

Evaluation of Safety Awareness Among Workers Performance with Respect to Safety Hazard at Spiral Pipe Manufacturing Industry

Hilda Victor¹, Mohd Fuad Yasak^{1*}

¹ Department of Chemical Engineering Technology, Faculty of Engineering Technology,
University Tun Hussein Onn Malaysia, 84600, Panchor, Pagoh, Johor, MALAYSIA

²Department of Mechanical Engineering Technology Faculty of Engineering Technology,
University Tun Hussein Onn Malaysia, 84600, Panchor, Pagoh, Johor, MALAYSIA

*Corresponding Author Designation

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Abstract: The number of accidents that occur in the industrial or manufacturing sector correlates with an industry's rapid expansion. The number of reported accidents rises year after year. The Department of Occupational Safety and Health (DOSH) reported 6,686 accidents in 2021. The goal is to identify safety awareness among Spiral Pipe Manufacturing workers, analyze safety awareness using statistical analysis using the Statistical Package for the Social Sciences (SPSS), and propose a mitigation plan for prevention and control measures to reduce the risk of safety hazards. Workplace high-risk safety hazards include suspended loads, moving pipe, working at heights, and mechanical and electrical hazards. To continue with this study, the problem statement is that some workers do not care about workplace safety; they take shortcuts to complete tasks, which encourage workplace accidents. The second problem statement is that a few workers violate the 12 Non-Compromise Rules (NCR), where this NCR rule is a safety rule that cannot be broken at all. The third issue is that employees are unconcerned about or unwilling to participate in safety programmes. This is evident where the HSE has launched a 5S programme to which only a few parties have responded. Following that, the project was completed through observation and a questionnaire distributed to 102 respondents. The data was analysed using SPSS software. According to the study's findings, employees are aware of the safety hazards they face on a daily basis at work, but when observed, some employees do not care about their safety and perform work without proper procedures. This study also discusses safety hazard prevention control through "Grand Toolbox Talk," "Safety Signage Installation," and "Training and drills."

Keywords: Safety Hazards, Statistical Analysis, SPSS

1. Introduction

The number of accidents that occur in the industrial or manufacturing sector correlates with the rapid expansion of an industry. There were 6,686 accidents in the construction industry in 2021, according to the Department of Occupational Safety and Health [1]. However, some businesses are not holding themselves to the same standard and this can have a detrimental effect on workers' health and wellbeing. This is because they do not wish to maintain a record of Lost Time Injury (LTI). Workers' health and social well-being at work are vitally important, and ignoring them can lead to a variety of difficulties. Accidents that occur throughout the year call into question the element of worker safety. This demonstrates that employee wellbeing is not effectively addressed.

Other than that, improper manual handling - such as pushing, pulling, lifting, lowering, carrying, and bearing weight without the use of mechanical assistance - can lead to musculoskeletal problems [2]. The importance of addressing this issue within the organization is strongly advocated. Certain measures are required by this work manual in order to safeguard employees from occupational safety and health hazards such as accidents, injuries, and overload. All of these elements fall under the umbrella of ergonomic work solutions [3].

1.1 Statement of Problem

The problem statement for this study is that some workers do not care about workplace safety; they take shortcuts to complete tasks that encourage workplace accidents to occur. During a walkabout, the welder at the repair station took a shortcut and attached the ground clamp directly to the light metal structure. The second problem statement is that a few employees violate the 12 Non-Compromise Rules (NCR), which are rules that cannot be broken at any cost. 12 NCR contains a rule about drugs and alcohol. When the urine test is performed, some employees test positive. Last but not least, statement of the problem is that employee participation in the HSE programme is not receiving a satisfactory response. For example, in the HSE's 5S programme, some employees do not participate in 5S activities. This is demonstrated when monitoring 5S, where cleanliness is less than satisfactory and security officers receive complaints from employees about implementing 5S.

1.2 Objective

The key goal of this research to examine the Safety and Health Performance of Workers at Spiral Pipe Manufacturing. The research will discuss the following concerns in order to do this:

- I. To identify the safety awareness among manufacturing worker for Spiral Pipe Manufacturing.
- II. To analyse the safety awareness using a statistical analysis.
- III. To propose the mitigate plan for the prevention and control measure in reducing the risk of safety hazards.

1.3 Research Question

These are the questions that are be used as guidance for this study:

- I. Are employees aware of the hazards they face throughout the workday?
- II. Do employees feel burdened by safety regulations?
- III. Have control measure been put in place to reduce the risk of accidents in the workplace?

1.4 Significant of the Study

This study will investigate employee performance in workplace safety hazards from various perspectives to determine the main factors or causes of employee performance decline and increase. Data produced from this study will be used to show the evaluation of worker performance with respect to safety hazards for the spiral pipe manufacturing industry.

Finally, the researcher will take the control measures that need to be implemented to control the performance of these employees at a level where these control measures can be well received by them while helping them to always be consistent with their performance.

2. Methodology

This study was made by the means of quantitative methods of researcher. Quantitative research involves the use of computational, and statistical tools SPSS. It is conclusive in its purpose as it tries to quantify the problem and understand how prevalent it is. This study aims to find out the level of knowledge and awareness of employees regarding safety hazards that occur in the family. Petro Pipe Sabah (PPS) is a spiral pipe manufacturing. The study will involve all PPS workers in assessing their performance against workplace hazards.

The instrument used in the document analysis are Likert-type scales questionnaire. All the elements in the questionnaire were based on two (2) categories, namely the demographic respondents are Part A, while Part B is evaluation of worker's performance where respect to safety hazard for spiral pipe manufacturing industry. The explanations, discussions, and conclusions are based upon the results presented by the analysis. Data was collected using Google Form and converted to Statistical Package for the Social Sciences (SPSS). SPSS can read data from almost any file type and generate tabulated reports, charts and plots of distributions, trends and descriptive statistics. SPSS is available for both personal computers and mainframe computers and is a powerful tool for analyzing large amounts of data [4]

3. Results and Discussion

Based on figure 1, most respondents are male, with 85.3% of the total respondents, followed by female respondents, with only 14.7% of the total respondents. There are more male respondents because the majority of employees are men.

Figure 1: Analysis of gender of respondents

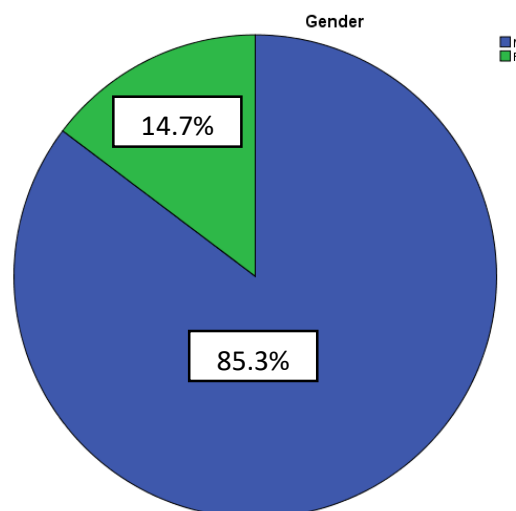


Figure 2 shows the age of the respondents. The age of the respondents was between 18 and 60 years old and divided according to four age categories. The first category is those between the ages of 18- 30 years, which consist of 30.4% (31 people). The second category is 31–40 years old, which consists of 34.3% (35 people). Next, for the third category, the age range of 41–50 years is made up of 23.5% (24 people). The fourth category is the age range of 51–60 years,

which consists of 11.8% (12 people). In this fourth level, it was found that the working age range has decreased.

Figure 2: Analysis of age of respondents

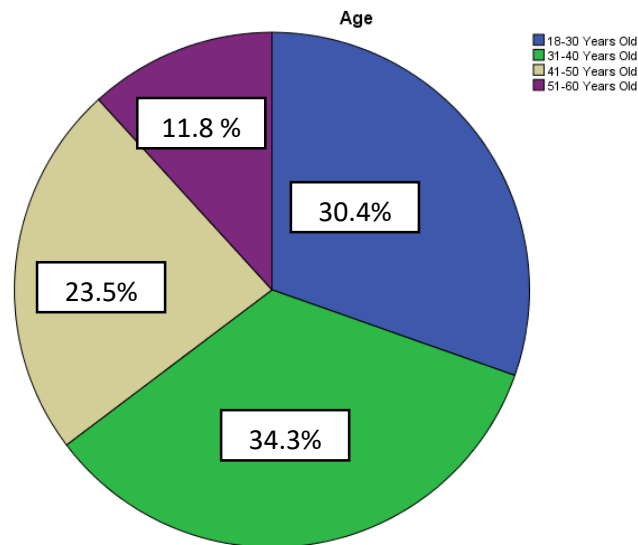


Figure 3 shows the employee's years of service. The employee's years of service range from less than 1 year to 20 years of service. Respondents who served less than 1 year and 1 to 5 years of service have the same percentage value of 29.4% (30 people). Meanwhile, respondents who worked for 6 to 10 years had a service rate of 23.5% (24 people). 17.6% (18 people) of manufacturing plant employees have 11 to 20 years of experience. Referring to this analysis, there are many veteran workers who are still continuing their service.

Table 3: Employee Year of Service

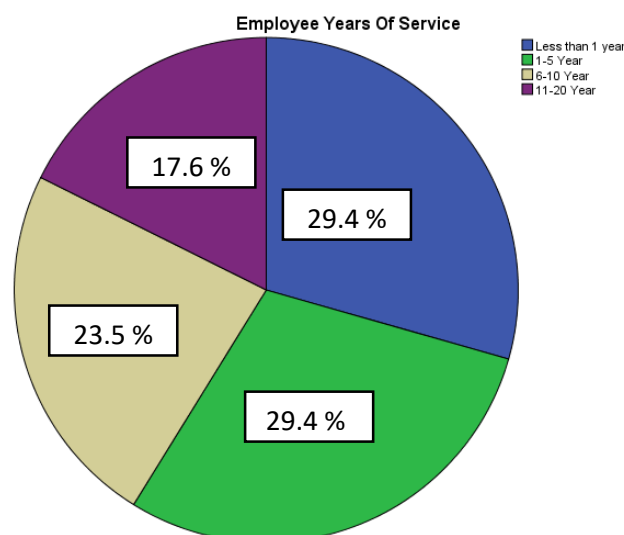


Table 1 shows the safety hazard risk assessment and awareness. Item no.1 depicts the activities performed while working at heights. 2% (2 people) of respondents disagreed that working at heights carries a high risk of death and serious injury. Furthermore, 12.7 (13 people) agree and believe that working in high places is dangerous. According to the findings, 85.3%

(87 people) strongly agree that working at heights is a very dangerous work activity that should take seriously because it can result in death or serious injuries.

Item no.2 shows the respondents' awareness of the use of a safety harness when working in high places. The majority of respondents (93.1%, or 95 people) do not agree that the safety harness does not need to be used when working in high places if the work is light and does not take a long time. This proves that respondents are aware that when working in high places, even if they perform light work, a safety harness is mandatory to use because accidents do not happen depending on the time of day. In addition, 3.9% (4 people) agree and 2.9% (3 people) strongly agree that a safety harness does not need to be used if carrying out light work. A few respondents were not aware that working in high places is less risky.

The hazards of moving machinery are shown in item no.3. According to the findings, 1.0% (1 person) disagreed that moving machinery could cause an accident. As a result, 11.8% (12 people) agree that moving machinery can collide and make contact with other machines, causing property damage, or personnel can be hit by the machine, resulting in serious injury and fatal. The majority of respondents, 87.3% (89 people), strongly agree that moving machinery is a hazard that workers must be aware of during working hours. When moving machinery collides, an accident can occur, causing property damage, injury, and fatal.

Item no.4 shows the potential dangers that will occur when mechanical lifting activities are carried out. 1.0% (1 person) disagreed that mechanical lifting of the load lifted by the overhead crane is likely to drop the load. Furthermore, 13.7% of people (14 people) agreed that the load lifted by the overhead crane is extremely dangerous. The majority of respondents strongly agreed 85.3% (87 person) during the mechanical lifting of hanging loads by the Over Head Crane, the dangers that can occur are wire rope, web slings, loose and disconnected hooks resulting in the load falling.

Item no.5 shows the respondent feedback on the risk of danger during pipe moves on the buggy. It shows that 88.2% (90 people) strongly agree while 11.8% (12 people) agree the moving pipe is a hazard. When the pipe moves on the buggy, the possibility of the pipe coming off the track is high, which can cause property damage, injury, and fatality.

Item no.6 shows the respondent's feedback on the safety hazards of the rotating machine for each motor on the machine part. The results of the analysis found that the average respondent strongly agreed 85.3% (87 people) and 14.7% (15 people) agreed that the motor that rotates on the machine should have a barrier or cover. Even smooth, slowly rotating shafts can grip hair and clothing and, through minor contact, force the hand and arm into a dangerous position. Contact with rotating parts can result in severe injuries.

Item no.7 shows that 88.2% (90 people) disagree that the mandatory use of PPE burdens and encourages work movement during daily work. 10.8% of the respondents (11 people) agreed that using PPE during daily work is burdensome and will increase the risk of danger. There is one person who strongly agrees that the mandatory use of PPE is very effective and can further increase the risk of harm.

Item no.8 shows the respondents' awareness of doing housekeeping at work. The results of the analysis found that the majority of 90.2% (92 people) did not agree with the statement above that doing housekeeping cannot reduce the risk of danger, is tiring, and is not mandatory at work. This proves that respondents are aware that doing housekeeping at work can reduce the

risk of danger. Meanwhile, 4.9% (5 people) of respondents agree or strongly agree that doing housekeeping is tiring and not mandatory at work.

Item no.9 shows the driving and transportation of respondents using forklifts. Based on the analysis, 76.7% (78 people) disagreed that a person can drive a forklift even if he is not competent. This proves that respondents are aware that accidents can happen if the driver is not a competent person. While 20.6% (21 people) agree and 2.9% (3 people) strongly agree that a person can drive a forklift if he knows the basics of driving and has been taught by colleagues.

Item no.10 shows the safety awareness of using mobile phones during working hours. Findings showed that 92.2% (94 people) of respondents did not agree that playing mobile phones and listening to music during working hours can reduce stress at work. This proves that respondents are aware that using mobile phones during working hours can invite accidents. However, there are a few respondents who agree with a percentage of 4.9% (5 people) and 2.9% (3 people) who strongly agree that using mobile phones to listen to songs can reduce stress at work.

Item no.11 depicts the assessment of feedback from respondents about the smoking safety awareness among workers in the plant. It shows that the majority of respondents, with 91.2% (93 people), disagree with the statement that personnel can smoke inside the plant when they ensure the surrounding area is safe. It proves that respondent, aware that inside the plant has hazards that can create fire hazards, smoking in the plant is strongly prohibited. Therefore, 3.9% (4 people) strongly agree and 4.9% (5 people) agree that smoking inside the plant in a safe place is allowed. It shows that this respondent is not aware of the smoking safety campaign.

Item no.12 shows the respondents' responses to their awareness of the safety implications of being under the influence of alcohol while working. Based on the data, the majority of respondents (82.4%) (84 people) do not agree that a person under the influence of alcohol while working can work calmly and safely. This is because a person under the influence of alcohol while working will be distracted, work will not focus, and they will feel sleepy and dizzy. This will cause an accident to occur. In addition, there are a few respondents who agree: 10.8% (11 people) and 6.9% (7 people) strongly agree with the above statement. This shows that the respondents do not have the awareness that personal safety is prioritized while working.

Item no.13 shows the assessment of respondents' awareness regarding the use of gloves during paint mixing activities. A total of 86.3% (88 people) did not agree not to use gloves when mixing paint; this proves that respondents are aware that gloves must be used to avoid irritation on the skin. Next, 10.8% (11 people) of respondents agreed, and 2.9% (3 people) of respondents strongly agreed that they do not use gloves when mixing paint because gloves will stick and make it difficult to work. This shows that some workers are still not aware of the hazards they are exposed to that can harm their skin.

Item no.14 shows the assessment of hazard awareness among respondents about the pinch point on the machine that can cause injury. 1.0% (1 person) of respondents do not agree with the above statement that pinch points can cause hands and fingers to be pinched. Next, 10.8% (11 people) agree, and the majority 88.2%, (90 people) strongly agree that the pinch point area on the machine is likely to get hands and fingers stuck.

Item no.15 shows the respondents' assessments of hydraulic oil leaks that can create slip and fall hazards, fire hazards, and pollute the environment. The majority of respondents, 86.3% (88

people), strongly agree, and 12.7% (13 people) agree that leaking hydraulic oil is a hazard to workers in the factory. However, there are 1% (1 person) of respondents who do not agree with the above statement.

Item no.16 for the dangers when performing a pipe inspection. A total of 79.4% (81 people) of respondents strongly agree, and 17.6% (18 people) agree that the dangers that exist during pipe inspection are iron dust, the hot environment inside the pipe, and the sharp surface of the pipe. There are 2.9% (3 people) of respondents who do not agree that pipe inspection work has dangers faced by QC people.

Item no.17 shows respondents' awareness of electric shocks that can occur while working. The results found that the majority of 87.3% (89 people) of respondents strongly agreed and 12.7% (13 people) of respondents agreed that this electric shock can occur if touched by power lines, the use of damaged electronic devices.

Item no.18 shows the results of the respondents on the safety hazards of hot work activities. The majority of 88.2% (90 people) of the respondents strongly agreed that the hazard during welding, plasma cutting, and grinding work activities is sparks that cause injuries and burns if they come into contact with the body. In addition, 9.9% (10 people) agreed with the above statement, while 2.0% (2 people) disagreed that sparks from hot work activity can cause injury.

Item no.19 shows the effects of exposure to welding fumes on workers, which can cause irritation to the eyes, nose, and throat, nausea, and lung damage. The findings show that the majority of 86.3% (88 people) strongly agree and 11.9% (12 people) of respondents agree that exposure to welding fumes is a hazard to workers. 2.0% (2 people) of respondents did not agree that welding fumes are not harmful to workers' health.

Table 1: Safety Hazard Risk Assessment and Awareness

No	Description	Disagree (%)	Agree (%)	Strongly Agree (%)
1	Work at height	2.0	12.7	85.3
2	Awareness of using Safety Harness when Working at Height	93.1	3.9	2.9
3	Moving Machinery	1.0	11.8	87.3
4	Mechanical Lifting	1.0	13.7	85.3
5	Moving Pipe	0	11.8	88.2
6	Rotating Machine	0	14.7	85.3
7	The use of mandatory Personal Protective Equipment (PPE)	88.2	10.8	1.0
8	Awareness of housekeeping	90.2	4.9	4.9
9	Driving and Transportation of Forklift	76.5	20.6	2.9
10	Safety Awareness of Using Mobile Phone During Working Hour	92.2	4.9	2.9
11	Smoking Safety Awareness	91.2	4.9	3.9
12	Safety Awareness influence of alcohol during working hours	82.4	10.8	6.9
13	Mixing Paint Activity	86.3	10.8	2.9
14	Pitch Point	1.0	10.8	88.2
15	Leakage of Hydraulic Oil	1.0	13.7	86.3
16	Hazard during Pipe Inspection	2.9	17.6	79.4

17	Electric Shocks	0	12.7	87.3
18	Hot Works (Welding, Plasma Cutting, and Grinding Works)	2.0	9.8	88.2
19	Welding Fumes	2.0	11.8	86.3

Table 2 show the oxy- acetylene hazard possibility occurred. Item no.1 shows the respondents' feedback about the dangers that exist when using oxy-acetylene. The findings of the study show that 85% (87 people) of respondents know the dangers that may occur when oxy-acetylene is used. If oxy-acetylene is not checked before starting work, flashback, backfire and explosion can occur. In addition, 14.7% (15 people) of respondents stated that only an explosion would occur if.

Table 2: Oxy-Acetylene Hazard

No	Description	Blast (%)	Flashback, Backfire and Blast (%)	Not applicable (%)
1	Oxy-Acetylene Hazards	14.5	85.3	0

3.1 Prevention and Control Measure in Reducing the Risk of Safety Hazards

Prevention and control measures for reducing the risk of safety hazards include holding a toolbox talk to keep all employees safe. Install security signs after going through administrative control. Safety signs are strategically placed to reduce the risk of serious injury. Signs are essential for informing employees about the hazards they face in each area of their workplace. Furthermore, through training and drills, it can help to create a safer work environment in which employees can focus on their duties without being concerned about their personal safety. This increased concentration will result in increased work output and higher-quality products, ultimately increasing productivity and profitability.

4. Conclusion

The use of personal protective equipment (PPE) is mandatory to reduce the risk of injury. Working in high places is very risky and can cause serious injuries and death. In addition, moving machinery, moving pipes, and mechanical lifting of lifted loads are also safety hazards. A well-known safety hazard is when mixing paint, which is a chemical that can be harmful to hands. When mixing paint, workers should wear latex safety gloves. The use of mobile phones is also a safety hazard where negligence at work can lead to accidents. It is the same with the influence of alcohol while working. Smoking inside the plant is strictly prohibited because there are flammable materials. Incidents such as flashback, backfire, and blast can occur during pipe cutting. Electric machines are also a danger in factories because they can cause electric shocks if they come in contact with power lines. Prevent and control measures for reducing the risk of safety hazards include holding a toolbox talk to maintain safety awareness. Safety signs are important to inform workers of the hazards they face in each area of their workplace. In addition, through training and drills, it can help create a safer work environment where employees can better focus on their duties.

4.1 Recommendation for future studies

In the future, research like this should be conducted in a broader scope that includes both health and the environment, so that the findings can be generalized to the entire country. Furthermore, because the sample of this study is open to all workers, it is suggested that in future studies, the study be focused on workers who work in other sections in order to obtain clearer information about the hazard faced by workers based on different sections. Finally, this study uses a questionnaire that has problems with data collection because respondents answer it casually. Therefore, it is recommended that further research be conducted using the interview method.

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