

Improvement of Unsafe Act and Unsafe Condition Online Reporting System at Port

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Abstract

The port industry is one of the industries that has a high risk of accidents such as overturned trucks, falling into the sea, violations between trucks, overturned forklifts, and etc. Unsafe acts and unsafe conditions is a factor that might cause an accident. Hence, it must be periodically reported and summarised to help the company determine the workplace's level of safety. The aim of this study was to make an improvement of unsafe acts and unsafe conditions online reporting system. There are three objectives of this study which are to analyze the unsafe act and unsafe condition from online near miss reporting system, to investigate the current problem on unsafe act and unsafe condition online reporting system, and lastly to propose the improvement of unsafe act and unsafe condition online system to top management. In order to achieve the objectives, unsafe acts and unsafe conditions data reporting analysis (existing data) and interview with related representatives will be used to identify problems that need to be analysed and make improvement. Then meeting or group discussion will be conducted to propose to the top management. It was found that the highest near miss accident reported were not wearing PPE with total of 72 cases. Damage equipment recorded 37 cases, Housekeeping involving improper storage issues recorded 24 cases and involving procedure with 22 cases, Traffic involving vehicles park at undesignated parking area reported 15 cases. 18 cases of unsafe conditions involving obstruction of emergency response procedures were reported. Therefore, organizations can create an online reporting system that not only encourages reporting but also facilitates a comprehensive and timely response to unsafe acts and conditions, ultimately contributing to a safer workplace.

1. Introduction

Almost 80% of accidents are caused by human behavior, often known as unsafe acts. Compared to unsafe conditions, unsafe acts is affected by various factors and have a complex creation mechanism [1]. A part of accident analysis, near miss management or unsafe act unsafe condition management are very crucial to

mitigate the accident in the workplace [2]. Data from unsafe act unsafe condition reporting can be served as important input to manage the safety at the workplace.

An unsafe act is an activity that deviates from understood safety standards and endangers a person or a group of people [3]. These acts may be deliberate or inadvertent, and they may be the consequence of inattention, a lack of knowledge or training, carelessness, or an indifference for safety procedures. Taking shortcuts, working at unsafe speeds, failing to wear personal protective equipment (PPE), and using machinery without the required training are just a few examples of unsafe acts.

While, a workplace's unsafe conditions are any physical or environmental elements that endanger the health and safety of its workers. These situations can be caused by a variety of things, including defective equipment, poor maintenance, insufficient safety precautions, or a lack of the necessary safety infrastructure. Slippery floors, poor lighting, exposed electrical wires, broken machinery, congestion, poor ventilation, or the presence of dangerous materials without the appropriate labelling or containment are typical instances of unsafe circumstances [2]. The condition or environment of the workplace that can precedent to an accident.

In order to make it simpler to identify the factors that could be the cause of any kind of accident, it is important to keep records of any unsafe act or condition that occurs at workplace. This may help organizational development, which in turn improves management's commitment to enhancing safety and increases the organization's efficiency in dealing with persistent unsafe conditions [4]. It shows that very crucial for the company must have very good and stable management system which are easily maintained and used by the employees. Industry 4.0 is widely talked about and used nowadays. With technological advancements such as the internet of things (IoT's) helping the industry to facilitate the management of large data and making it easier for safety practitioners to analyze and find data that is important in managing OSH in the workplace.

2. Methodology

2.1 Research Design

Table 1 shows the research design based on objectives. This serves as proof that the system is inefficient to extract all the data related to unsafe act and unsafe condition (UAUC). Besides, conduct an interview with respondent provided further confidence regarding those elements that require improvement and provided proof that the previous technique was inefficient to utilize. Next, focus group discussion conducted to present the system proposed. If the system is more efficient to use, the company could implement it because more effective and making it simpler for all parties involved.

Table 1 Research Design Based on Objectives

Research Objective	Research Methodology	Data
To analyze unsafe act and unsafe condition from online near miss reporting system	Qualitative – UAUC existing data	UAUC data reporting analysis
To investigate the current problem on unsafe act and unsafe condition online reporting system	Qualitative – UAUC existing data and semi-structures interviews before develop improvement of system	Semi-structures interview question
To propose the improvement of unsafe act unsafe condition online system to top management	Focus group discussion / meeting with QHSSE Department for propose the improvement of system	Generate efficient online reporting system

2.2 Data Collection Method

2.2.1 Interview (Semi-Structures)

The interview approach used by the researcher in this study is a semi-structured interview, in which the researcher conducts interviews with those who will serve as the study's respondents and asks questions that have been prepared to discuss the objectives of the investigation. The researcher chose a sample from the company's Quality, Health, Safety, Security and Environment (QHSSE) Department staff and Information Technology (IT) Department staff since it was thought to be able to supply accurate statistics and information. When the interview procedure is conducted, the researcher will ask the respondent the questions from the list of pre-prepared questions right away if it is thought necessary.

2.2.2 Focus Group Discussion

Focus groups are small groups of individuals who gather to talk about a specific subject [5]. They frequently follow established procedural guidelines, and a moderator leads the group discussion. Therefore, staff from QHSSE Department is the focus group that chosen by researcher to conduct discussion or meeting. It is intended to propose the improvement of unsafe act unsafe condition online system to them. They also can gain the benefits of this study related to online system that more effective and user friendly.

2.3 Near Miss Analysis

In the study of investigate the UAUC from online near miss reporting system, a research methodology centered on near-miss analysis is employed to uncover valuable insights into potential hazards and risk factors. This methodology involves the systematic collection and analysis of data related to incidents that narrowly avoided causing harm or damage [6]. Near-miss reports from various sources, such as incident databases, employee interviews, and safety records, will be gathered and examined. The analysis will focus on identifying common patterns, root causes, and contributing factors associated with these near-miss incidents. By understanding the precursors to potential accidents, the research aims to proactively enhance safety measures and prevent future occurrences. This methodology provides a proactive approach to safety research, allowing for the identification of latent hazards and the development of targeted interventions to improve safety behavior and overall workplace safety within the ink manufacturing industry.

2.4 Narrative Analysis

In the investigation of effectiveness the UAUC online system, a research methodology employing qualitative narrative analysis proves to be a comprehensive and insightful approach. This methodology seeks to understand the complex narratives surrounding safety incidents and behaviors by collecting and analyzing qualitative data in the form of personal accounts, stories, and narratives from employees within the industry [7]. Through purposive sampling, participants will be selected based on their direct involvement in safety incidents or experiences. In-depth interviews and possibly focus group discussions will be conducted to gather rich and contextual data. The collected narratives will then be systematically analyzed using thematic coding and narrative analysis techniques. By examining the narratives, the research aims to identify recurring themes, patterns, and the underlying meanings associated with safety behavior. This approach allows for a nuanced exploration of individual perspectives and experiences, contributing to a deeper understanding of the socio-cultural factors influencing safety behavior within the unique context of ink manufacturing. The qualitative narrative analysis will offer valuable insights into the subjective dimensions of safety, facilitating the development of targeted interventions and policies to enhance workplace safety in the industry.

3. Result and Discussion

The result were constructed to achieve the aim and objectives. This result also will discuss the findings from interview session with respondent including participants and issues with current online reporting system. Besides, the difference between existing system and proposed system will also be shown in the form of a flow chart.

3.1 Participants

Participants were recruited using purposive sampling strategy. Safety practitioners and representatives from IT Division with experience in using the existing system were considered to be eligible to participate in this study. The potential participant were extracted through meetings in meeting room. Thus, the participants were asked to choose the date and time for interview sessions. Three safety practitioners and one representative from IT Division volunteered to participate in this study. The participants from safety practitioners include Safety and Health Officer (SHO) and Safety Executive. Beside representative from IT Division is IT Executive. The participants were all male with ages ranging between 31 and 44 years old and has working experiences as safety practitioners and information technology were varied between 2 and 10 years.

3.2 Data Collection

The data collection was conducted between April 2023 and October 2023. Researcher conducted 1 face-to-face interviews session and collected existing UAUC data for January 2023 until March 2023. The data collected were recorded with note taking by the researcher. The interviews have resulted in a collection of issues with current system for UAUC and improvements for the system. The issues with current system will explain in data analysis as well as improvements for the system.

3.3 Data Analysis

3.3.1 Near Miss Accident Analysis

Figure 1 showed the data analysis for near miss accident recorded from January to March 2023. A total of 245 near miss cases were recorded with an average of 80 cases per month. Beside, Figure 2 showed from total of 245 cases, 39% (95 cases) were unsafe act category, 27% (65 cases) were Machinery / tools / equipment not comply, 16% (40 cases) are unsafe condition category, 11% (27 cases) are housekeeping categories and 7%(18 cases) are categorized as environmental issue cases.

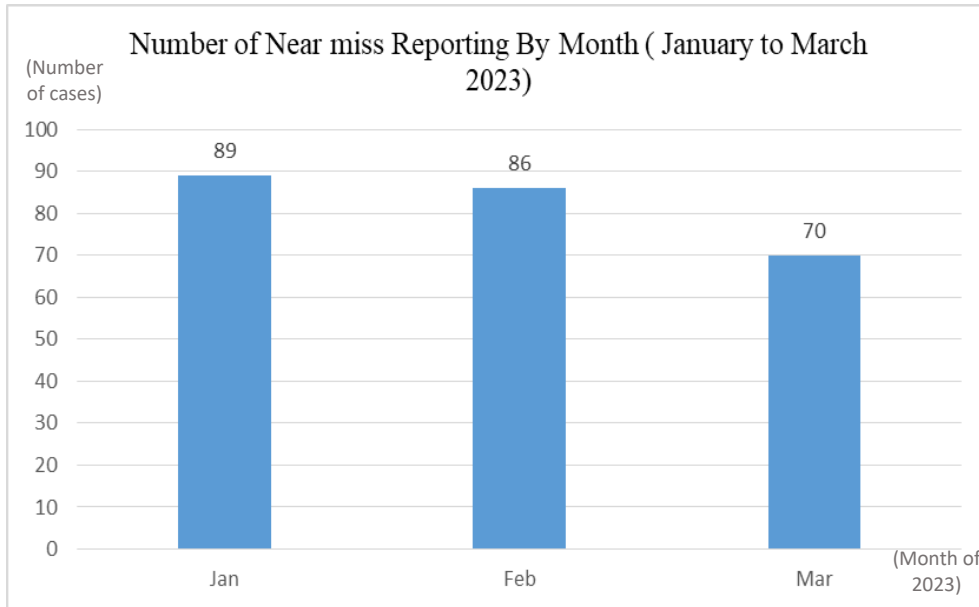


Fig. 1 Near miss accident recorded from January to March 2023

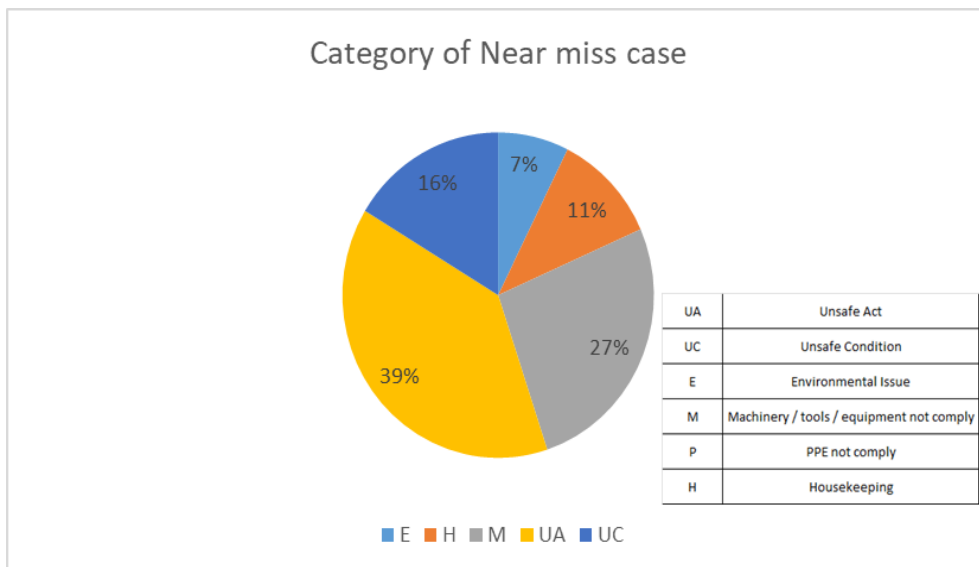


Fig. 2 Near miss accident recorded from January to March 2023 by Category

From total of 245 cases, most of the accident happen at Location A with total case of 200 cases. Meanwhile 45 cases happen at Location B as shows in Figure 3. Further analysis was conducted on specific location shows that, the highest cases reported were at workshop with total case of 79 cases. Followed by warehouse with 41 cases, stockyard with 34 cases and wharf 32 cases as show in Figure 4.

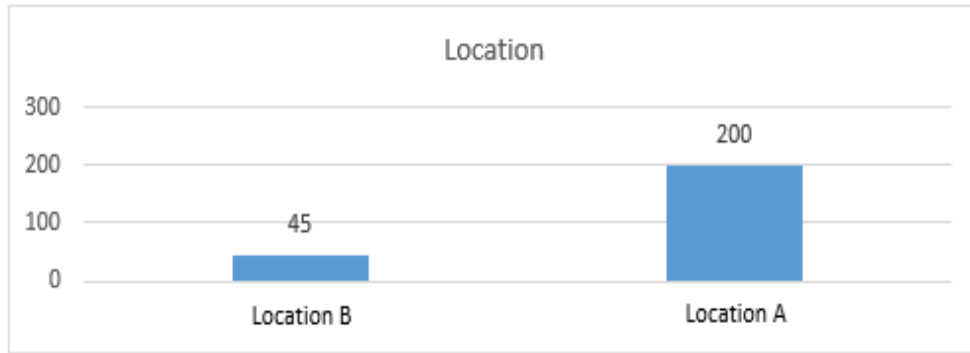


Fig. 3 Near miss accident recorded from January to March 2023 by Location

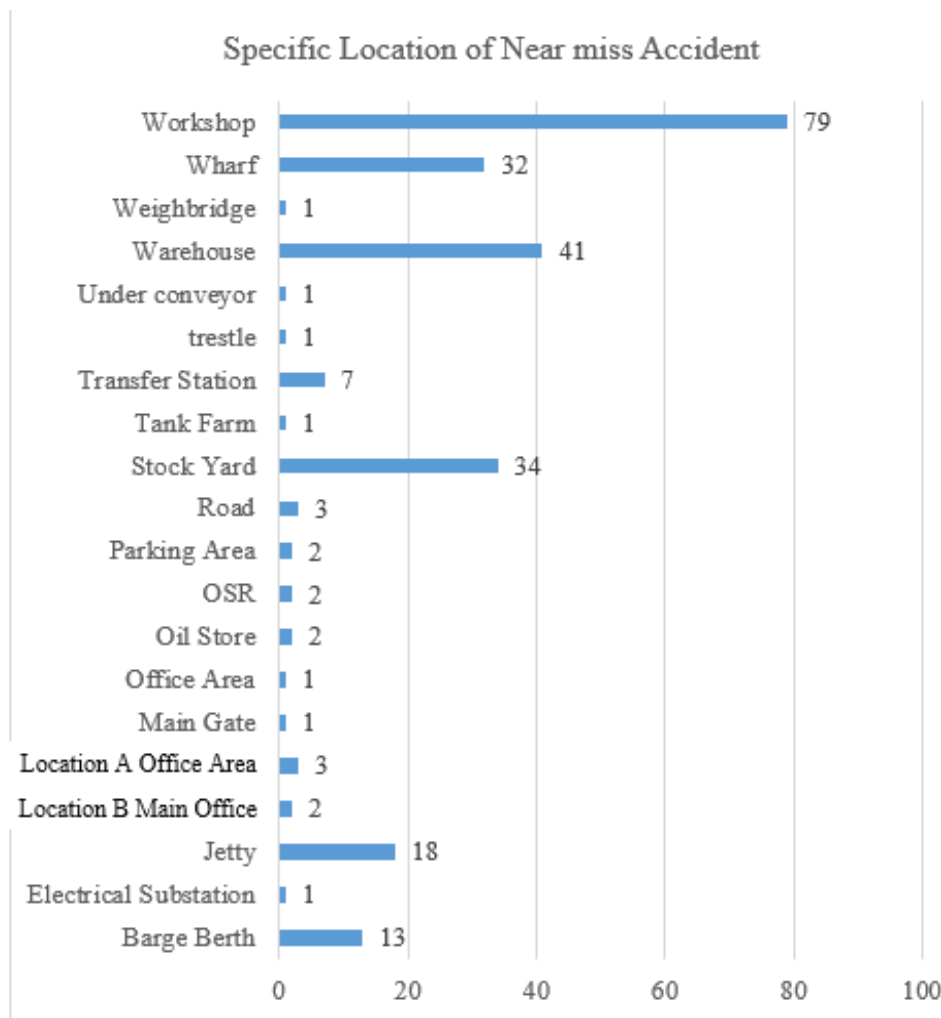


Fig. 4 Details Location of Near miss reported cases

Figure 5 shows the analysis of type of near miss accident reported. The highest near miss accident reported were not wearing Personal Protective Equipment (PPE) with total of 72 cases. Damage equipment recorded 37 cases, Housekeeping involving improper storage issues recorded 24 cases and involving procedure with 22 cases, Traffic involving vehicles park at undesignated parking area reported 15 cases. 18 cases of unsafe conditions involving obstruction of emergency response procedures were reported. Other significant near miss reported are machine with no certification of “Permit Mesin Angkat” (PMA) and “Permit Mesin Tekanan” (PMT), no permit to work for high risk activities found during inspection and workers not wearing PPE such as safety vest and safety harness while working at height are also reported.

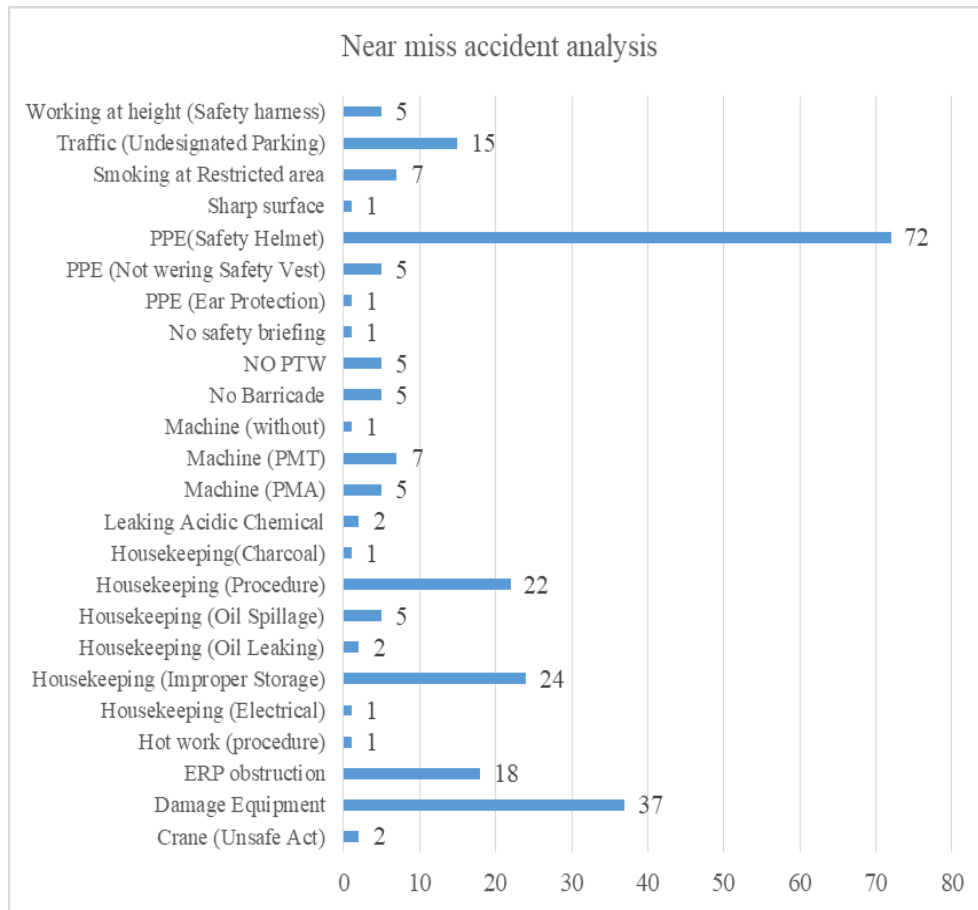


Fig. 5 Details of reported near miss cases

By collecting and analyzing statistical data on these occurrences, organizations gain insights into the root causes of accidents and near-misses. This data-driven approach enables the identification of trends, patterns, and high-risk areas, facilitating the development of targeted safety interventions. Whether it involves incidents related to machinery operation, chemical handling, or other specific tasks within the ink manufacturing process, tracking and analyzing statistics on unsafe acts and conditions empower organizations to implement preventive measures, enhance training programs, and continuously improve safety protocols. This proactive approach is instrumental in mitigating risks, reducing accidents, and fostering a culture of safety within the workplace.

3.3.2 Unsafe Act and Unsafe Condition Reporting System

An important issue that still exists in a lot of the UAUC reporting systems used today is the lack of effective data extraction capabilities. Among the challenges in the current reporting system are incomplete data capture which difficult to find trends and root causes by limiting the ability to fully analyse the circumstances for unsafe acts and unsafe conditions. This has also been raised by interviewee 1 that said:

“When we want to extract the data from current system, there are only a few parts that we get after extracting the data to Microsoft Excel which is observation ID, location, date and time, and status”. (Interviewee 1)

Besides, the failure of organizations to conduct a detailed analysis of unsafe acts and unsafe conditions situations is made more difficult by the lack of efficient data extraction technologies. Safety practitioners find it difficult to identify trends, evaluate risks, and effectively implement preventive actions when there is insufficient data. Interviewee 2 have said:

“We need to collect all the data because we want to analyse and identify trend related to unsafe acts and unsafe conditions situation that happened in our site. Estimated information for a month is approximately 100 reports”. (Interviewee 2)

This shows that they need a lot of time to extract all the data and make an analysis because there are quite a lot of reports from employees every month. This limitation reduces the effectiveness of unsafe acts and unsafe conditions reporting systems as proactive safety tools.

Manually keying in and analysing data is a traditional yet fundamental method that remains relevant in various industries, including those that involve safety management as show in Figure 6. In this process, raw data is entered into a system by safety and health officer, often using keyboards or other input devices. This method allows for meticulous attention to detail during data entry, ensuring accuracy in the recorded information. After the data is inputted, manual analysis involves the systematic review of the dataset to identify patterns, trends, and anomalies. While technological advancements have introduced automated data entry and analysis tools, the manual approach provides a hands-on understanding of the data, allowing analysts to catch nuances and contextual insights that automated processes might overlook. Despite the increasing prevalence of automated systems, manual keying in and analysis remain valuable in certain contexts, offering a personalized and nuanced perspective to inform decision-making processes within the intricate framework of safety management in this company.

Therefore, all the interviewees agreed to make an improvement against the current system. The improvement has been showed in Figure 7. This improvement will reduce their workload and save their time from copy and paste all information into Microsoft Excel. The proposed improvement will focus on process of data extraction because there are no issue related to reporting and notifying process. As per interviewee 3 and interviewee 4 has said:

“Although the current system is good for reporting process, but the system still have a problem to extract all the data. This system also not fully helpful us to analyse the data”. (Interviewee 3)

“This issue can be settle by contact the party that handle the database of the system, but, we have problems like communication because the party is from India”. (Interviewee 4)

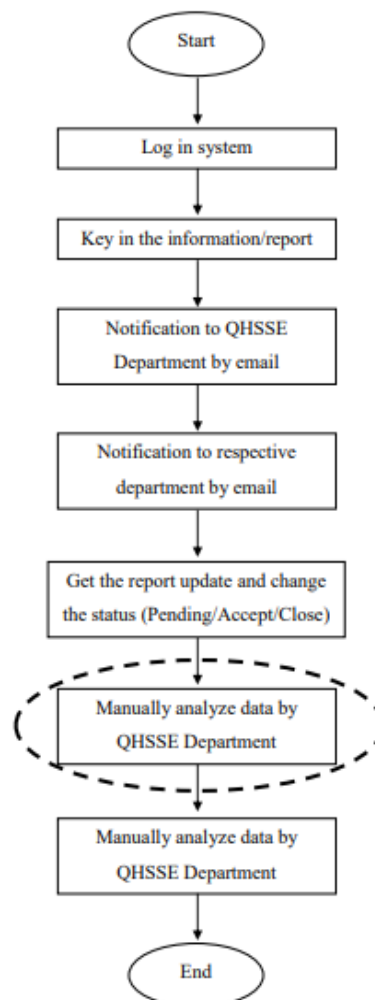


Fig. 6 Flowchart for online reporting system using current system

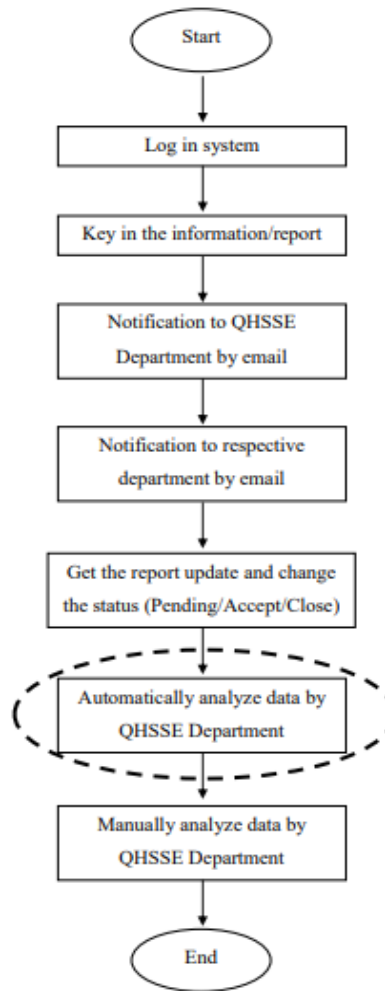


Fig. 7 Proposed for improving the online reporting system

3.4 Improvement of the System

The upgrading of the online reporting system for UAUC represents a pivotal step in bolstering safety management in this company as summarized in Table 2. The enhanced system aims to streamline the reporting process, ensuring a more efficient and user-friendly platform for employees to document and communicate safety concerns. By incorporating user feedback and technological advancements, the upgraded system facilitates seamless reporting, encouraging increased employee engagement in identifying and reporting unsafe acts or conditions.

Table 2 Proposed improvement on the current online reporting system

Proposed Upgrading	Details
User-Friendly Interface	Ensure the online reporting system has an intuitive and user-friendly interface. Simplify the reporting process with clear instructions, easy navigation, and minimal steps to encourage widespread participation.
Real-Time Notifications	Implement a system that sends real-time notifications to relevant personnel or departments when a report is submitted. This facilitates prompt responses and corrective actions, improving overall incident response time.
Feedback Mechanism	Establish a feedback loop by acknowledging reports and keeping employees informed about the actions taken. This fosters transparency and reinforces the importance of reporting unsafe acts and conditions.

Integration with Other Systems	Integrate the reporting system with other relevant systems, such as incident management or safety databases. This streamlines data analysis and ensures a more comprehensive understanding of safety trends.
Data Analysis Tools	Incorporate data analysis tools and visualizations to identify patterns and trends in reported incidents. This can aid in making informed decisions for targeted safety improvements.

Therefore, it is recommended company to make improvements to the existing system because based on feedback from IT Division, it is possible that there is coding which can be corrected or changed in the software of existing system. This is easier because it does not required much cost compared to changing the new system. The coding changes must be focused on the main issue of manually analyze to automatically analysis and followed by proposed upgrading include user-friendly interface, real-time notification, feedback mechanism, integration with other systems, and data analysis tools.

4. Conclusion

As conclusion, this study has been conducted to identify issues with current system and make an improvement for UAUC online reporting system. The key component for creating safe and healthy workplaces can be recognized as systematic OSH management [8]. Therefore, every company should have effective and efficient of UAUC system. By identifying each UAUC from the beginning, any preventive action can immediately implement and avoid accidents at workplace.

An effective and user-friendly system can assist the QHSSE Department in conducting a data analysis and presenting it to all employees, including contractors, regarding their level of workplace safety. Besides, researcher also identified the challenges faced by the QHSSE Department for data extraction and analysis. Finding patterns and trends through the analysis of unsafe acts and unsafe conditions makes it easier to create specific training programs and put preventative measures in implemented. This proactive strategy lowers the risk of accidents while promoting a good safety culture in which employees actively participate in the continuous improvement of safety regulations.

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Author Contribution

All authors of this study have a complete contribution for data collection, data analyses and manuscript writing.

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