Proceedings of the International Conference on Industrial Engineering and Operations Management

Publisher: IEOM Society International, USA DOI: 10.46254/AF6.20250241
Published: April 8, 2025

Developing a Safety Training Program Focusing on Machine Maintenance.

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Abstract

The study was about improving safety and machine maintenance in the organisation. The organisation was facing a problem of not having fully trained employees, which leads to machine breakdown, which can cause hazards. The study aimed to develop a safety training program that also looks at machine maintenance. The study had four main objectives: proposing a safety training program, analysing training materials used in the organization, outsourcing new practices that will improve machine learning and identifying areas to improve current practices. Interviews were conducted as one of the methodologies to identify exactly what the problem is and the gap that the current practices are leaving in terms of organisational safety. The study found that a majority of employees were aware of the maintenance issues of the machinery; however had no context in terms of when the maintenance should be undertaken. The study recommended that a training program for workers should be provided, focusing on the machine safety and machine maintenance.

Keywords
Machine-safety, Maintenance, Safety-training.

1. Introduction

Background of the study

The organisation is one of SA's top manufacturers in products that are used in several industries. It produces sponges, gaskets, and insulation forms for these industries. It utilizes machines to cut materials and produce those products, and sometimes those machines are not used properly which can result in machine breakdowns and that can cause a delay. Employees are not fully trained and that has resulted in two severe accidents that has endangered employee's health and put the organization in a very bad position. Employee safety is important to ensure that such problems do not occur, with sufficient training this could have been avoided. Machine maintenance also plays a significant role in making sure that the machines are working at 100%, to reduce them from causing defects on materials and avoid injuries that can decrease productivity rate. Every organization should have a fully proofed machine training to ensure that all employees are trained in using those machines (Glenn Platt 2018).

Problem statement

Maintaining machines is very crucial in organisations as it provides a sense of safety when employees are using them to avoid accidents and failure. The lack of training can result in inconsistencies in safety practices, compliance issues and decrease effectiveness in the organization. The research focused on examining how implementing a safety program that that emphasizes safety in machine learning to decreases the chances of accidents and defects.

Aim

Develop a complete safety training course that relates to machine maintenance.

1.1 Objectives

- Develop a safety training program suitable to the organization's specific machine needs.
- Analyse training materials employees use to learn about machine dangers and offer needed skills.
- Evaluate opportunities for direct practices of using machines.
- Identify areas that can be improved in the existing safety practices.

Significance of the study

The study will fill the gap between machine safety and training by offering effective training course that can be used to combine the two. It will show insight on how to decrease the number of risks of accidents, provide employees with the needed information they will require in operating machines and how the organization will gain advantage in terms of increasing productivity and employee morale. The study will provide the employees with a safe environment that prioritizes their safety and offer knowledge management that can be used to remain safe while working.

2. Literature review

2.1 Develop a safety training program suitable to the organization's specific machine needs.

According to (Dyreborg, et al. 2022), it was found that safety measures in the workplace can reduce the number of accidents that can occur and it looks at the types of elements of safety program are most effective. When organisations implement safety interventions properly, they can avoid issues like accidents and defects which leads to increased productivity rate. Prioritizing a long-term development program in terms of training is crucial in the organization to ensure that necessary skills are developed and used in operation of machines to avoid injuries (Younas et al. 2018).Routine maintenance can increase machine's lifespan and reduce malfunction, that can be done by focusing on industry-standard techniques. Preventative maintenance can also increase organisation performance and allow the organisation to prepare for machine malfunctions before they occur (Basri et al. 2017).

2.2 Analyse training materials employees use to learn about machine dangers and offer needed skills.

The analyses of training materials are important to ensure that employees are aware and have the necessary materials they need to be safe and enhance skill development (Cascio 2019). Effective training materials should emphasize detailed information on potential hazards associated with the diverse types of machines the organisation uses. Apart from highlighting dangers, training materials should equip employees with the skills they need to have a safe operation of machines, and ways to identify hazards (Walters & R2017). These materials will offer employees the information they need prior to their training so that they have a background of what they have to deal with. In addition to being able to identify machine related hazards and the providing safety skills, training materials should also include firsthand learning opportunities that involves theoretical knowledge.

2.3 Evaluate opportunities for direct practices of using machines.

Direct practice with machine is also important for developing employee's confidence in using the machines. When employees are using machines to practice it can offer knowledge in real life, which will reinforce safe operation when using it for real (Ninareh Mehrabi 2021). Supervised practice can also assist employees in receiving guidance from trainers in the best ways to operate machines, they can reduce the risk of accidents as it will give employees a chance to be able to identity and respond to hazards (W. James Murdoch 2019). In this way it will also result in continues training where employees regularly have training so that they have a refresh of what they need to do which is essential in retaining effectiveness .

2.5 Identify areas that can be improved in the existing safety practices.

The area that can be improved in the organisation is regularly updating safety practices when new machinery is being introduced in the organisation (Pinto et al. 2020). This will help in making sure that employees have all the necessary information they need to use the machines and remain safe in doing so. Continuous training can also be implemented to give employees a refresh of what they were trained on to retain skills and improve their work (Ben Shneiderman 2020). Encouraging open communication to assist in making employees feel comfortable in reporting potential hazards and difficult encounters while using machines.

3.Research Methodology

Theory approach

Qualitative methods were used to gain employee's viewpoints, experiences and action based on a specific topic. It emphasizes on how and why, aims to provide the reader with relevant information on the study by using in-depth explanations (Tenny et al. 2022). Interviews were conducted because of the open-ended questions it has that allows the researcher to ask to follow up questions, and get more information by judging their body language and emotions (Tenny et al. 2022).

3.1 Research design

Descriptive design was used to gain insight into the study by having clear research objectives that are used to guide the interview questions being asked. It helps the questions to fulfil the purpose of the study, and ensure that the data is accurate and feasible. Semi-structured interviews were conducted as conversations between participants and the researcher, and it is followed by follow up questions. Descriptive interviews are used when the aim is to understand the employees' experiences and attitude about the study.

Sample

The population at the organisation is fifty, the sample size the researcher engaged with is forty-five employees that consist of one supervisor from each 5 department, 2 mechanical engineers, 3 top level managers and 30 general workers. The sample size is 80% of the population size, and it will result in having a lower sampling error which will result in more accurate results (Hennink & Kaiser , 2022).

Data analysis

Using (Witkowsky & Bingham 2021) method of analysing data, it consists of five phases which is Organising the data, sorting the data into relevant categories, open coding, identifying pattern and themes and applying theory and explaining findings.

4.Results

This section consisted of interview questions that were generated by the researcher to ask employees regarding the problem identified. The questions and answers were then put into graph to properly analyse the responses received. Thirty graphs were designed using diverse types of graphs and an analysis followed after each to get a better understanding of the results obtained.The questions asked employees were based on the four objectives that were identified and the below will be a summary of how employees responded to each, the sample consisted of forty-five employees including general workers and management, some questions were directed to employees and others to management.

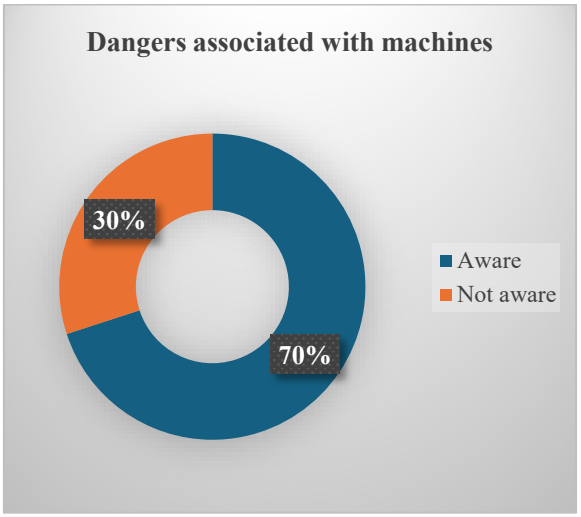

Figure 1. Awareness of machine dangers amongst respondents.

The below figure shows that not all employees were aware of dangers the machines they use pose a danger, this is the result of not having sufficient training and knowledge on machine usage and practicing safety. 70% of the people was found to be mostly people from management and the 30% were employees who work closely with these machines. These results show us that it is crucial for organisation to have a safety culture to ensure that everyone is safe in the workplace.

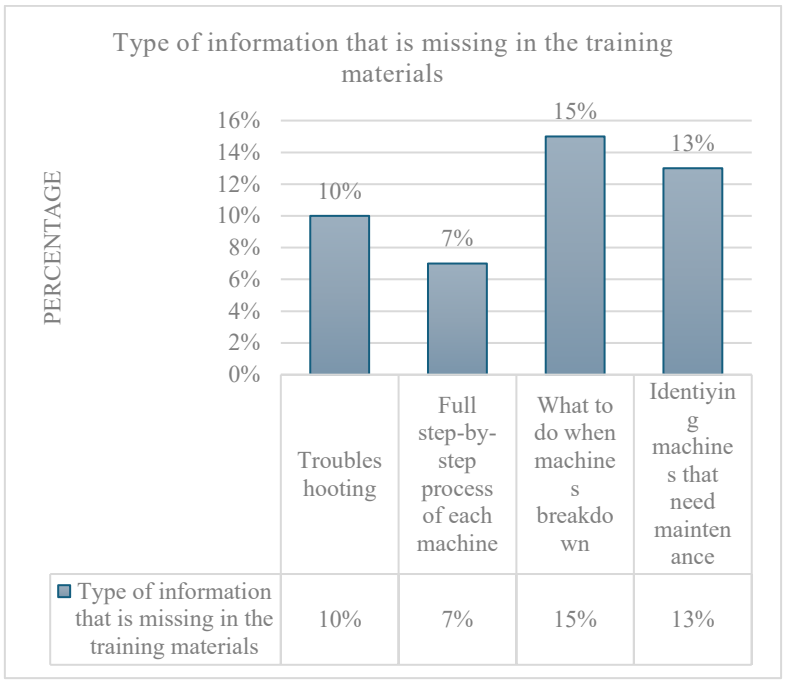

Figure 2. Information that is not found on the training materials.

The below figure shows that after combing the information and gathering the data it was shown that there's information that was not included in the current training materials that the respondents picked up. 10% is how to troubleshoot machines, 7% is a full step-by-step guide on how each machine works, 15% is what to do when machines breakdown and 13% is how they can identify when machines are due for maintenance.

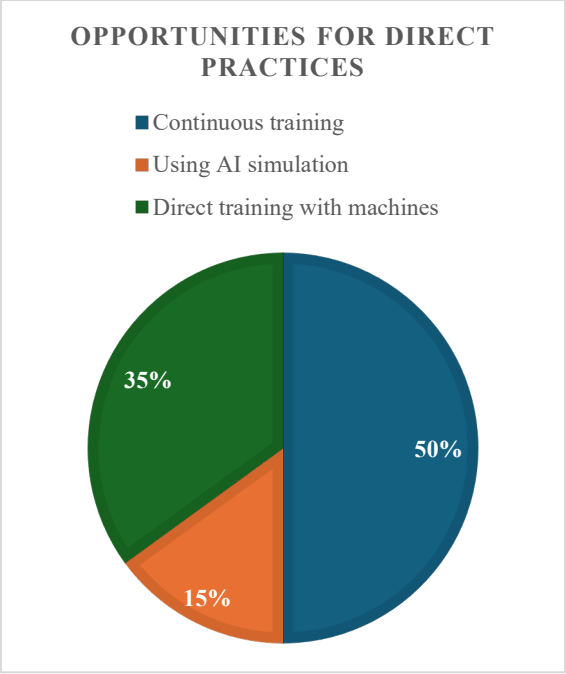

Figure 3. Ways the organisation can use direct practices to implement training.

The figure below shows ways in which the respondents has suggested ways they can make training more effective, with 15% saying using AI simulations, 50% saying with continuous training and 35% saying using the actual machines to train and get familiar with how to use the machines.

Figure 4. Areas of improvement in the current safety practices.

The figure below shows ways the organisation can improve their safety practices and 50% is by updating their safety practices so that they are current and up to date, 50% by opening communication to all employees so that they are able to report any issues they might have.

5. Recommendations

The recommendations provided were based on the objectives that were formulated in the beginning of the study.

Propose a Safety Training Course Suited to the Organization's Specific Machine Needs.

Organisation A will benefit from the safety training course that is divided into 7 steps that breaks down how the training course can be implemented; the following steps are: (Loosemore & Malouf 2019)

- An overview of machine safety.
- Training the specific machine and equipment.
- Protective wear when using machines.
- Incident report.
- Risk mitigation and hazards identification.
- Constant refresher courses.

Analyse the training materials for employee's knowledge when it comes to machine dangers.

There are ways to analyse and improve training materials in order to ensure that it has the latest updates (Hoare & Richard 2021). The ways used to analyse the materials are, evaluating all machine related risks common and uncommon. They should explain safety procedures in a way that is easy to understand. Show ways on how employees can prevent accidents and the importance of always wearing protective clothing (Tyler et al. 2021).

Evaluate opportunities for direct practice and skill improvement for using machines.

Effective practices are implemented in a way that employees are continuously learning on the best ways to stay safe by having supervision from seasoned operators that can guide them in the training with complex machines (Jing, et al. N2019). Simulations can be implemented to give the employees a feel of how they can utilize machines while learning without worrying about making major mistakes. Interactive workshops can be used to assist in making sure employees are familiar with the machines before they start working on them.

Identifying areas that can be improved in the current safety practices.

The relevance of machine upgrades in the changing environment is essential in keeping the organization safe. An implementation of a detecting device can be introduced to assist in identifying errors and mistakes before they occur **(Liang 2020)**. Management has a responsibility of demonstrating dedication to set an example of adhering to safety practices in the organization and push communication with their employees to foster relationships to increase effectiveness.

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