the intervention will be necessary. This research is one piece of the bigger part which develops the occupational safety health in University of North Sumatera mainly in engineering faculty.

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