Implementation of Safety Management of Selected Construction Companies in Manila

Reynaldo C. Carolino [1], Guillermo O. Bernabe [2], Joseph Raniel Bianes [3]

[1] *Polytechnic University of the Philippines, Manila, Philippines.* reynaldocarolino1728@gmail.com

[2] *Polytechnic University of the Philippines, Manila, Philippines.* gobernabe@pup.edu.ph

[3] *Polytechnic University of the Philippines, Manila, Philippines.* jrabianes@pup.edu.ph

Abstract: In the 1980s, the safety management system (SMS) was created to reduce material waste and the risk of accidents and fatalities in the construction industry. With the correct SMS deployment, construction companies can reduce safety-related difficulties. This study assessed the current status of construction safety management intending to determine the level of implementation of selected construction companies with category AAA in Manila, Philippines. A survey was done to determine the SMS implementation level in terms of lack of control, basic cause, immediate cause, incident, and accident. The researcher used the quantitative method of research with the survey questionnaire as the main tool in gathering data. Architects, engineers, safety officers, and skilled workers were the respondents of the study. The gathered data were statistically treated with the use of Frequency, Percentage, Weighted Mean, Kruskal Wallis, Man Whitney U-test, and Spearman Rho Correlation. The overall results showed that the level of the selected construction companies in Manila is somewhat implemented. The results of this study are helpful to the industry as well because they can improve the understanding of SMS among industry professionals and aid in better SMS deployment at work.

Keywords: Safety, Management, Implementation, Construction, Manila, Risks, Hazard.

1. INTRODUCTION

The construction industry is the third highest hazardous industrial service in the country according to the Philippine Statistics Authority. Across all industries, the three most common causes of fatal injuries accounting for more than half of fatalities in 2020-2021 continue to be workers falling from a height, being struck by a moving vehicle, and being struck by a moving object. Lack of safety training, inexperienced scaffold installers, low-quality safety walks, inappropriate tool use, improper maintenance of power equipment, and poor housekeeping are few factors affecting the level of safety management implementation among Manila's construction companies. For these reasons, proper implementation of safety management must continue to be a top priority even while the modern workplace has created new health challenges for both employees and those who have a responsibility to them. By doing the proper implementation of safety management, incidents or accidents involving employees will be avoided, outstanding performance will be rewarded with big bonuses and incentives for the personnel and management, and the owners will reap significant financial rewards. Learning and implementing construction safety measures not only reduce risks and accidents but save time during construction and reduce unexpected, accidental expenses. Therefore, the goal of this study is to assess how well safety management is implemented and used to improve construction project safety in Manila. The scope of this investigation was limited to particular building construction in Manila and is classified as General Building one and as category AAA. Only architects, engineers, safety officers, and skilled workers were included as research respondents.

1.1 Statement of the Problem

The objective of this study is to assess the implementation of safety management of selected construction companies in Manila.

Specifically, this study aims to answer the following questions:

1. What is the profile of the respondents in terms of the following:

1.1 Age;

1.2 Sex;

1.3 Position in the company; and

1.4 Years of experience?

2. How do the respondents assess the instruments of safety management of selected construction companies in terms of:

2.1 Lack of control (management);

2.2 Basic causes (origins);

2.3 Immediate causes;

2.4 Incident; and

2.5 Accident ?

3. Is there any significant difference in the assessments of the respondents on the implementation of safety management of construction companies when grouped according to profile?

4. What is the recommendation to enhance the safety management of the selected construction companies?

2. REVIEW OF LITERATURE AND STUDIES

Safety Management

On a global scale, the construction industry is large and frequently referred to as an economic organization. The sector is essential to a country's economic growth, but it currently faces many challenges that obstruct project goals and ongoing economic advancement. The high-risk industry known as construction consists of the planning, designing, building, altering, maintaining, repairing, and finally demolishing of structures, as well as civil engineering projects, mechanical and electrical engineering, and other analogous processes. The complicated industry of construction is prone to disputes, delays, and cost overruns. The construction industry possesses characteristics that, taken separately, are exclusively present in construction. (Hillebrandt, 2017).

There are several benefits to good safety performance in the construction industry, many of which are related to the effective use of safety programs. Because workplace accidents and illnesses are less common, absenteeism and turnover are fewer, productivity is higher, and employee morale is higher.

According to Rowlinson, the goals of putting safety protocols into place in construction projects are to minimize unnecessary and risky actions, to notify risks and hazards, and to make sure that incidents are recorded and handled appropriately. Companies that implement safety initiatives increase their revenues, employee morale, reputation, and the quality of their output according to Oliveira et al. (Buniya, M. K., Othman, I., Sunindijo, R. Y., Kineber, A. F., Mussi, E., & Ahmad, H., 2021).

According to Peng, R., Zhang, M., & Liu, T., (2021), The number of workers on construction sites has gradually expanded as a result of China's economy and the building and construction sector's continued expansion. In a variety of industries, China recently established rules for safe production. To fully advance their degree of comprehensive management, construction enterprises must actively pay attention to the safety supervision and management of project site construction. This is a result of the challenging nature of construction in the construction sector, the increased need for engineers, and the challenging work factors.

However, it is evident from the frequency of accidents in recent years that the enterprise engineering construction's safety management is insufficient, the required level of safety management for construction enterprises has not yet been reached, and there is not yet a culture of responsibility within the organization. Project safety adoption has an effect on the safe development of society as a whole and is linked to social stability and the acquisition of benefits for

people's lives. High altitude operations are frequent at construction sites. The building difficulty coefficient is therefore relatively high. A building site's environment is also dynamic and complicated, which poses challenges for people who work there. (Peng, R., Zhang, M., & Liu, T., (2021).

Also, according to Peng, R., Zhang, M., & Liu, T., (2021Construction sites typically have harsh working conditions, and the project's construction has poor safety performance. Building corporations are compelled to offer workers safety training while they pursue financial rewards. Businesses must make sure that construction workers can finish the construction process safely, and construction units must aggressively strengthen their own safety awareness in order to raise the safety consciousness of construction personnel.

Peng, R., Zhang, M., & Liu, T., (2021), showed that there is a lack of accountability and poor construction management on the whole. As more construction projects are being done today, engineering construction management is growing more difficult. At the construction site, there are still a lot of undiscovered dangers, some construction units are still ignorant of the problem with witnessing the safety monitoring and management of the site, and there is still no safety management in place for engineering construction.

Businesses are not paying enough attention to new kinds of potential safety threats or even operating without corresponding safety management systems, which has led to an expansion in the area of risk management. It will be difficult to achieve the goal of zero accidents if the construction unit continues to employ the standard safety management strategy because the safety management scope of the construction site will not be appropriately covered. (Peng, R., Zhang, M., & Liu, T., (2021, April)).

The use of numerous modern technology at the accident scene has also affected the potential safety issues that might have occurred there. Without comparable measures to rely on, it is challenging to secure employee safety, which in turn makes it challenging for firms to generate profits. The construction unit must therefore rationally establish safety management approaches in accordance with the actual construction conditions at various phases and diverse construction features in order to ensure the project is implemented safely. (Peng, R., Zhang, M., & Liu, T., (2021).

According to Zhang et al. (2017), the scope of construction safety management is difficult to define since there are so many safety risk factors and they cover such a broad range of topics. He claims that several scholars have attempted to differentiate between the pre-construction and construction phases of construction safety management.

The first step was leveraging the expertise of specialists or managers to identify potential hazards, which were then removed using the required preventative measures. In the second stage, he proposed that accidents may be avoided by keeping an eye on the site's machinery, personnel, and general atmosphere. Researchers found that construction safety management should gradually progress throughout the full building life cycle, conducting a comprehensive and thorough safety management, rather than being restricted to just the construction phase as they investigated more effective safety management techniques with improved safety concepts. (Zhang et al., 2017),

According to Tayeh et al.(2020), the three stages of a construction project are pre-construction, construction, and post-construction. He continued by noting that the pre-construction stage is always given priority initially in the management of a building project. Planning, designing, and tendering are considered the "upstream" activities, whereas construction is seen as the "downstream" activity. Furthermore, he indicates that worker safety and health should be prioritized by both "upstream" and "downstream" requirements.

In addition, Tayeh et al. (2020) present data demonstrating that OHS-related problems with building projects can happen at any time, not only during construction. If more effort had been made during the project's pre-construction phase, the majority of the H&S-related issues that emerged during the building phase may have been solved. Since they reduce risks at their source, H&S standards during the pre-construction stage have been recognized as an effective and successful method for managing OHS. The results of a study, which group the primary causes of accidents into three categories—poor design decisions, insufficient planning, and human error—support this assertion.

The practical definition of limiting the potential of the factors that were a source of damage is carrying out the processes that make the factors safer. OHS therefore has a substantial impact on the projects' H&S-related outcomes at the pre-construction phase. (Tayeh, B. A., Yaghi, R. O., & Abu Aisheh, Y. I. (2020))

The promotion of OHS is now essential during pre-construction procedures like planning, designing, and tendering. The safety of construction workers must be the first priority for the project manager (owner's representative), planners, and designers. (Tayeh, B. A., Yaghi, R. O., & Abu Aisheh, Y. I. (2020))

The planning and designing stages offer the chance to reduce hazards and damages before they happen on the job site. This possibility of risk mitigation declines as the project progresses. (Tayeh, B. A., Yaghi, R. O., & Abu Aisheh, Y. I. (2020))

The project manager (owner's representative) must integrate OHS throughout the pre-construction phase if he or she is to be successful. (Tayeh, B. A., Yaghi, R. O., & Abu Aisheh, Y. I. (2020)).

Basic causes (Origins)

Everyone who is trying to reduce accidents and improve safety performance is concerned about human behavior. A term that is frequently used is "Behavior and accidents are what it is all about.".

Behavioral safety, according to McSween & Moran (2017), is the application of behavioral research on human performance to the issues of workplace safety. It implies that any safety program that refers to itself as a behavioral safety program must follow the guidelines established by behavior analytic research for workplace procedures. Behavior-based safety is a promising technological advancement for the sector. It's a fantastic approach to learn about how well a company's safety management system is performing. It uses science to ascertain why people behave in certain ways when it comes to safety. If done effectively, it is also a useful next step in developing a proactive safety culture where loss prevention is a core value. Though conceptually straightforward, behavior-based safety is frequently challenging to put into practice and maintain.

Behavior-based safety (BBS), according to Christino (2020), is a procedure that uses safety observations to inform management and employees about the overall safety of the workplace. The purpose of BBS is to make employees aware of their own and their coworkers' regular safety practices. The BBS program aims to increase worker safety for the benefit of the business.

According to Dakota (2020), the term "behavioral safety in the workplace" refers to the application of research on human performance to workplace safety issues. It indicates that any safety program that calls itself a "behavioral safety program" must adhere to the standards set by behavior analytic research for workplace practices.

Each person is responsible for their own security. Everyone employed by the organization should receive training on how to conduct themselves professionally, take workplace regulations seriously, recognize potential hazards, and take precautions to avoid them. They must also notify their supervisor right soon of any mishaps, illnesses, or injuries. On the other hand, it is the responsibility of management to provide a safe and healthy working environment, personal protective equipment, train employees in safety procedures, and identify dangers. (Gonzales, 2018).

Immediate causes

According to Rafindadi et al (2022), the following were the identified workers' factors from the previous researches: individual characteristics; voluntarily doing risky activities ; rushing to complete the work; human error, and inappropriate use of controls; improper use of inoperative PPE; failure to wear PPE; inadequate knowledge of potentially hazardous situations; the unfamiliarity of workers with the working environment; unsafe action of another person(s), boisterous play among the workers, operating machines at unacceptable speed, fixing machine or equipment while in motion; work while at unsafe position or posture; failure to alert and warn; operating equipment or machine without qualification or authorization; physical and emotional stress; use of hazardous methods or procedure; failure to adhere with the safe use of materials, tools, vehicles, and machines; workers' safety mindset; lack of knowledge about safety and skill for the job; carelessness; failure to comply with work and safety procedures; and wrong judgment by workers may account for about 33% of construction fall from height. Drugs and alcohol are also the root causes or contributing factors of many accidents on the job every year. The language barrier is another factor that can cause accidents in construction sites because most construction workers are often foreigners who neither speak the local language nor understand it. (Rafindadi, A. D. U., Napiah, M., Othman, I., Mikić, M., Haruna, A., Alarifi, H., & Al-Ashmori, Y. Y., 2022).

The following elements have been recognized as falling under this category, according to Rafindadi et al. (2022): unsafe working procedures, loud and excessive noise, defective tools, equipment, supplies, and personal protective equipment (PPE); insufficient supports or guards; insufficient warning systems; apparel hazard; traffic; unsafe environmental conditions; and poor housekeeping. The complexity or difficulty of the job, which diverts workers' attention when they are working at heights, may also play a significant role in the cause of falls. Insufficient lighting during the night shifts may also affect the surrounding vision and ultimately result in falls for a location that is open 24/7. A support system malfunctioning, being struck by an object, or falling through an unprotected or concealed hole are some scenarios that might result in falls. Other risk factors include inadequate scaffolding, a lack of edge protection, hazardous building windows, a lack of edge safety during roof construction, risky renovation work, and improper ladders and hoists. According to Chi et al., the main causes of fatal falls are unsafe holes and a lack of scaffold compliance. Concerns with scaffolds include a lack of a working platform, an inadequate scaffold for the job, and a permanent obstruction for the working platform. The most common reasons for fatal fall accidents are ladders, scaffolds, tripping, and falling off a structure. Also, it was demonstrated that working too long on a damaged scaffold or ladder is one of the factors contributing to falls. Moreover, it could occur as a result of working along precarious walkways, closely to structural edges or openings, without guardrails or with the incorrect sort, unsecured stairs, slippery surfaces, or skylights.

Incident

According to the modified Domino theory model, which takes management into account, incidents begin with management's loss of control. Planning, controlling, coordinating, and directing by management are the factors that can stop incidents from happening. Vincoli divided the main causes into two groups: people factors and environmental factors. Personnel considerations include things like unrelated personal issues, mental health issues, sickness, a bad attitude, and a lack of knowledge or abilities. issues that are work-related, such as poor workmanship, regular or unusual wear and tear, inferior tools, and poor equipment design or maintenance.

According to the new model, hazardous behaviors and circumstances are signs of underlying problems that resulted from dominoes 1 and 2. Vincoli contends that the management system permits the variables to remain unchecked and improperly controlled, resulting in an event. (Y. Chen and Z. Wang, February 2021)

According to a data from the Ministry of Employment and Labor, the construction industry was responsible for 26.6% and 27.1%, respectively, of all industrial accidents in South Korea in 2018, resulting in 27,686 injuries and 570 fatalities.

Many studies of the underlying reasons were done in order to stop fatal accidents in the construction industry. Given that the majority of fatal accidents occur during the construction phase, the best way to avoid such catastrophic events is to anticipate their likely occurrence in the pre-construction phase. If fatal incidents in the construction industry are foreseen while taking into consideration the specifics of the project, significant risks may also be avoided.

The following traits apply to construction accident types. First, based on the project kind, there are different tasks. One significant fatality that occurs during building construction is called "Fall," for instance. Yet, "traffic accident" is important when there are road construction projects. As a result, the project type should be taken into account to lower the number of fatal accidents in the construction sector. The sort of labor should also be taken into account. For instance, "Fall" and "Slide" are prominent accident kinds while performing structural work that is typically done at an elevated site, but "Electric shock" is the hazard that needs to be taken into account the most when performing electrical work. Third, it's important to properly segment the accident type. There are many different kinds of tragic incidents, such as those that fall, get hit, or involve traffic.

The Work Breakdown Structure (WBS) and Risk Breakdown Structure (RBS) concepts were used in previous study that included the project, work, and accident types to evaluate fatal incidents in the construction industry. WBS stands for a group of work items in a certain project that accurately define and characterize the scope of the task. RBS is able to identify hazards in a project and calculate the amount of risk for a unit of work..

The WBS and RBS merger brings a number of advantages (i-WRBS). The risk level related to a certain unit of work can be easily ascertained first. Second, it is possible to identify the riskiest professions. Finally, decision-makers can

utilize this strategy to control risks before building begins. The WBS-RBS hierarchy can also facilitate risk management for construction projects.

Just a small number of studies, utilizing real accident data from the construction industry, have coupled WBS with RBS to date. If the decision maker describes the work being done (the "WBS") using variables that are easily identifiable and also identifies the primary accident type of fatal incident (the "RBS") for each of those work types, they can issue construction safety guidelines that focus on preventing fatal incidents for construction workers under specific and foreseeable circumstances. This study offers a system that combines WBS and RBS in order to make it simple for the decision maker to ascertain the hierarchy of fatal accidents and apply it for safety management.

Accident

Construction-related workplace fatalities decreased to 39 in 2020 from 42 the year before, while the number was still higher than the 36 average over the previous five years.

The Health and Safety Executive (HSE) recently released data showing that construction has the greatest percentage of fatal injuries overall. About four times the average for all industries, the construction sector has a higher fatal injury rate (at 1.84 per 100,000). Nonetheless, it is far lower than in forestry, fishery, waste and recycling, and these sectors.

While many staff were in fact furloughed in 2020–21 and so technically off the job, the HSE claimed that coronavirus had made it challenging to calculate injury rates. To begin, divide the total number of fatal injuries by the anticipated workforce size to get the number of fatal injuries per 100,000 workers. The HSE asserted that this measure would be beneficial even though it would overestimate the number of persons who were genuinely employed in 2020–21.

In terms of job status, the HSE discovered that 35% of those killed in construction accidents in 2020/21 were self-employed and that 65% of those deceased were employees.

Workers being struck by moving objects (17), being struck by a moving vehicle (25) and falling from heights (35), which together accounted for more than half of fatalities in 2020/21, continue to be the three most common causes of fatal injuries across all industries.

Meanwhile around 30% of fatal injuries in 2020/21 involving workers aged 60 or over, even though such workers only make up around 11% of the workforce.

Mesothelioma, a cancer brought on by prior asbestos exposure, caused 2,369 deaths in Great Britain in 2019, which was 7% fewer than the 2,540 deaths per year average over the previous seven years.

"Although the modern workplace has brought up new health issues for both workers and those who have a responsibility to them, safety must still come first," said Sarah Albon, chief executive of the HSE. Even though the situation has significantly improved over time and Great Britain is one of the safest places to work in the world, we are committed to making workplaces as safe as possible and making sure that employers are held accountable and take their responsibilities seriously. (Construction deaths fall in 2020/21 - Construction Management)

Even if the modern workplace has created new health challenges for both employees and those who have a responsibility to them, safety must remain a top priority. Although if the situation has substantially improved over time and Great Britain is one of the safest places to work in the world, every fatality at work is heartbreaking. We are committed to enhancing workplace safety and ensuring that employers are held responsible and take their duties seriously.

There are many different reasons why accidents might occur on construction sites. The most common causes of death for construction workers were falls, followed by being struck by an instrument, electrocution, and being imprisoned. 56% of accidents involve falls from heights, 21% involve getting trapped by toppling or collapsing objects, 10% involve being hit by a moving vehicle, 4% involve being hit by a flying or falling object while using a material-lifting machine, 3% involve coming into contact with moving machinery or material that is being machined, and 1% involve being exposed to a hot or dangerous substance. (Thanaraj, M. S., & Priya, M., 2019)

According to the Department of Safety and Health in Malaysia, the Consolidated Table of Construction Accidents for June 2019 indicates 43 accidents and 46 fatalities. The bulk of them involved falling from a height, while there were also substantial injuries from collapse incidents and object collisions. Building companies can use this information,

which is based on yearly accidents, to promptly stop the development of safety calamities. This helps uncover solutions to the accident's underlying causes and ensure the safety of every construction worker. This can help address the current problems with managing safety on construction sites and advance the project's successful conclusion.

Table 1. Consolidated Table of Construction Accidents in June 2019

Serial No.	Reason	Deaths/Person	No. of Accidents / Time
1	Fall from height	22	22
2	Collapse accident	9	6
3	Other accidents	3	4
4	Object strike	8	8
5	Mechanical Damage	1	1
6	Lifting injury	2	2
	Total	**46**	**43**

The level of enterprise safety consciousness is low. The bulk of construction businesses currently have a poor foundation in terms of safety awareness. Additionally, the majority of contemporary engineering construction uses cutting-edge techniques, materials, and other building processes. Yet, because migrant workers make up the majority of the construction workforce, businesses are unable to promptly offer safety training and instruction. In general, the approval process for new building is drawn out. The unit neglected to organize corresponding safety drills and perform safety training for construction employees. Also, the construction site's implementation of fire protection and accident prevention was weak.

As a result, if the occurrence happens unexpectedly, staff members are unable to stop the injuries caused by the accident in time. Before starting construction, some companies also neglected to create an acceptable emergency plan, and the safety protection equipment failed to perform the inspection in accordance with the stated standards, resulting in inferior safety protection equipment.

Also, some firms have a tendency to cut the expense of security work in order to maximize the organization's financial gains. This will compromise security because it violates the requirements for using protective equipment. The majority of the safety variables that cause accidents on construction sites are represented in Table 2. Up to 50% of them were height-related falls, whereas 22% involved object strikes, 10% collapse, 11% mechanical damage, and 5% drowning. Hence, the construction unit must put measures in place in accordance with the reasons of its own engineering project accidents in order to reduce the possibility of engineering accidents. This can guarantee that workers can finish the project inside a safe window, advancing the manufacturing implementation process.

Table 2. Safety factors caused by accidents

Safety Factors	Fall from height	Object strike	Collapse accident	Mechanical damage	Drown
Occupy ratio	50%	22%	12%	11%	5%

According to data reported in the literature, managerial issues, unsafe site conditions, and workers' risky behaviors are the leading causes of construction accidents in many countries throughout the world. In Malaysia's construction sector, management variables, risky site circumstances, environmental concerns, and the uniqueness of the business are the key accident-causing elements. The main causes of fatal accidents in Singapore are unsafe worker behavior and managerial issues. The distinctive nature of the industry, poor management, dangerous worker conduct, unsafe workplace conditions, and major construction accident rates in Thailand are all factors. In According to research conducted in the UK, the primary causes of occupational accidents are worker behaviors, hazardous site conditions, the type or state of the commodities used on-site, and a lack of risk management competence. Construction accidents in Kuwait are mostly brought on by employee issues, management issues, unsafe site conditions, and the industry's unique traits. In the US, factors relating to employees, management, unsafe site conditions, physical features, and

industry-specific characteristics can contribute to injuries and fatal accidents. The primary causes of construction-related injuries and fatal accidents in Taiwan are unsafe working conditions, workers' unsafe behavior, the nature of the project, company size, and management failure. In Spain, management and human factors are the primary causes of deadly construction accidents. Only management factors, hazardous site conditions, and workers' risky behaviors were taken into consideration in the study based on the intersection of the above-mentioned criteria under examination and the investigated fatal accident reports from the safety and health department. Malaysia (DOSH).

The management factors include workers working at high elevations without adequate safety measures in place, a lack of technical guidance, a lack of competent project managers, a lack of safety management manuals, an inadequate supply of first aid supplies, a lack of management commitment, and a lack of stringent operating procedures; not providing the required PPE for the job; weak method for quality control; team behavior; tradition of the industry; provision of unsafe/defective/faulty tools, vehicles and machines; negligence; lack of pre-construction safety planning; incorrect or no work procedures; poor management of the site; inability of management to predict potential hazards; and pressure on the workers from their site supervisors to accelerate job on-site most especially in the afternoon causes fall from height. (DOSH Malaysia)

Higher education institutions (HEIs) are widely viewed in the Philippines as safe havens where young people can discover brilliant ideas, make lifelong connections, and gain knowledge. The creation of a learning environment that enables students to take in as much information as their brains can handle is headed by a student-friendly institution. It is the kind of environment that promotes children's healthy development, equips them with knowledge and skills they will use throughout their lives, and gets them ready to be responsible and helpful members of their community and society.

The number of safety incidents at schools has, according to research, steadily increased over time. From 69,487 incidents in 2009 to 77,496 incidents in 2010, 86,468 incidents in 2011, 100,365 incidents in 2012, 105,088 incidents in 2013, 116,527 incidents in 2014, and 116,527 incidents in 2015, the number of incidents has increased over time. The Philippines' occupational safety and health standards were established in 1978 in accordance with the requirement imposed by the constitution to safeguard workers' social and economic well-being as well as their physical safety and health. The 1978 Standard is regarded as a turning point in Filipino labor and social legislation because it was accepted through the tried-and-true democratic method of tripartism. (OSH Standards, 1989).

On the other hand, the Commission of Higher Education (CHED) CHED and its regional commissioners, trustees of state colleges and universities, and leaders of private schools nationwide have been urged to ensure that "preventive and protective" measures are put into place to ensure the safety of students and teachers. Furthermore, it was stated in Republic Act (RA) No. 7722, commonly referred to as the Higher Education Act of 1994, Batas Pambansa 232, and Resolution No. 321-2013 that CHED is wholly committed to supporting high-quality, applicable, and successful higher education in the Philippines. Yet, under memorandum instructions that were focused exclusively on engineering initiatives, standard safety measures were not given significant weight in CHED's rules, regulations, and standards.

However, the CHED Memorandum Order No. 40, Series 2008, which was registered at the Office of the National Administrative Registrar (ONAR) on October 17, 2008, and published in the Official Gazette on November 24, 2008, placed a strong emphasis on the safety-related requirements that apply to private higher education institutions. (Ermita, P., & Florencondia, N. September 2019)

The Philippines' president, Rodrigo Duterte, has signed a bill that guarantees workers' comprehensive protection from all occupational hazards and promotes a safe and healthy workplace. Republic Act (RA) 11058 ensures that the requirements of the labor code, federal laws, and internationally acknowledged standards for occupational safety and health (OSH) are adequately enforced and followed by companies. The aforementioned regulation mandates that every person who manages, regulates, or supervises the work ensure that employees are safe at work. There shouldn't be any hazardous conditions where employees run the risk of passing away, getting sick, or suffering physical harm.

3. RESEARCH METHODOLOGY

A quantitative approach and a descriptive research methodology were utilized by the researcher to identify and assess the concerns found in this study. Descriptive research is a type of analysis that focuses on describing the characteristics of the population or issue under study.

Architects, engineers, safety officers, and skilled employees all responded to the poll. Age, sex, position, and years of experience were all taken into consideration while choosing them. Respondents were chosen from both the public and private sectors at the chosen construction enterprises.

The researcher used the following tools in this study to collect all the information required to address the study's specific issues, which fell under the following domains: lack of control (management), fundamental causes (origins), immediate causes (symptoms), incident (an event that could endanger people or property), and accident (loss of properties, people, processes).

After the instruments were developed and validated, the following information were gathered: first, the respondents from the selected construction companies were identified; second, they were informed that a survey questionnaire would be sent to them via Messenger, email, Google Form, and printed instruments; third, the completed survey questionnaire was followed up via Messenger, email, phone call, and personal visit at the site; and fourth, the completed survey questionnaires were retrieved.

In this paper, the Non-Probability Sampling approach was used. The researcher selected the purposive sampling type, using his discretion to choose participants from the population to participate in the study (Crossman, 2018).

The sample size computation made use of the Raosof Calculator. The values were entered into the Raosof Calculator's fields in the following order: 1. How much room for error can you afford? (5% were chosen by the researcher) 2. What level of assurance do you require? (The researcher made a 95% decision). 3. How many people live there? (Because the population number is uncertain, the researcher used a sample size of 20,000) 4. What is the response distribution? (The researcher chose a response of 50 responses). When all the required information had been entered, the final field showed a suggested sample size of 377.

The architects, engineers, safety officials, and skilled workers of the selected construction firms in Manila made up the study's population. They were chosen as respondents because they met the requirements for this study.

The researcher used a survey questionnaire as a tool to collect all the information necessary to respond to the study's unique questions. Part I of the questionnaire covers the profile of the respondents in terms of age, sex, position, and year of service. Part II includes the respondents' assessment of the safety management implementation of the construction companies in terms of lack of control (management), basic causes/origins (basic causes: 1-personnel factors, 2-job factors), immediate causes/symptoms (unsafe act and condition), incident (the event that could harm either people or property), and accident/loss (properties, people, processes).

The researcher utilized the following modified Five Point Likert Scale with the response mode and numerical equivalent.

After the validation of the survey questionnaire, the researcher sought approval and asked permission from his adviser to distribute and retrieve the questionnaire to the respondents from the selected construction companies in Manila via Messenger, Google form, and via email. The data collected were tabulated in MS excel. Statistical tools were applied for analysis and interpretation.

In analyzing the data gathered, descriptive and inferential statistical tools were utilized to the following statement of the problem. The statistical treatment of data was descriptive and used the mean in computing the average of the data and utilized standard deviation in measuring dispersion around the mean. The statistical treatment of data was descriptive and used the mean in computing the average of the data and utilized standard deviation in measuring dispersion around the mean. The test used for the normality of data was the Shapiro-Wilk W test. The statistical tools used were Kruskal-Wallis H – test and the Mann-Whitney U test for not normally distributed data. These were used in concluding the significant differences in population means since there were more than two comparison groups involved.

4. RESULTS AND DISCUSSIONS

This chapter presents the summary of findings, conclusions and recommendations derived in the conduct of the study which is to assess the implementation of safety management of selected construction companies in Manila.

The respondents were architects, engineers, safety officers and skilled workers of the selected construction companies in Manila. They were selected using purposive sampling and it employed quantitative research. Pertinent data were obtained through survey questionnaires. The statistical data used were percentage, mean and Kruskal-Wallis H – test and Mann-Whitney U test. The tool used to test the normality of the data was Shapiro-Wilk W test.

The findings of the study were summarized according to the statement of the problem stated in Chapter 1.

1. Profile of the respondents in terms of age, sex, position, and years of experience.

    1.1. The age bracket 25 years old & below posted the highest percentage which is 39.42% or 149 respondents and the lowest percentage is 3.17% or 12 respondents are aged 56 years old & above.

    1.2. In terms of sex, the male respondents dominated the survey with 84.39% or 319 respondents out of 378 of the total respondents.

    1.3. In terms of position, the skilled workers have the highest percentage which was 64.81% or 245 respondents and the lowest percentage is 3.44% or 13 safety officers.

    1.4. For years of experience, the highest percentage is 60.32% or 228 respondents with 5 years & below of experience in the industry and the lowest percentage is 2.38% or 9 respondents under the 26 years & above bracket.

2. Respondents' assessment in the implementation of safety management of selected construction companies in terms of lack of control (management), basic causes, immediate causes, incident and accident.

    2.1. The respondents' assessment on the safety management of selected construction companies in Manila according to Lack of Control is "Implemented" as manifested also on the grand mean of 3.99.

    2.2. The respondents' assessment on the safety management of selected construction companies in Manila according to Basic Causes is "Implemented" as manifested also on the grand mean of 3.85.

    2.3. The respondents' assessment on the safety management of selected construction companies in Manila according to Immediate Causes is "Implemented" as manifested also on the grand mean of 4.01.

    2.4. The respondents' assessment on the safety management of selected construction companies in Manila according to Basic Causes is "Implemented" as manifested also on the grand mean of 3.85.

    2.5. The respondents' assessment on the safety management of selected construction companies in Manila according to Incidents is "Implemented" as manifested also on the grand mean of 4.11.

    2.6. The respondents' assessment on the safety management of selected construction companies in Manila according to Accidents is "Implemented" as manifested also on the grand mean of 3.99.

3. Significant difference in the assessments of the respondents on the implementation of safety management of construction companies when grouped according to profile.

    3.1. The respondents' assessment on the safety management of selected construction companies in Manila in terms of Lack of Control according to profile is significant only on the position of the respondents since the computed p-value (0.0035) is less than the set level of significance at 0.05 which statistically means that we abled to accept the null hypothesis. While the other profiles are not significant. This indicates that the position of the respondents matters on their assessment.

    3.2. The respondents' assessment on the safety management of selected construction companies in Manila in terms of Basic Causes according to profile is significant only on the position of the respondents since the computed p-value (0.0138) is less than the set level of significance at 0.05 which statistically means that we abled to accept the null hypothesis. While the other profiles are not significant. This indicates that the position of the respondents matters on their assessment.

3.3. The respondents' assessment on the safety management of selected construction companies in Manila in terms of Immediate Causes according to profile is significant only on the position of the respondents since the computed p-value (0.0003) is less than the set level of significance at 0.05 which statistically means that we abled to accept the null hypothesis. While the other profiles are not significant. This indicates that the position of the respondents matters on their assessment.

3.4. The respondents' assessment on the safety management of selected construction companies in Manila in terms of Incidents according to profile is significant only on the sex and position of the respondents since the computed p-values (0.0035 and 0.0054) are less than the set level of significance at 0.05 which statistically means that we abled to accept the null hypothesis. While the other profiles are not significant. This indicates that the sex and position of the respondents matters on their assessment in.

3.5. The respondents' assessment on the safety management of selected construction companies in Manila in terms of Accidents according to profile is significant only on the sex and position of the respondents since the computed p-values (0.0112 and 0.0002) are less than the set level of significance at 0.05 which statistically means that we abled to accept the null hypothesis. While the other profiles are not significant. This indicates that the sex and position of the respondents matters on their assessment.

This chapter presents the discussions of statistical tables, analysis and interpretations of data gathered through the questionnaire's devised by the researchers for this study. Also, this chapter provides the statistical data relative to the problems posted in the Statement of the Problem (SOP) in chapter 1. The data found in this chapter were arranged according the problems treated in this study.

1. What is the Profile of the Respondent?

Table 4. Profile of the respondents according to their Age Bracket

Age Bracket	Frequency	Percentage
25 years old - below	149	39.42
26 – 35 years old	105	27.78
36 – 45 years old	67	17.72
46 – 55 years old	45	11.90
56 years old - above	12	3.17
Total	**378**	**100.00**

As shown in Table 4, the age bracket 25 years old & below posted the highest percentage which is 39.42% or 149 respondents out of 378 of the total respondents. The second highest is 27.78% or 105 respondents out of 378 of the total respondents. The third highest is 17.72% or 67 respondents out of 378 of the total respondents. The fourth highest is 11.905 or 45 respondents out of 378 of the total respondents. On the other hand, lowest percentage is 3.17% or 12 respondents are aged 56 years old & above.

Table 5. Profile of the respondents according to Sex.

Sex	Frequency	Percentage
Male	319	84.39
Female	59	15.61
Total	**378**	**100.00**

*Used Mann Whitney U test

Table 5 shows the percentage respondents in terms of sex. From those that had been surveyed, the male respondents dominated the survey with 84.39% or 319 respondents out of 378 of the total respondents. The percentage of female is 15.61% or 59 respondents out of 378 of the total respondents.

Table 6. Profile of the respondents according to Position in the Company.

Position in the Company	Frequency	Percentage
Architect	14	3.70
Engineer	106	28.04
Safety Officer	13	3.44
Skilled Worker	245	64.81
Total	**378**	**100.00**

As presented in Table 6, the highest percentage is 64.81% or 245 respondents which is dominated by the skilled workers out of the 378 total respondents. The second highest percentage is 28.04% composed of engineers with 106 respondents. The third highest percentage is 3.70 or 14 architects out of 378 of the total respondents. The lowest percentage is 3.44% or 13 safety officers out of 378 respondents.

Table 7. Profile of the respondents according to Years of Experience.

Years of Experience	Frequency	Percentage
5 years - below	228	60.32
6 – 10 years	82	21.69
11 – 15 years	28	7.41
16 – 20 years	16	4.23
21 – 25 years	15	3.97
26 years - above	9	2.38
Total	**378**	**100.00**

As shown in table 7, the highest percentage is 60.32% or 228 respondents with 5 years & below of experience in the industry. The second highest percentage is 21.69% or 82 respondents with the age bracket of 6-10 years of experience. The third highest percentage is 7.41% with 28 respondents under the bracket of 11-15 years of experience. The fourth highest percentage is 4.23% or 16 respondents under the bracket of 16-20 years of experience. The fifth highest percentage is 3.97% or 15 respondents under the bracket of 21-25 years of experience. The lowest percentage is 2.38% or 9 respondents under the 26 years & above bracket.

2. How do the respondents assess the implementation of safety management of selected construction companies in terms of lack of control (management), basic causes, immediate causes, incident and accident?

Table 8. Mean Distribution of the respondents according to their assessment of safety management of selected construction companies in Manila according to lack of control.

ITEMS	MEAN	VERBAL DESCRIPTION
Lack of control (Management)		
Management proactively plan on safety for workers by providing orientation on Safe Working Method Statements (SWMS) prior to deployment at site	4.05	Implemented
The management dedicated a safety officer at construction site as per OSHA requirement	4.07	Implemented
The management provided PPE's to the employee as per RA 11058	4.03	Implemented
The safety officer conducted safety orientation prior to deployment of manpower at construction site	4.10	Implemented

ITEMS	MEAN	VERBAL DESCRIPTION
Lack of control (Management)		
The management provided COSH training to project engineers and supervisors assigned at site	3.77	Implemented
The management maintains its high level of hazard awareness especially during graveyard shift	3.91	Implemented
The company provides complete tools and equipment to the workers at site	4.08	Implemented
Calibration of tools conducted regularly by the management	3.90	Implemented
Communication apparatus such as walkie-talkie and the likes were provided at site and during operations by the management	3.94	Implemented
Regular safety walk conducted by the project manager or project engineer to the workers at construction site	3.87	Implemented
Project engineer provided visible safety warnings at construction site	4.18	Implemented
Project engineer provided visible safety warnings at construction site	4.12	Implemented
Toolbox meetings conducted every morning at construction site	4.05	Implemented
Scaffoldings/ladders are complete and are defective free and are calibrated and are installed by competent and by trained personnel	3.83	Implemented
GRAND MEAN	**3.99**	**Implemented**

Legend: *"Not Implemented (1.00 – 1.80)", "Less Implemented (1.81 – 2.60)", "Somewhat Implemented (2.61 – 3.40)", "Implemented (3.41 – 4.20)", "Fully Implemented (4.21 – 5.00)"*

Above table shows that most of the respondents' assessment on the safety management of selected construction companies in Manila according to the domain "lack of control" is "Implemented" as manifested also on the grand mean of 3.99. Items 1 to 14 under the domain "lack of control" have a verbal description of "Implemented" however based on the definition set in the Likert Scale that if the total rating per item consists of more than 5 ratings lower than 4, the level of implementation will be downgraded to the next level which is "Somewhat Implemented". Based on the data gathered, all of the items have a weighted mean under domain "lack of control" have more than 5 ratings lower than 4 therefore the level of implementation on this domain is "Somewhat Implemented".

Item 1.11 "Project engineer provided visible safety warnings at construction site" posted the highest mean with a rating of 4.18. Most of the sites that the researcher visited have tarpaulins on safety and/or warning signs that are visible near the entrance gate however the researcher observed that most of the projects have insufficient visibility of warning signs within the construction site. It is therefore recommended to place additional, essential safety or warning signs in strategic spots throughout the construction site.

The lowest mean is under item 1.5 "The management provided COSH training to project engineers and supervisors assigned at site". Among the 14 items under the lack of control of the management with a mean of 3.77. The researcher recommends to the company to hire architects and engineers with certificate on COSH training or the company should invest to engineers and supervisors that are being hired with no COSH training yet by providing them training that eventually reap rewards in many forms including financial aspect. According to Buniya et al 2021, "there are numerous benefits of good safety performance in the construction industry associated with the effective implementation of safety programs."

Table 9. Mean Distribution of the respondents according to their assessment of safety management of selected construction companies in Manila according to basic cause

ITEMS	MEAN	VERBAL DESCRIPTION
Basic Causes (Personnel factors and Job factors)		
Workers have completed training on the proper usage of tools and equipment to be used at site	3.94	Implemented
Workers have conducted proper maintenance of tools regularly	3.76	Implemented
Provided complete fall protection for workers on elevated structures	4.02	Implemented
Provided protection for people on the ground from falling objects	4.08	Implemented
Provided missing guards or protections on power tools	3.97	Implemented
Management conducted daily exercise every morning to monitor their health prior to deployment of workers to their respective assignments	3.74	Implemented
Workers were trained to apply 5'S at site. (Sort, set in order, Shine, Standardize, Sustain)	3.60	Implemented
Workers were trained to handle toxic substance for their safety as per MSDS (Material Safety Data Sheet) guide.	3.65	Implemented
GRAND MEAN	**3.85**	**Implemented**

Legend: *"Not Implemented (1.00 – 1.80)", "Less Implemented (1.81 – 2.60)", "Somewhat Implemented (2.61 – 3.40)", "Implemented (3.41 – 4.20)", "Fully Implemented (4.21 – 5.00)"*

Table above shows that most of the respondents' assessment on the safety management of selected construction companies in Manila according to Basic Causes is "Implemented" as manifested also on the Grand mean of 3.85. Items 1 through 14 in the domain of "Basic Causes" have verbal descriptions of "Implemented," but according to the definition established in the Likert Scale, the level of implementation will be downgraded to the next level, which is "Somewhat Implemented," if the total rating per item consists of more than 5 ratings lower than 4. According to the data acquired, the domain "Basic Causes" has a "Somewhat Implemented" degree of implementation because all of the items have a weighted mean under that domain and more than five items have scores below 4.

Item 2.4 "Provided protection for people on the ground from falling objects" shows the highest mean among the 8 items with a rating of 4.08 with a verbal description of "Implemented". Items 1 through 8 in the domain "Basic Causes" have a verbal description of "Implemented," but according to the definition established at the Likert Scale, the level of implementation will be downgraded to the next level, which is "Somewhat Implemented," if the total rating per item consists of more than 5 ratings lower than 4.

Based on the data gathered, if items have a weighted mean under domain "Basic Causes" have more than 5 ratings lower than 4 therefore the level of implementation on this domain is "Somewhat Implemented". The researcher spoke with a safety officer by chance in one of the construction sites, and learned that the nearby building site does not fully comply with the requirements for protecting those working on the ground from falling objects. He told the researcher that he would discuss the problem with the safety officer of the adjoining building in order to avoid any potential harm or mishap. Also, the researcher physically witnessed a piece of steel fall from the sky during a construction project and land close to where they were standing. In another occasion, his men were working in the pit when falling debris from a higher floor poured into the pit below where they were working. The work was immediately stopped, and the superintendent was informed of the occurrence. He also gave advice to everyone working on higher floors to clean and clear out every shaft entrance door of any material.

The lowest mean under the domain "Basic Causes" is Item 2.7 "Workers were trained to apply 5'S at site. (Sort, set in order, Shine, Standardize, Sustain)" with a rating of 3.60 with a verbal description of "Implemented". Items 1 through 8 in the "Basic Causes" domain have verbal descriptions of "Implemented," but in accordance with the definition

outlined in the Likert Scale, the level of implementation will be downgraded to the following level, which is "Somewhat Implemented," if the item is composed of more than 5 ratings lower than 4. The data gathered show that the ratings on this item have more than 5 lower than 4 therefore the verbal description for this item is “Somewhat Implemented”.

According to DOLE-OSCH, the 5S, a Japanese concept that aims to optimize time for production, is a very practical, simple and proven approach to improving housekeeping in the workplace. Housekeeping is important because it lessens accidents and related injuries and illnesses. It therefore improves productivity and minimizes direct/indirect costs of accidents/illnesses. Housekeeping means putting everything in its proper place. It is everybody’s business to observe it in the workplace.

Table 10. Mean Distribution of the respondents according to their assessment of safety management of selected construction companies in Manila according to “Immediate Causes”

ITEMS	MEAN	**VERBAL DESCRIPTION**
Immediate Causes		
PPE is complete and appropriately and properly worn by the workers always	3.98	Implemented
Only qualified or authorized personnel operated the tools and equipment at site	4.07	Implemented
Workers use tools or equipment that are calibrated and properly working	3.97	Implemented
Workers use tools or equipment that have protection, warning devices and without bypassing safety warnings.	3.98	Implemented
Workers focus on work and do not indulge in horseplay at work	4.01	Implemented
Cellphones were allowed to use by the workers as necessary at construction site	3.60	Implemented
Holes are properly and safely secured at construction site	4.19	Implemented
Sufficient lighting is provided at construction site	4.21	Fully Implemented
Rail guards are provided at construction site	4.05	Implemented
There are assign guards during point of operation	3.90	Implemented
Workers should stay out under a suspended load	4.14	Implemented
Always start machinery with warning devices	4.06	Implemented
GRAND MEAN	**4.01**	Implemented

***Legend**: “Not Implemented (1.00 – 1.80)”, “Less Implemented (1.81 – 2.60)”, “Somewhat Implemented (2.61 – 3.40)”, “Implemented (3.41 – 4.20)”, “Fully Implemented (4.21 – 5.00)”*

Above table shows that most of the respondents’ assessment on the safety management of selected construction companies in Manila according to Immediate Causes is “Implemented” as manifested also on the Grand mean of 4.01. Items 1 through 12 in the "Immediate Causes" domain have verbal descriptions of "Implemented," but in accordance with the definition given in the Likert Scale, the level of implementation will be downgraded to the next level, "Somewhat Implemented," if the total of all ratings for each item is made up of more than 5 ratings below 4. The data collected indicate that ratings consist of more than 5 ratings lower than 4 therefore the level of implementation for the domain “Immediate Causes” is Somewhat Implemented.

The highest rating among the 12 items under the “Immediate Causes” is item number 3.8 “Sufficient lighting is provided at construction site” with a mean of 4.21 and with a verbal description of “Fully Implemented”. But in accordance with the definition given in the Likert Scale, the level of implementation will be downgraded to the next level, " if the rating per item obtained from the respondents consists of more than 5 ratings lower than 4. Based on the data gathered, the line item has more than 5 scores lower than 4 therefore the verbal description for this item is “Implemented”.

The lowest rating among the 12 items under the “Immediate Causes” is item number 3.6 “Cellphones were allowed to use by the workers as necessary at construction site” with a rating of 3.60. and with a verbal description of

"Implemented". Based on the data gathered, the line item number 3.6 has more than 5 scores lower than 4 therefore the verbal description for this item is downgraded to "Somewhat Implemented".

Table 11. Mean Distribution of the respondents according to their assessment of safety management of selected construction companies in Manila according to "Incident"

ITEMS	MEAN	VERBAL DESCRIPTION
Incidents		
Incidents or near misses are immediately reported within 24 hours to the project manager by the workers at site	4.20	Implemented
Incidents and near misses are discussed immediately at the safety meting or toolbox meetings to avoid its recurrence	4.08	Implemented
Identified potential occurrence of incidents in advance in the pre-construction phase by the management	4.01	Implemented
Incidents risk level for a certain unit of work are identified proactively	4.00	Implemented
Management Enforce mandatory break times to workers	4.25	Fully Implemented
GRAND MEAN	**4.11**	**Implemented**

Legend: *"Not Implemented (1.00 – 1.80)", "Less Implemented (1.81 – 2.60)", "Somewhat Implemented (2.61 – 3.40)", "Implemented (3.41 – 4.20)", "Fully Implemented (4.21 – 5.00)"*

Above table shows that most of the respondents' assessment on the safety management of selected construction companies in Manila according to Immediate Causes is "Implemented" as manifested also on the Grand mean of 4.11. Items 1 through 5 in the domain "Incidents" have verbal descriptions of "Implemented," but in accordance with the definition given in the Likert Scale, the level of implementation will be downgraded to the next level, "Somewhat Implemented," if the total of all ratings for each item is made up of more than 5 ratings below 4. The data collected indicate that ratings consist of more than 5 ratings lower than 4 therefore the level of implementation for the domain "Incidents" is "Somewhat Implemented."

The highest rating among the 5 items under the "Incidents" is item number 4.5 "Management Enforce mandatory break times to workers" with a mean of 4.25 and with a verbal description of "Fully Implemented". But in accordance with the definition given in the Likert Scale, the level of implementation will be downgraded to the next level, " if the rating per item obtained from the respondents consists of more than 5 ratings lower than 4. Based on the data gathered, the line item 4.5 has more than 5 scores lower than 4 therefore the verbal description for this item is "Implemented".

The lowest rating among the 5 items under the "Incidents" is item number 4.4 "Incidents risk level for a certain unit of work are identified proactively" with a rating of 4.0 and with a verbal description of "Implemented". Based on the data gathered, the line item number 4.0 has more than 5 scores lower than 4 therefore the verbal description for this item is downgraded to "Somewhat Implemented".

Table 12. Mean Distribution of the respondents according to their assessment of safety management of selected construction companies in Manila according to "Accident"

ITEMS	MEAN	VERBAL DESCRIPTION
Accidents		
Scheduled regular safety meetings to ensure the new employees are aware of safety measures	4.03	Implemented
Communication Day on safety is being held regularly	3.95	Implemented
Taking note of previous accidents where, when, and how the accident occurred and are used during toolbox meetings	3.99	Implemented

ITEMS	MEAN	VERBAL DESCRIPTION
Accidents		
Company reviewed the occurrence of accidents during the construction process to avoid similar situations next time	3.98	Implemented
Management preserved any accident evidence that may be needed for proper investigation and in claiming damages	4.02	Implemented
GRAND MEAN	**3.99**	**Implemented**

Legend: *"Not Implemented (1.00 – 1.80)", "Less Implemented (1.81 – 2.60)", "Somewhat Implemented (2.61 – 3.40)", "Implemented (3.41 – 4.20)", "Fully Implemented (4.21 – 5.00)"*

Above table shows that most of the respondents' assessment on the safety management of selected construction companies in Manila according to "Accidents" is "Implemented" as manifested also on the Grand mean of 3.99. Items 1 through 5 in the domain "Incidents" have verbal descriptions of "Implemented," but in accordance with the definition given in the Likert Scale, the level of implementation will be downgraded to the next level, "Somewhat Implemented," if the total of all ratings for each item is made up of more than 5 ratings below 4. The data collected indicate that ratings consist of more than 5 ratings lower than 4 therefore the level of implementation for the domain "Incidents" is "Somewhat Implemented."

The highest rating among the 5 items under the "Accidents" is item number 5.1 "Scheduled regular safety meetings to ensure the new employees are aware of safety measures" with a mean of 4.03 and with a verbal description of "Implemented". But in accordance with the definition given in the Likert Scale, the level of implementation will be downgraded to the next level, " if the rating per item obtained from the respondents consists of more than 5 ratings lower than 4. Based on the data gathered, the line item 5.1 has more than 5 scores lower than 4 therefore the verbal description for this item is "Somewhat Implemented".

Every morning at the construction site, the researcher's former employer held frequent toolbox or safety meetings before sending employees to their various responsibilities. Additionally, some employees the researcher encountered on the job site claimed that they have daily tool box meetings. The toolbox safety meeting should be taken seriously as the workers perceived it as only a requirement for attendance. Quality safety toolbox meetings should also be considered by the safety officer and/or the project in-charge. Safety must remain a top priority even though the modern workplace has created new health challenges for both employees and those who have a responsibility to them, according to Thanaraj, M. S., & Priya, 2019. Even if the situation has substantially improved over time, every fatality at work is terrible.

The lowest rating among the 5 items under the "Accidents" is item number 5.4 "Communication Day on safety is being held regularly" with a rating of 3.95 and with a verbal description of "Implemented". Based on the data gathered, the line item number 5.4 has more than 5 scores lower than 4 therefore the verbal description for this item is downgraded to "Somewhat Implemented".

The majority of businesses continue to underestimate the value of holding a communication day on safety and instead see it as a significant additional investment. Getting everyone together to talk about safety issues already costs the business a lot of money in terms of profits. Few businesses allocate time for this event because it costs a lot of money and results in nothing on that particular day.

Table 13. Over-all Mean Distribution of the respondents according to their assessment of safety management of selected construction companies in Manila

ITEM	MEAN	VERBAL DESCRIPTION
Assessment of safety management of selected construction companies in Manila.	3.99	Implemented

Legend: *"Not Implemented (1.00 – 1.80)", "Less Implemented (1.81 – 2.60)", "Somewhat Implemented (2.61 – 3.40)", "Implemented (3.41 – 4.20)", "Fully Implemented (4.21 – 5.00)"*

Overall, the results indicate that the majority of respondents believe that the safety management of certain construction enterprises in Manila is "Implemented," which is also reflected in the overall mean of 3.99. The overall mean for the level of safety management is "Somewhat Implemented" since all of the sub-means achieved a degree of implementation on safety management that is described by the Likert Scale as "Somewhat Implemented" according to the data collected with more than 5 ratings lower than 4.

3. Is there any significant difference in the assessments of the respondents on the implementation of safety management of construction companies when grouped according to profile?

Table 14. Test for Normality of Data using Shapiro-Wilk W test.

Variable	Sample Size	p-value	Remarks
Assessment of safety management of selected construction companies in Manila.	378	0.0000	Not Normal

Based on the table above, the computed p-value using Shapiro-Wilk test in testing the normality of data collected is less than the set level of significance at 0.05 which implies that the data gathered are not normally distributed. Based on standard, it is recommended that the advisable Inferential statistical tools to be used in the study is a non-parametric statistical test.

Table 15. Significant Difference on the respondents' assessment of safety management of selected construction companies in Manila according to sex profile

(*Mann-Whitney U test)

Variable	Profile	Mean-Rank	p-values	Decision	Remarks
Lack of Control (Management)	Male	185.47	0.0952	Accept null hypothesis (H_0)	Not Significant
	Female	211.28			
Basic Causes	Male	186.99	0.2974	Accept null hypothesis (H_0)	Not Significant
	Female	203.09			
Immediate Causes	Male	184.78	0.0504	Accept null hypothesis (H_0)	Not Significant
	Female	215.03			
Incident	Male	182.50	0.0035	Reject null hypothesis (H_0)	Significant
	Female	227.32			
Accident	Male	183.41	0.0112	Reject null hypothesis (H_0)	Significant
	Female	222.42			

Note: *"If p value is less than or equal to the level of significance (0.05) reject Ho, otherwise accept Ho."*

Lack of control, fundamental causes, and urgent causes do not significantly differ when grouped by sex profile, whereas event and accident do. The majority of women made up all of the mean ranks within the sex profile. Due to their greater attention to detail than male workers, skilled female workers are in greater demand in the construction industry. Also, the researcher conducted a casual chat with a few of the talented female employees who worked for the construction company, with the majority of the women being allocated to the painting department.

With scores of 182.50 and 1.83.41, respectively, incident and accident have the two lowest mean ranks when grouped according to profile on the substantial difference on the respondent's appraisal of safety management of the selected construction business in Manila. Male skilled workers made up the majority of respondents (64.81%, or 245 respondents), and respondents under the age of 25 made up 39.42%, or 149 respondents, according to the study's findings. Due to their lack of safety expertise, male respondents tended to feel that accidents and incidents are less likely to occur.. Peng, R., Zhang, M., & Liu (2021) believe that in addition to financial incentives, companies should be forced to offer safety training to employees.

5. CONCLUSIONS

Based on the summary of findings, the researcher concluded the following:

1. **Profile of the respondents in terms of age, sex, position, and years of experience?**

Skilled workers have the highest percentage which was 64.81% or 245 respondents with age bracket 25 years old & below posted the highest percentage which is 39.42% or 149 respondents, and predominantly male.

2. **Respondents' assessment in the implementation of safety management of selected construction companies in terms of lack of control (management), basic causes, immediate causes, incident and accident.**

The study concludes that the overall level of implementation of safety management on the selected construction companies in Manila is "Implemented" with an overall grand mean of 3.99. The following domains used that contributed to the overall result of grand mean are lack of control (3.99), basic causes (3.85), immediate causes (4.01), incidents (4.11) and accidents (3.99). The five domains had a rating of "Implemented" since they were in between 3.41 and 4.20 on the scale. However, based on the criteria used for the Likert Scale, the level of safety management of the chosen Manila construction enterprises was lowered from "Implemented" to "Somewhat Implemented" because the mean per item had more than 5 ratings lower than 4.

3. **Significant difference in the assessments of the respondents on the implementation of safety management of construction companies when grouped according to profile.**

Lack of Control, Basic Causes, Immediate Causes, Incident, and Accident is significant.

6. ACKNOWLEDGEMENTS

The researcher expresses his heartfelt gratitude to all those individuals who helped him make this work possible. First of all, utmost thankfulness is offered to God Almighty for giving wisdom and strength in doing this research.

The researcher is beholden to his research guide and adviser Dr. Guillermo O. Bernabe, Engr. Joseph Raniel Bianez (Program Coordinator) and the Evaluation Committee Dr. Lincoln A. Bautista, PhD (Chairman), Dr. Michael Corpuz, Dr. Orlean Dela Cruz and Engr. Jhocielinda Golpeo.

The researcher gives much appreciation to his parents Hiralrio Piano Carolino and Emelie Caniedo Carolino, as well as to his siblings Mercedes Carolino Sta. Maria and her husband Joven Sta. Maria and family, Marita and Warren Ibarra, Carmenchita and Walden Brigado, Jessie and Cecilia Carolino, Jescel ,Joyce, Prince, Mary Ann and Modesto Compas, Eli and Ethan Compas, Crystal and Jay Ibasan and Alyssa Ibasan, Jinky Rhea, Carlos and Kenzo.

Sincere gratitude is also extended to the UE Faculty and administrators Engr. Alpis (Associate Dean), Ma'am Jasmin Salazar (College Secretary), Ma'am. Loriza Roma , Ma'am Nelly Viallalobos, Engr. Mark Anthony Escober (Dept. Head), for their support and prayers in accomplishing this study.

The researcher is also thankful to Pastor Boni and Paraluman Arzadon, Pastor Jovitmar and Hazel Bumarlong, Sis. Lita Olvida, P12 Guys and Ladies, Churchmates, Justo Bedan Jr. and Wency Vince Brigado for all their support and prayers.

Again, my utmost gratitude to God Almighty, my Lord and Savior Jesus Christ and the Holy Spirit for the love, grace and favor given to me to finish this thesis.

7. REFERENCES

[1] Azil, N. A. S., & Jabar, I. L. A. Preliminary Survey on Safety Practices at Construction Site: Towards Safe Environment for Public. *Management*, *6*(26), 300-310.

[2] Buniya, M. K., Othman, I., Sunindijo, R. Y., Kineber, A. F., Mussi, E., & Ahmad, H. (2021). Barriers to safety program implementation in the construction industry. Ain Shams Engineering Journal, 12(1), 65-72.

[3] Chen, Y. & Wang, Z. (2021, February). Accident-Causing Theory in Construction Safety Management. In IOP Conference Series: Earth and Environmental Science (Vol. 638, No. 1, p. 012097). IOP Publishing.

[4] Chunko, K. and Benjaoran, V. (2019). Implementation of Construction Safety Knowledge Management via Building Information Model. In: Pradhan, B. (eds) GCEC 2017. GCEC 2017. Lecture Notes in Civil Engineering, vol 9. Springer, Singapore. https://doi.org/10.1007/978-981-10-8016-6_35

[5] Construction Deaths Fall in 2020/21 - Construction Management

[6] Cruz, O. G. D. (2021). Virtual reality (vr): A review on its application in construction safety. Turkish Journal of Computer and Mathematics Education (TURCOMAT), 12(11), 3379-3393.

[7] Dela Cruz, O.G., Ongpeng, and J.M.C. (2022). Building Information Modeling on Construction Safety: A Literature Review. In et al. Advances in Architecture, Engineering, and Technology. Advances in Science, Technology & Innovation. Springer, Cham. https://doi.org/10.1007/978-3-031-11232-4_8

[8] Department of Labor and Employment Occupational Safety and Health Center, North Avenue corner Agham Road, Diliman, Quezon City Trunkline: 929-6036 to 39 Fax No.: 929-6030 Email Address: oshc_dole@yahoo.com Website: www.oshc.dole.gov.ph

[9] Ermita, P. & Florencondia, N. (September 2019). Managing Safety in Higher Education Institutions: A Case in the Philippines.

[10] Goerlandt, F., Li, J., & Reniers, G. (2022). The landscape of Safety Management Systems research: A scientometric analysis. Journal of Safety Science and Resilience.

[11] http://www.ilo.org/global/topics/safety-and-health-at-work/lang--en/index.htm

[12] Jeong, J. & Jeong, J. (2021). Novel approach of the integrated work & risk breakdown structure for identifying the hierarchy of fatal incident in the construction industry. Journal of Building Engineering, 41, 102406.

[13] Kang, Y., Jin, Z., Hyun, C., & Park, H. (2018). Construction management functions for developing countries: Case of Cambodia. Journal of Management in Engineering, 34(3), 05018004.

[14] Kasirossafar, Mohammad , and Farzad Shahbodaghlou (2015). "Construction Design: Its Role in Incident Prevention." *Prof. Safety* 60 (2015): 42–46.

[15] Khodeir, L. & Dine, Y. S. (2018). The Impact of Integrating Occupational Safety and Health into the Pre-Construction Phase of Projects: A Literature Review. The Academic Research Community publication, 2(3), 173-182.

[16] Ladewski, B. J. & Al-Bayati, A. J. (2019). Quality and safety management practices: The theory of quality management approach. Journal of safety research, 69, 193-200.

[17] Lee (2017). Types of Construction Site Accidents, Types of Construction Site Accidents | Steven M. Lee, PC (attorneystevelee.com)

[18] National Capital Region (NCR) Profile – PhilAtlas

[19] Nicole S.N. Yiu, N.N. Sze, Daniel W.M. Chan (2018). Implementation of safety management systems in Hong Kong construction industry – A safety practitioner's perspective, Journal of Safety Research, Volume 64, Pages 1-9, ISSN 0022-4375 https://doi.org/10.1016/j.jsr.2017.12.011.

[20] OSH-Standards-2020-Edition.pdf (dole.gov.ph)

[21] Othman, I., Shafiq, N., & Nuruddin, M. F. (2017, December). Effective safety management in construction project. In IOP conference series: materials science and engineering (Vol. 291, No. 1, p. 012018). IOP Publishing

[22] Pangilinan, R. B., Arlheth, P., & dela Cruz, O. G. (2019). Risk Management Practices in a developing country setting: The Philippine experience.

[23] Peng, R., Zhang, M., & Liu, T. (2021, April). Analysis of Key Points in Safety Supervision and Management of Construction Site. In IOP Conference Series: Earth and Environmental Science (Vol. 760, No. 1, p. 012035). IOP Publishing.

[24] Praveen, P. & Prasanna Venkatesan, R. (2020). Safety Management in Construction Project. Risk, 5(1), 0. https://psa.gov.ph/content/highlights-20192020-integrated-survey-labor-and-employment-isle-module-occupational-injuries
[25] Rad, K. G. (2013). Application of domino theory to justify and prevent accident occurrence in construction sites. IOSR J. Mech. Civ. Eng. IOSR-JMCE, 6, 72-76.
[26] Rafindadi, A. D. U., Napiah, M., Othman, I., Mikić, M., Haruna, A., Alarifi, H., & Al-Ashmori, Y. Y. (2022). Analysis of the causes and preventive measures of fatal fall-related accidents in the construction industry. Ain Shams Engineering Journal, 13(4), 101712.
[27] Razali, N. A., Redzuan, N. I., Kamaruddin, A. N., Dahlan, A. D., Nobli, F. N., Atan, N. S., & Hanafi, N. M. (2018). A Study on Safety Management Practices and Safety Performance. The European Proceedings of Social & Behavioral Sciences, 2.
[28] Reyes-Garcia, A. J., Arenas, K. R., Manzon, R. D. S., Loria Jr, S. A., & Galang, A. G. (2021). Construction Safety Management Assessment of the Local Government Unit of Dingalan, Aurora Philippines. International Journal of Progressive Research in Science and Engineering, 2(12), 52-56.
[29] Saeed, Y. S. (2017). Safety Management in Construction Projects. Journal of Duhok University, 20(1), 546-560. https://doi.org/10.26682/sjuod.2017.20.1.48
[30] Santhiya, G. & Jagadeesan, K. (2020). Visualization Technology Aided for Construction Safety Management.
[31] Stig Winge, Eirik Albrechtsen, Jan Arnesen (2019). A comparative analysis of safety management and safety performance in twelve construction projects, Journal of Safety Research, Volume 71, Pages 139-152 ISSN 0022-4375https://doi.org/10.1016/j.jsr.2019.09.015. (https://www.sciencedirect.com/science/article/pii/S0022437519306292)
[32] Tayeh, B. A., Yaghi, R. O., & Abu Aisheh, Y. I. (2020). Project manager interventions in occupational health and safety during the pre-construction phase in the Gaza Strip. The Open Civil Engineering Journal, 14(1).
[33] Tayeh, B. A., Yaghi, R. O., & Abu Aisheh, Y. I. (2020). Project manager interventions in occupational health and safety during the pre-construction phase in the Gaza trip. The Open Civil Engineering Journal, 14(1).
[34] Thanaraj, M. S. & Priya, M. (2019). Effective safety management in construction. International Research Journal of Engineering and Technology, 6(4), 832-836.
[35] Yaghi, R. O. (2019). Project Manager (Owner's Representative) and his Interventions in Occupational Health and Safety during Pre-construction Phase Towards Improving Workers Performance (Doctoral dissertation, The Islamic University–Gaza).
[36] Yiu, N. S., Chan, D. W., Shan, M., & Sze, N. N. (2019). Implementation of safety management system in managing construction projects: Benefits and obstacles. Safety Science, 117, 23-32.
[37] Yiu, N. S., Chan, D. W., Sze, N. N., Shan, M., & Chan, A. P. (2019). Implementation of safety management system for improving construction safety performance: A Structural Equation Modelling approach. Buildings, 9(4), 89.
[38] Yiu, N. S., Sze, N. N., & Chan, D. W. (2018). Implementation of safety management systems in Hong Kong construction industry–A safety practitioner's perspective. Journal of Safety Research, 64, 1-9.
[39] Zhang, M., Cao, T., & Zhao, X. (2017). Applying sensor-based technology to improve construction safety management. Sensors, 17(8), 1841.

DOI: https://doi.org/10.15379/ijmst.v10i2.2975