A Comparative Analysis Between Day Shift and Night Shift Construction Workers on their Safety Performance towards Reducing Workplace Accidents

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Abstract- ***The core drive of this study is to evaluate the safety locus of control, situation awareness, and safety behavior of construction workers in relation to their safety performance. This current study also investigates the comparative differences between day and night shift construction workers about the three variables and discusses how they can affect their safety performance. Thus, these purposes intend to address the given variables' adverse impacts on construction workers' safety performance by reducing workplace accidents. Using a mixed-methods approach, the participants of this study are 24 interviewees, 62 survey respondents of day shift construction workers, and 62 survey respondents of night shift construction workers, for a total of 124 survey respondents. Moreover, a comparative approach is used to determine the significant difference between the day and night shifts. The findings revealed that the safety locus of control of both day and night shift construction workers scores an insignificant difference. In contrast, both safety awareness and safety behavior have significant differences. It is also evident in the findings that day-shift construction workers tend to have higher safety performance than night-shift workers. In terms of condition, night shift workers need to put some effort into prioritizing their safety performance. Overall, this study provides a strong basis for recommendations to prioritize safety performance enhancement. Lastly, recommended actions for the stakeholders are disclosed, as are suggestions for the future expansion of this study.***

Indexed Terms- ***Safety Locus of Control, Situation Awareness, Safety Behavior, Safety Performance***

I. THE PROBLEM AND A REVIEW OF RELATED LITERATURES AND STUDIES

1.1 Introduction

Working in construction demands considerable physical effort from workers as they actively apply themselves to perform various tasks. Construction projects are one of the leaders in occupational accidents in the Philippines (Marie Ching, 2019). It is crucial to ensure that everyone participating in the construction is safe. Safety knowledge in the construction site is necessary to give primary knowledge when it comes to the safety of the workers. Injuries in the workplace can cause much damage to the employees and the company itself (Fhan Zhang, 2019). When accidents happen, it causes much damage to the workers and, at the same time, to the company, causing them a big loss.

According to a report by Business Wire in 2023, the construction sector in the Philippines is projected to experience an average annual growth rate of 7.3% from 2023 to 2026. This growth is attributed to government investments in the transportation, energy, and residential sectors. The Occupational Safety and Health statistics provided by the Department of Labor and Employment (DOLE) indicate that the frequency rate of reported occupational injuries in the construction industry was 5.06 per 500 full-time workers. This means there was approximately one injured worker for every 99 individuals at the worksite. Moreover, the industry recorded an estimated fatality rate of 0.16, translating to one fatality for every 3,125 workers. In non-fatal cases, temporary incapacity was found to be more common,

occurring at a rate of one case per 102 workers, compared to one case per 5,000 workers.

The construction industry also consists of day and night shifts, where construction workers can work 6 to 12 hours per day, with most construction workers falling in the range of 8 to 10 hours per day. Overtime is one of the factors with construction workers as they might need to put in extra hours to meet a deadline for project completion or a specific stage of the project.

There are many variables distressing safety performance in the construction industry. However, few studies focus on safety locus of control, situation awareness, and safety behavior. These three variables are also important indicators of how safety performance is measured. So, the researchers mainly focus on the three variables stated to assess the safety performance of the employees in the construction field.

The locus of control is a psychological principle that refers to how much a person believes they have control over the events that affect their life, well-being, or success. It is frequently related to a person's perspective on what occurs to them in life and who is to blame for their achievements and failures (Eatough, 2022). As per the locus of control definition, it can be utilized in safety. Safety Locus of Control (SLC) can predict employee accidents and injuries. Individuals with a strong internal safety locus of control assume personal responsibility for their safety, believing they can take preventive steps to avoid accidents.

Then, situation awareness is a state of knowing where you are and what is happening around you, allowing individuals and organizations to be more alert and informed and make better decisions. Situation Awareness is a crucial aspect of ensuring safety in the construction industry, as it encompasses perceiving the elements present in the environment, comprehending the current situation, and foreseeing potential future developments. These three interconnected elements emphasize the importance of being aware of one's surroundings and being able to communicate and respond promptly to hazardous situations (Love P. E. et al., 2013).

Safety behavior pertains to the actions undertaken by individuals concerned about minimizing or averting risks. It encompasses a range of practices aimed at promoting health and safety by addressing potentially hazardous human behavior that could lead to accidents. It is often described as tackling ‘unconscious’ behavior – potentially dangerous habits and practices that an individual may not know about or be aware of (Seward, 2022).

Thus, the study will investigate and analyze if there are significant differences in safety performance in terms of safety locus of control, situation awareness, and safety behavior of day and night shift construction workers in reducing workplace accidents.

While injuries and financial losses are commonly recognized as significant outcomes of occupational accidents, it is essential to acknowledge the broader implications they can have. Workplace accidents can diminish employee morale, reduce productivity and product quality, damage an organization's reputation, and negatively impact customer perceptions (Hadikusumo et al., 2017). Consequently, it becomes imperative to prioritize workplace safety and consider it a critical concern for every organization. To effectively prevent occupational accidents, promoting safety behaviors while simultaneously reducing unsafe behaviors is necessary. Identifying, analyzing, and modifying the factors that contribute to unsafe behaviors among employees is crucial in achieving this goal (Ghasemi et al., 2017).

1.2 Review of Related Literatures

1.2.1 Safety Locus of Control

A person’s locus of control refers to an individual’s perceived mastery of their environment and how far they see themselves in control of their destiny. People who believe they can control their destiny are referred to as internals, and those who believe that factors outside their control determine their experiences are referred to as externals (Construction et al., May 2004). Safety locus of control refers to an individual's beliefs about the degree of control over their safety in various situations. According to Bandura's social learning theory, individuals develop their sense of control through their experiences and interactions with

their environment (Bandura, 1977). Thus, an individual's sense of safety locus of control can significantly impact their behaviors and actions related to safety.

A study by Johnson and Smith (2018) examined the relationship between safety locus of control and workplace safety behaviors. They surveyed employees from various industries and found that individuals with a high internal safety locus of control believed they had control over their safety and took personal responsibility for it. They were more likely to engage in safe behaviors at work. These employees proactively identified and addressed potential hazards, adhered to safety protocols, and actively participated in safety training programs. On the other hand, individuals with a high external safety locus of control, who believed that external factors beyond their control largely influenced safety outcomes, were less likely to exhibit safe behaviors.

Rotter (1966) defines locus of control as individuals' overall beliefs regarding the causes of rewards and punishments. It represents the extent to which individuals perceive life outcomes to be under their control and influenced by their efforts and choices (internal locus of control), as opposed to attributing outcomes to factors like luck, fate, or others (external locus of control). The concept of locus of control is applicable in saving decisions (Chatterjee et al., 2011; Cobb-Clark et al., 2016; Lunt & Livingstone, 1991) and financial difficulties (Kuhnen & Melzer, 2018). Individuals who possess a stronger internal locus of control, believing they have control over their life outcomes, tend to have higher levels of savings and encounter fewer financial problems.

Furthermore, evidence suggests that both time preferences (Meier & Sprenger, 2015) and locus of control (Cobb-Clark & Schurer, 2013) remain relatively stable at the individual level over time. Apart from the impact of stressors on locus of control, it has been independently linked to health outcomes. Generally, individuals with an internal locus of control experience better health outcomes, including a lower risk of depressive symptoms (Gale et al., 2008; Omani Samani et al., 2017).

Locus of control also correlates with various behavioral outcomes, such as substance use and related problems. Individuals with a high external locus of control tend to exhibit a higher prevalence of substance use (Haynes & Ayliffe, 1991; Soravia et al., 2015), while those with a low internal locus of control are also susceptible to such issues (Sheffer et al., 2012). However, it is worth noting that the relationship between locus of control and substance use can be complex, as certain studies have reported contradictory findings, indicating that an internal locus of control may be associated with an increased risk of substance use (Goss & Morosko, 1970; Ersche et al., 2012). This contradictory evidence may be explained by the notion that individuals with a high internal locus of control may believe they have more control over their substance use, which could hinder their willingness to seek help (Conell-Price & Jamison, 2015).

Previous research has demonstrated that an internal locus of control is negatively associated with fear of death (Vargo & Black, 1984) and other health-related fears (Indelicato et al., 2017). In the context of career decisions, Maddux (1991) found that individuals with an internal locus of control tend to exhibit greater motivation and ambition than those with an external locus of control. They also demonstrated higher ratings in job proficiency and learning. Conversely, Carlopio et al. (2001) and Durand and Shea (1974) discovered that individuals with an external locus of control are more inclined to be effective leaders and demonstrate greater consideration for others. Research has shown that construction workers with a strong internal safety locus of control - those who believe they have control over their own safety and can take steps to prevent accidents - are more likely to engage in safe behaviors on the job. Conversely, workers with a more external safety locus of control - those who believe that safety outcomes are largely determined by external factors, such as luck or the actions of others - may be less likely to take responsibility for their safety and may be more prone to engaging in risky behaviors (Li et al., 2021).

In addition, individuals with a strong external locus of control are more inclined to follow instructions that contradict their own experiences and tend to exhibit greater predictability when facing unexpected events.

However, it is important to note that the relationship between locus of control and behavior is often influenced by factors such as gender, race, and social class. For instance, Phares (1976) discovered that gender frequently moderates the association between locus of control and behavior. Specifically, in males, an internal locus of control is less likely to lead to opportunistic behavior than in females. This gender difference may stem from males' heightened need to safeguard themselves against failure, leading to a greater tendency to attribute outcomes to external factors. Consequently, we can anticipate that individuals with a more prominent internal locus of control would have a stronger belief in their ability to prevent work-related accidents. These findings suggest that the safety locus of control is an important factor in predicting safety-related behaviors and attitudes and that interventions aimed at promoting an internal SLOC may effectively improve safety outcomes in various settings.

1.2.2 Situation Awareness

Maintaining situation awareness is crucial in high-speed work settings like the construction industry, where daily job site hazards and risks exist. Being cognizant of these risks is essential for ensuring the safety of oneself and colleagues. Employing situational awareness as a proactive measure is an effective approach to preventing injuries. Ultimately, as emphasized by Stanton et al. (2017), individuals themselves are the most valuable resource in preventing workplace injuries.

Imagine a firefighter responding to a building fire. As they enter the building, they quickly assess the situation. They are aware of the layout of the building, the potential hazards, the location of other firefighters, and the status of the fire. They continuously gather information from their environment, such as smoke, heat, and the sound of collapsing structures. Based on this information, they make informed decisions about where to go, how to navigate the building, and how to combat the fire effectively (Endsley et al. (1995).

Furthermore, the situation awareness (SA) concept is commonly explained through the three-level model proposed by Endsley (1995). Level 1 SA involves perceiving the elements present in the immediate environment. Level 2 SA focuses on comprehending and interpreting the perceived elements and understanding how they function and interact with one another. Level 3 SA encompasses projecting future outcomes and anticipating the system's status. SA represents an individual's ability to receive and comprehend information, establishing connections between that information and future events (Reinerman-Jones et al., 2019).

To be more precise, SA refers to the perception of environmental elements, the comprehension of their significance, and the ability to predict their future status (Salmon et al., 2009). Consequently, employees' SA relies on their accurate and comprehensive understanding of various factors present in the workplace (Mentes et al., 2015). Extensive research has consistently highlighted the critical role of situation awareness as a predictor of human performance in complex systems such as aviation (Endsley et al., 2003), driving (Samuel et al., 2016), and nuclear facilities (Lee et al., 2012). Operators are frequently physically capable of being aware of their responsibilities and the prevailing working practices, yet a lack of understanding of work-related incidents can harm their safety performance (Naderpour et al., 2014). Effective decision-making and performance are regarded to be predicated on SA, which is used in human factor research to explain how much operators of safety-critical and complicated real systems are aware of the system and environment (Lee et al., 2012). Situation awareness is a second personal factor that directly affects safety performance, and its deficiency or weakness may result in catastrophic incidents.

This includes awareness about personnel location and assigned duties, the environment, and any potential risks for organizations. It is also one of the most important topics in human factors engineering and ergonomics and is regarded as a causative factor in safety performance (Stanton et al., 2017). Studies have shown that when workers' situational awareness diminishes, there is a higher tendency for workplace accidents.

Several studies have emphasized the importance of situation awareness (SA) in preventing occupational accidents and promoting safety performance.

Individuals with high levels of SA have demonstrated the ability to predict the consequences of their actions and avoid unsafe behaviors (Sneddon et al., 2013). Conversely, those with weak SA are slower in identifying occupational problems within the system and may react with a delay (Stanton et al., 2001). The absence or weakness of SA has been associated with serious accidents (Brady & Goldenhar, 2014).

Unsafe behavior can be categorized into errors and violations. Errors encompass slips, lapses, and mistakes, where individuals may omit necessary actions or commit unsafe behaviors believing they are more effective (Choi et al., 2016). Modifying employees' behavior is a crucial approach to preventing occupational accidents, and behavior-based safety (BBS) is a widely employed method that focuses on altering unsafe behaviors (Chen & Ren, 2015; Roberts & Geller, 2018; Guo et al., 2018).

SA has been identified as a causal factor in accidents, and its loss has been associated with various incidents. Accidents in the offshore industry and drill rig accidents were found to be linked to the loss of SA and failure in cognitive awareness and risk assessment (Sneddon et al., 2006, 2013). Situational awareness is vital for safety systems and resilient engineering, as it helps individuals understand hazards, make correct decisions, and avoid accidents (Salmon et al., 2015; Chatzimichailidou et al., 2015; Fang & Cho, 2017).

However, it should be noted that situation awareness is not solely a decision-making process but serves as a foundation for decision-making. While it can be a predictor and indicator of performance, it may not always accurately predict performance outcomes (Endsley, 1995b; Mehta et al., 2018). Situational awareness is integral to the appropriate performance, and its absence can lead to unsuccessful outcomes (Mehta et al., 2018).

In conclusion, situation awareness is critical in promoting safety, preventing accidents, and enhancing performance. Individuals need to develop and maintain situational awareness to understand their environment effectively, make informed decisions, and take appropriate measures to ensure safety in the workplace.

1.2.3 Safety Behavior and Human error

Behavioral safety views employees as having direct control over any hazardous behavior, such as taking shortcuts or carrying too many items. Employees might engage in this behavior even when warned against it in an organization's written health and safety policies. This is where phrases such as "but we have always done it this way" or "it has never caused a problem before, so why make changes now?" can be heard. They may be true in some cases, and accidents may not yet have happened, but does that mean the actions are safe? (Seward, 2022).

According to the Centers for Disease Control and Prevention (CDC), seatbelt use is one of the most effective ways to prevent injuries and save lives in motor vehicle crashes. Their research shows that seat belts reduce the risk of death by about 45% and the risk of serious injury by about 50%.

In Addition, Safety behaviors are actions intended to prevent, minimize, or escape a feared outcome (Kirk et al., 2019). Safety behaviors are strategic in responding to the demands and fears associated with a situation (Moscovitch et al., 2013). Psychosocial safety behavior has been indicated to be an important factor in ensuring workplace safety (Zhang et al., 2022). On the other hand, self-induced safety behaviors cover those that adhere to safety standards (Uryan, 2010), including the two strands of safety participation and compliance (Aliabadi et al., 2020). These behaviors form safety compliance, which sustains or enhances the individual's safety and health. Employees' safe performances and adherence to rules, such as wearing safety equipment, participation in safety comprises actions not directly related to preserving or enhancing safety but also raise an organization's overall degree of security. Helping coworkers stay safe, volunteering to attend safety meetings, training, and developing safety initiatives are all a few instances of safety involvement (Saedi et al., 2020; Tong et al., 2020; Ye et al., 2020). If we hope to prevent workplace accidents, we must enhance safety habits and reduce risky ones. It is essential to recognize, assess and change the conditions that lead to dangerous employee behavior (Ghasemi et al., 2017). Therefore, improving employee safety behavior can greatly reduce casualties and occupational safety accidents.

The human action (or behavior) that fails to produce the desired outcome of their task can be defined as human error (Reason, 1990). Also, human failure (or error) and success in performing a task result from the same cognitive processes (Al-Tarawneh, 2012). Human error influences the safety of a system in its design, development, installation, operation, and maintenance. It contributes to industrial/occupational accidents, and further safety improvements can be achieved by managing it (Pramod et al., 2020). Human error is one of the leading causes of workplace accidents and a pressing threat to system safety (Kumar et al., 2020). Many studies agree that unsafe human behavior is responsible for 60–90% of all accidents; it is a pressing threat to system safety and a major cause of an accident, property damage, significant personal injury, and sometimes fatality (Zhang et al., 2019). Human error has become a crucial concern in the mining industry as it is responsible for 85% of mining accidents (Rushworth et al., 1999). Research on platinum mine accidents in South Africa found that unsafe acts were responsible for 98.9% of accidents (Bonsu et al., 2017). So, in all the high-risk industries, human error has been a grave concern to safety personnel, and it is a widely studied and burning topic for personal safety (Academies of Sciences and Medicine, 2018). Therefore minimizing human error is the key to improving safety performance.

1.2.4 Variables affecting Safety Performance

Various personal and organizational factors can influence situation awareness (SA). Endsley (1995) developed a well-known theoretical model that categorizes these factors into personal, situational, and organizational domains. Personal factors include the availability of detailed and accurate information about an event (De Cillis et al., 2016), knowledge and experience (Durso et al., 2006; Rodriguez et al., 2017), attitudes (Eid et al., 2005), safety locus of control (Endsley & Bolstad, 1994), fatigue, and sleep disorders (Sneddon et al., 2013).

On the other hand, organizational factors, such as system design and system-operator relationship, workload, leadership style, and person-organization relationships and support, also play a role in influencing SA (Endsley, 1995a; Friedrich et al., 2018; Sætrevik & Hystad, 2017; Sandhåland et al., 2017; Rodriguez et al., 2017).

Research on the effects of these variables on SA in industrial workers is limited, but it is recognized that personal, situational, and organizational factors can impact the occurrence of accidents (Cornelissen et al., 2017). Unsafe behaviors link organizational shortcomings and accidents, with organizational factors indirectly affecting personal and psychological factors (Ghasemi et al., 2017).

Internal tendencies and external conditions influence individual behavior, including factors such as fatigue, sleep disorders, knowledge, safety attitude, safety locus of control (Christian et al., 2009), and situation awareness (Mehta et al., 2018). The absence or weakness of situation awareness can contribute to serious accidents (Brady & Goldenhar, 2014). Numerous studies have identified situation awareness as a direct and immediate cause of unsafe behavior.

Overall, understanding and addressing the various factors that influence situation awareness are crucial for promoting safety performance and reducing the occurrence of accidents in industrial settings.

1.3 Statement of the Problem

Several studies have investigated the effects of personal variables on the occurrence of accidents. However, more models have yet to be introduced on the effects of such variables on safety performance in industrial employees. Similarly, some studies have investigated the effects of some personal variables on situation awareness, but most have focused on non-industrial fields. Thus, this study aims to compare day-shift and night-shift construction workers' safety performance in reducing workplace accidents. Especially the following question will be addressed:

1. How can day and night shift construction workers describe safety locus of control, situation awareness, and safety behavior?
2. Is there a significant difference between day and night-shift construction workers regarding their safety locus of control?
3. Is there a significant difference between day and night shift construction workers regarding their situation awareness?

4. Is there a significant difference between day and night-shift construction workers in terms of their safety behavior?
5. Is it possible to use it as a topic for safety seminars?

1.4 General Objective

This study utilizes a comparative study between day shift and night shift construction workers on their safety performance in reducing workplace accidents.

1.4.1 Specific Objectives

This study aims the following specificities:

1. To describe the safety locus of control, situation awareness, and safety behavior based on the perception of day and night shift construction workers.
2. To identify the difference between safety locus of control of day shift and night shift construction workers.
3. To identify the difference between situation awareness of day shift and night shift construction workers.
4. To identify the difference between safety behavior of day shift and night shift construction workers.
5. To propose a seminar for the construction workers safety performance if possible.

1.5 Research Hypothesis

These are the following hypothesis to be tested in the study:

Ha: There is a statistically significant difference in the safety performance of the construction workers in terms of their safety locus of control, situation awareness and safety behavior between day shift and night shift.

Ho: There is no statistically difference in terms of safety locus of control, situation awareness and safety behavior of day shift and night shift construction workers in their safety performance in reducing workplace accidents.

1.6 Significance of the Study

This study aims to increase people's knowledge of various aspects of work and safety to create accurate and complete mental models of working conditions. Benefiting the study are the various sector as follows:

Education. This study will serve as a reference and guideline for future studies about the topic.

Economy. The construction industry not only directly affects the economy but also serves as one of the indications of whether the economy is growing or slowing. This study will benefit the economy because it can help the employees on the construction site to be more aware of their safety. As a result, they will be more productive and efficient in focusing on their work.

Construction Workers. This study will help the workers to be more cautious and safe in construction areas.

Future Researchers. This research will gain significance in this study. It may serve as their data in evaluating and designing construction materials, both partial alterations of contents. The study's outcome can be a source of new knowledge and provide interpretation for future and further research and similar topics.

1.7 Scope and Limitations

This study compares the safety performance of day-shift and night-shift construction workers in reducing workplace accidents. The study setting took place on the available registered construction company during the allotted time for data gathering in the City of San Fernando, Pampanga. Furthermore, this research is delimited into three variables: safety locus of control, situation awareness, and safety behavior, which affect the safety performance of construction workers. The target respondents consist of 124 construction workers, evenly distributed between the day and night shifts with a strict 1:1 ratio. The interview portion of the study includes 14 participants from the day shift and 10 from the night shift. However, other employees on the construction site, such as site engineers and safety officers, are excluded from this study. It is a requirement that each respondent has a minimum of one year of working experience in the construction industry. Additionally, any variables not explicitly mentioned in the statement of the problem are not considered in this study.

1.8 Conceptual Framework

The framework for the conceptual basis of the proposed study is shown in the figure below. The framework utilizes the IPO format, which gives the readers a chance to browse the wholeness of the study. It previews what is taken in the input, the processes involved, and the output of the given study. The study's input includes the safety locus of control, situation awareness, and safety behavior. The process includes all the steps that the researchers did, and it starts with collecting data, and then ends with an analysis of results and conclusions. Lastly, the output consists of the implementation of seminars, training, and other construction activities in terms of safety.

INPUT	PROCESS	OUTPUT
Effects of some variables on safety performance, in terms of; ● Safety Locus of Control ● Situation Awareness ● Safety Behavior	Collection of ● Data ➢ Modified Questionnaire/ Survey Forms ➢ Face to Face Interview ● Data Analysis ➢ SPSS Software ● Results and Conclusions	● Propose interventions, including seminars and training, aimed at mitigating accidents on the construction site by addressing the varying safety performance among the workers.

1.9 Definition of Terms

The following terms are defined conceptually to understand unfamiliar words used in the study.

Catastrophic Incidents. An incident involving a major uncontrolled emission, fire or explosion that causes significant damage, injuries and/or fatalities onsite and has an outcome effect zone that extends into the surrounding community. Cognitive Awareness. apply to the skills required to understand, these skills are the mental abilities and processes that control your actions and that allow you to conduct complex tasks. Your cognitive awareness allows you to learn, remember and problem-solve.

Construction Industry. The industrial branch of manufacturing and trade related to building, repairing, renovating, and maintaining infrastructures. Construction Projects. The organized process of constructing, renovating, refurbishing, retrofitting or adapting a building. Human Factors. Refer to environmental, organizational and job factors, and human and individual characteristics, which influence behavior at work in a way which can affect health and safety.

Human Error. A person's mistake rather than the failure of a machine.

Likert-Scale. A unidimensional scale that researchers use to collect respondents' attitudes and opinions. Occupational Safety And Health Center (OSHC). It deals with all aspects of health and safety in the workplace and has a strong focus on primary prevention of hazards. Its goal is to prevent accidents and harm to people from work-related activities. Personal Protective Equipment (PPE). An equipment that is worn or used in order to provide protection against hazardous substances or environments. Raosoft Software. An advanced application developer for web surveys and forms that lets you create complex questionnaires needing extended logic statements, or very large questionnaires for the web, with large populations and/or large question sets. Safety Behavior. A behavior performed by an anxious individual in an attempt to minimize or prevent any risks. Safety Knowledge. Applies knowledge of occupational health and safety principles, techniques and practices and provides information to other process safety elements. Safety Locus of control. The safety scale was designed to predict employment applicants' readiness for on-the-job accidents. Safety Standard. Standards designed to ensure the safety of products, activities and processes, etc.

Situation Awareness (SA). state of knowing where you are and what is going on around you, allowing individuals and organizations to be more alert and informed and to make better decisions. Statistical Package for the Social Sciences (SPSS). also known

as IBM SPSS Statistics, is a software package used for the analysis of statistical data.

II. METHODOLOGY

This chapter presents the methods and procedures employed for data collection and interpretation in the study. This section offers insights into the research design, respondents, instrumentation, and data-gathering process utilized to ensure accurate analysis and interpretation of the collected data.

2.1 Research Design

The researchers employed a mixed-method design, a combination of qualitative and quantitative research strategies, which best specified the purpose of the study. Situated with the qualitative approach, it aimed to gather information about their perceptions concerning the effects of some variables that can affect their safety performance for the quantitative approach, particularly descriptive survey and descriptive-comparative research. The two methods were used to accurately delineate the safety performance of the construction workers and test the research hypothesis by evaluating the differences between the day shift and night shift in terms of the construction workers' variables. Hence, the researchers conducted in the respondents' natural setting with no manipulated variables.

2.2 Respondents

The target respondents of the study are day and night shift construction workers with at least a year of experience who are working around the vicinity of San Fernando, Pampanga. This served as the main subject of this study. The number of day shifts and night shifts who responded was 62 each, so the total number of respondents is 124. Then the number of interviewees is 14 day shift and 10 night shift construction workers.

2.2.1 Determination of Sample Size

The criterion for the sample size of the survey respondents came from the suggested value obtained from Raosoft Software, a tool that aids in finding the minimum appropriate sample size. Although the software provided 120 as an accepted sample size (with a 92% confidence level and 8% margin of error), the researchers used 124 For the interviewees, the researchers initially selected 30, 15 for day shift and 15 for night shift construction workers. However, only 24 of them gave their full consent to participate in the study. Consequently, their identities were not reported to keep the confidentiality of their profiles. It is in accordance with the consent form they have signed before their interview schedules.

2.2.2 Sampling Technique

The researchers used non probability convenience sampling in obtaining the totality of respondents. Since the study prioritizes collecting samples from construction workers who are conveniently present at the chosen work site. Convenience sampling is the most commonly used sampling technique as it’s incredibly prompt, uncomplicated, and economical. Using this technique, we can observe habits, opinions, and viewpoints in the easiest possible manner (Dan Fleetwood,2019). While the interviewees were chosen using a judgment sampling technique. A quick poll or survey can be conducted with the sample using judgment sampling since the members of the sample possessed appropriate knowledge and understanding of the subject. Judgment sampling is most effective in situations where there are only a restricted number of people in a population who own qualities that a researcher expects from the target population (Dan Fleetwood,2019).

2.3 Research Instrument

This study used printed questionnaires to obtain data from construction workers from San Fernando, Pampanga. The questionnaires of this study have four sections. The first section includes demographic background and occupational information. Then the three remaining sections compromise items measuring the variables of the study. Before being used, the survey questionnaires are approved by professionals. This study also used Statistical Package for the Social Sciences (SPSS) software for data analysis and assessing some variables' direct and indirect effects on a specific target variable.

2.3.1 Questionnaires

The following sets of survey questionnaires were administered face-to-face to gather data from the participants.

- Safety Locus of Control

The Safety Locus of Control variable was measured using a subjective and self-report questionnaire, as commonly done in research (Nykänen et al., 2018). The questionnaire in this study consisted of four questions related to locus of control, with responses provided on a 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). A higher score indicated a stronger internal locus of control (Mohammadfam et al., 2021). The Cronbach alpha coefficient for this measurement was 0.79.

- Situation Awareness

For Situation Awareness, the Persian version of the instrument developed and validated by Sneddon et al. (2013) was utilized in this study. Participants responded to the questions using a 5-point Likert scale ranging from 0 (never) to 4 (very often), with a higher score indicating a higher level of situational awareness (Mohammadfam et al., 2021). The Cronbach alpha coefficient for this measurement was 0.75.

- Safety Behavior

Safety Behavior is often divided into safety compliance and participation (Vinodkumar & Bhasi, 2011). Questionnaires have been commonly used to measure safety behavior, with specific questions assessing each aspect (Dahl & Kongsvik, 2018). This study evaluated each aspect using four questions on a 5-point Likert scale ranging from 0 (never) to 4 (very often). A higher score out of 24 indicated better and more standard safety behavior (Mohammadfam et al., 2021).

2.4 Data Collection

The data was collected from the construction workers through questionnaires and interviews that the researchers prepared around San Fernando, Pampanga. It served as the foundation of the proposed study and benefited the safety performance of the employees in the construction industry. Data gathered in the questionnaires and interviews about the given variables of the respondents served as a guide for the researchers. Also, it served as a basis needed to test the study's hypothesis. After collecting the data, the following procedures are tabulated after collecting the data, statistical treatment was applied to the collected data.

2.4.1 Statistical Treatment of Data

The collected raw data through the questionnaire was extracted and organized extensively using Microsoft Excel. In particular, the average Safety Locus of Control, Situation Awareness, and Safety Behavior scores in both Day and Night Shift are calculated automatedly. Afterward, the summary of information was analyzed by using the Statistical Package for the Social Sciences (SPSS) program, wherein measures of central tendency and variability, such as mean and standard deviation, were obtained.

2.4.2 Criteria for Data Analysis

The scores of the respondents in each questionnaire were verbally described using the following criteria:

Table 1: Criteria for the Safety Locus of Control

Numerical Rating	Verbal Interpretation
4.45-5	Excellent
3.45-4.44	High
2.45-3.44	Moderate
1.45-2.44	Low
1.00-1.44	Very Low

Table 1.1: Criteria for the Situation Awareness

Numerical Rating	Verbal Interpretation
3.45-4	Excellent
2.45-3.44	High
1.45-2.44	Moderate
0.45-1.44	Low
0-0.44	Very Low

Table 1.2: Criteria for the Safety Behavior

Numerical Rating	Verbal Interpretation

3.45-4	Excellent
2.45-3.44	High
1.45-2.44	Moderate
0.45-1.44	Low
0-0.44	Very Low

Furthermore, the comparative coefficients were described using the following criteria:

Table 1.3: Criteria for the Description of the p-value

Score Ranges	Description
$p > 0.05$	No statistically significant relationship
$p \leq 0.05$	Statistically significant relationship

2.4.3 Ethical Considerations

In conducting the study, the participants are respected. Together with the questionnaire signed and approved by the participants, a letter of consent is used to verify their voluntary engagement in the study. The letter includes information regarding the motive of the study and what participation demands. The participants were informed that the study was voluntary and would not affect their status as workers or individuals. Any terms used in the questionnaire, written or verbally said, are not intended to be offensive. On the other hand, the sources used in this study are properly cited and acknowledged.

III. RESULTS AND DISCUSSIONS

The present study aimed to describe and examine the safety performance of day shift and night shift construction workers based on their safety locus of control, situation awareness, and safety behavior during work. Hence, descriptive statistics of the scales were provided in the tables below.

SAFETY LOCUS OF CONTROL (Day Shift)

Table 2.1: Descriptive Statistics for Modified Questionnaire for Safety Locus of Control (Day Shift).

Indicator	Mean	Std. Dev	Verbal Description
1.Employees are safe from occupational accidents by fully complying with safety regulations.	4.94	0.25	Excellent
2. Occupational accidents and injuries are preventable.	4.84	0.58	Excellent
3. Employees who work carefully will not be harmed.	4.79	0.68	Excellent
4. Occupational accidents and injuries occur due to insufficient attention of employees to safety issues.	4.61	0.98	Excellent
GRAND MEAN	4.79		Excellent

Table 2.1 shows the descriptive statistics of the responses for the day shift construction workers measuring their safety locus of control. All of the given items were utilized to assess the given variable. Hence, it was determined that the statement with the highest mean score is 'Employees are safe from occupational accidents by fully complying with safety regulations' ($M = 4.94$, $SD = 0.25$). While, the statement with the lowest mean score is 'Occupational accidents and injuries occur due to insufficient

attention of employees to safety issues' (M = 4.61, SD = 0.98). Nonetheless, the data revealed an excellent result in the response of the dayshift construction workers.

Findings from the interviews showed that many accidents may occur at the site. The data above reveals that construction workers working day shifts are most likely to have an internal locus of control as they take full responsibility for the mistakes or lapses they have committed on the site. It was also mentioned that they are always mindful to avoid mistakes or lapses because they can cause harm to their safety and also to the safety of their co-workers. Hence, they are always keeping their focus on work. Additionally, aside from keeping their focus, most interviewees said that they are always assessing the situation first, listening to the instructions given, etc.

Despite hardship on the site, the construction workers are trying to always prioritize their safety on the site. Moreover, they always find a way to correct or improve themselves when they commit a mistake. Also, they mentioned that they are getting enough rest, which helps them keep their focus, reasoning, work ethic, productivity, etc. As a result, they can work freely with a clear mind and as effective workers. Lastly, the safety locus of the construction workers working the day shift is based on their experience in the construction industry, and they are improving for every mistake they make.

Based on the emotional response of the construction workers, there is a big advantage of having a good safety locus of control. More specifically, workers with a higher locus of control have demonstrated more proactive qualities and tend to engage in problem-focused activities such as reducing a hazard (Ng & Butts, 2009).

SAFETY LOCUS OF CONTROL (Night Shift)

Table 2.2: Descriptive Statistics for Modified Questionnaire for Safety Locus of Control (Night Shift).

Indicator	Mean	Std. Dev	Verbal Description
1.Employees are safe from occupational accidents by fully complying with safety regulations.	4.98	0.13	Excellent
2. Occupational accidents and injuries are preventable.	4.89	0.55	Excellent
3. Employees who work carefully will not be harmed.	4.89	0.55	Excellent
4. Occupational accidents and injuries occur due to insufficient attention of employees to safety issues.	4.95	0.22	Excellent
GRAND MEAN	4.93		Excellent

Table 2.2 illustrates the Safety Locus of Control of the night shift respondents. Among all the items, Employees are safe from occupational accidents by fully complying with safety regulations (M = 4.98, SD = 0.13) got the highest mean score then it was followed by 'Occupational accidents and injuries occur due to insufficient attention of employees to safety issues.'(M = 4.89, SD = 0.55). While both 'Occupational accidents and injuries are preventable.' and 'Employees who work carefully will not be harmed.' (M = 4.89, SD =0.55) got the lowest. Nonetheless, the data revealed that the construction workers reflected an overall excellent level of safety locus of control during night shift (M = 4.93).

Based on the table, the overall conclusion is that the respondents have an excellent score, that they are safe from occupational accidents by complying with safety regulations, and that occupational accidents and

injuries are preventable. They also strongly agreed that working carefully can prevent harm and that accidents occur due to insufficient attention to safety issues. The grand mean score for all the indicators is 4.93, indicating that the employees have a positive attitude towards occupational safety and are aware of the importance of complying with safety regulations to prevent accidents and injuries.

Based on the interview findings, it is revealed that night shift construction workers are most likely to have both internal and external locus of control. Some construction workers take full responsibility for the actions, mistakes, or lapses they have committed. However, others with an external locus of control blame some things on their failures and mistakes. "When you are a night shift worker, it is so dark, sometimes they make mistakes because of it." As this statement shows, some circumstances affect their performance. Hence, they always find a solution or way to cope with these kinds of circumstances. Additionally, workers added that they know all the risks and hazards they may experience at night.

Additionally, based on the perceptions of construction workers working night shifts, the researchers concluded that internal and external locus of control plays a significant role in coping with failures and mistakes on the site. The locus of control theory reflects individual differences in generalized beliefs about the personal controllability of reinforcing life events. Individuals with an internal locus of control believe reinforcements are contingent upon their behaviors or attributes. Externals perceive outcomes to be contingent upon forces outside of themselves. Such action-outcome expectancies interact with the outcome's subjective reinforcement value to determine the potential for a particular behavior to occur. (Smith et al., 2004).

SITUATION AWARENESS (Day Shift)

Table 2.3: Descriptive Statistics for Modified Questionnaire for Situation Awareness (Day Shift)

Indicator	Mean	Std. Dev	Verbal Description
1. I am able to keep my mind focused on work and it has a tendency to 'wander'	3.52	0.36	Excellent
2. I do not find it difficult to concentrate for long periods of time	3.16	1.18	High
3. I never 'tune out' during routine work, or when work is boring	3.37	0.77	High
4. I never carried out work on 'auto-pilot', without being aware of it	3.00	1.13	High
5. I ensure I know most rig activities that are ongoing so I can 'keep an eye' on things	2.77	1.52	High
I think ahead of my work to plan for different possible outcomes	3.16	1.23	High
I find it easy to keep track of everything	2.52	1.45	High

that is going on around me			
I do not speak or act without thinking	3.19	1.01	High
I do not have difficulty paying close attention to details, which often results in careless errors	3.26	0.97	High
When I finish reading or being told instructions, I never have to re-read them or ask for them	2.40	1.57	Moderate
GRAND MEAN	3.04		High

Table 2.3 reflects the situational awareness of the construction workers during work. It was determined that the top 3 scorers are the statements ‘I am able to keep my mind focused on work and it has a tendency to ‘wander’’ (M = 3.52, SD = 0.57). 'I never ‘tune out’ during routine work or when work is boring' (M = 3.37, SD = 0.77) and 'I do not have difficulty paying close attention to details, which often results in careless errors' (M = 3.26, SD = 0.97). While the top 3 items with the lowest mean score are ‘When I finish reading or being told instructions, I never have to re-read them or ask for them’ (M

=2.40 SD = 1.57), 'I find it easy to keep track of everything that is going on around me' (M = 2.52, SD = 1.45), and 'I ensure I know most rig activities that are ongoing so I can ‘keep an eye’ on things' (M = 2.77, SD = 1.52). Overall, the data revealed that construction workers who are working on the day shift have high situation awareness (M =3.04).

Consistently, the results from interviews show that safety performance helps reduce workplace accidents, and construction workers always prioritize it before starting work. However, in some instances, accidents will always take place. So based on the researchers' interview, the day shift construction workers mentioned that they are capable and aware of all the accidents that may occur, and they also added that experience becomes their best teacher in this kind of field. It shows that their situational awareness is high because they can make decisions about situations that may cause risk on the site while also assessing the things around them. This kind of characteristic helps them to make themselves and their co-workers safer. In many domains, SA is applied and plays a vital role in environments where fast and accurate decisions are critical for project performance, such as electronic systems, space operations, and automation technologies. It was first applied in the construction industry concerning safety management (Gheisari et al., 2010). SA describes an understanding of what is happening around an individual concerning the project's progress to make decisions based on profound, trustworthy, and transparent data in the present and future (Gorsh et al., 2020).

SITUATION AWARENESS (Night Shift)

Table 2.4: Descriptive Statistics for Modified Questionnaire for Situation Awareness (Night Shift)

Indicator	Mean	Std. Dev	Verbal Description
1. I am able to keep my mind focused on work and it has a tendency to ‘wander’	3.30	0.53	High
2. I do not find it difficult to concentrate for	1.95	1.44	Moderate

long periods of time			
3. I never 'tune out' during routine work, or when work is boring	3.16	0.52	High
4. I never carried out work on 'auto-pilot', without being aware of it	2.48	0.92	High
5. I ensure I know most rig activities that are ongoing so I can 'keep an eye' on things	2.89	1.08	High
6. I think ahead of my work to plan for different possible outcomes	3.46	1.16	Excellent
7. I find it easy to keep track of everything that is going on around me	3.13	1.37	High
8. I often speak or act without thinking	3.10	0.89	High
9. I do not have difficulty paying close attention to details, which often results in careless errors	3.10	0.81	High
10. When I finish reading or being told instructions, I never have to re-read them or ask for them	2.97	1.53	Moderate
GRAND MEAN	2.95		High

Table 2.4 presents the situational awareness perceived by the respondents. Among the given statements, 'I think ahead of my work to plan for different possible outcomes' (M = 3.46, SD = 1.16) obtained the highest mean score. While ' I do not find it difficult to concentrate for long periods of time' (M = 1.95, SD = 1.44) got the lowest mean score.

The table shows the results for situation awareness during the night shift based on the responses to 10 indicators. The grand mean is 2.95, which indicates that the respondents have high situational awareness during the night shift. Overall, the results score a high score in their situation awareness, and there is room for improvement in situational awareness during the night shift.

However, during night shifts, construction workers show some vulnerability to accidents since they are expected to be productive in the absence of light. Findings from the interview show that night shift workers tend to have a challenging role in their situational awareness. However, there is always a way to lessen the probability of accidents that may happen. One of the solutions they are doing is that they always check their flashlights or lighting charges before starting the work. This increases their visibility of the possible risks that may occur. Also, they pay attention to all their surroundings more frequently because darkness can cause blind spots for them.

Night time can be dangerous in all fields, but construction workers experience an extra level of hazard just by nature of the darkness, proximity to traffic, and other risk factors. Safety should be an utmost priority at any site. Productivity might slow to keep everyone safe, but taking longer on a single job is better than facing an injury (Long, 2022). Also, based on the emotional responses of night shift construction situations, awareness plays a role in their safety and productivity in the industry. Despite

hardship, they can assess, understand, prioritize safety, make decisions correctly, etc.

SAFETY BEHAVIOR (Day Shift)

Table 2.5: Descriptive Statistics for Modified Questionnaire for Safety Behavior (Day Shift)

Indicator	Mean	Std. Dev	Verbal Description
1. I follow my work instructions and safety rules.	3.71	0.49	Excellent
2. I pay attention to safety warnings and signs.	3.81	0.40	Excellent
3. I use all personal protective equipment and safety equipment.	3.81	0.47	Excellent
4. When I do my job, safety is a priority.	3.87	0.34	Excellent
5. I encourage my coworkers to work safely.	3.81	0.40	Excellent
I try to improve the safety of my workplace	3.87	0.34	Excellent
I report dangerous situations to the supervisor or safety officer.	3.81	0.44	Excellent
If I see that my coworkers are doing their job in a way that is not safe, I ask them to stop.	3.87	0.34	Excellent
GRAND MEAN	3.82		Excellent

Table 2.5 demonstrates the safety behavior perceived by the respondents. It was determined that the statement with the highest mean score is ‘When I do my job, safety is a priority.' (M = 3.87, SD = 0.34). 'I try to improve the safety of my workplace.' (M = 3.87, SD = 0.34) and ‘If I see that my coworkers are doing their job in a way that is not safe, I ask them to stop.' (M = 3.87, SD = 0.34). While the item with the lowest mean score is 'I follow my work instructions and safety rules.' (M = 3.71, SD = 0.49).

The table presents the results of a survey conducted to assess safety behavior in the workplace. The survey consisted of eight indicators of safety behavior, each rated on a scale from 0 to 4, with higher scores indicating better safety behavior. The table shows the mean and standard deviation for each indicator, as well as a verbal description of the results based on the mean score. Overall, the results indicate that the respondents have an excellent grade when it comes to safety behavior in the workplace, with a grand mean score of 3.82 out of 4. This suggests that the respondents generally follow safety rules, use safety equipment, prioritize safety while performing their job, encourage coworkers to work safely, report dangerous situations, and intervene when they see unsafe behavior. This indicates that the responses are consistent among the respondents.

The finding in the interview says that there are things and practices that construction workers tend to use to predict safety on the site. However, for some reason, this practice has some lapses in terms of safety requirements. Even though this practice seems wrong, they continue to do it because no accidents have been reported while executing it. They also mentioned that they had been guided by all the instructions and safety regulations in managing safety performance. This shows that the safety behavior of the construction workers on the day shift shows a high tendency to

comply with the safety management on the site. Therefore, offering training and robust safety programs that could continually enhance safety behavior was essential for any employer to reduce possible hazards in the construction project. In order to lessen workplace accidents and the indirect impact of the consequences of the event before the injuries or accidents passed off protection, safety behavior was the important thing to put in force. If management commitment, training in safety awareness, and the PPE had been properly aligned, designed, and delivered on employees' safety engagement and behavior, the effects should have been huge (Ramasamy, 2020).

SAFETY BEHAVIOR (Night Shift)

Table 2.6: Descriptive Statistics for Modified Questionnaire for Safety Behavior (Night Shift)

Indicator	Mean	Std. Dev	Verbal Description
1. I follow my work instructions and safety rules.	3.95	0.22	Excellent
2. I pay attention to safety warnings and signs.	3.97	0.18	Excellent
3. I use all personal protective equipment and safety equipment.	3.92	0.28	Excellent
4. When I do my job, safety is a priority.	3.98	0.13	Excellent
5. I encourage my coworkers to work safely.	3.93	0.25	Excellent
I try to improve the safety of my workplace	4.00	0.00	Excellent
I report dangerous situations to the supervisor or safety officer.	3.92	0.28	Excellent
If I see that my coworkers are doing their job in a way that is not safe, I ask them to stop.	3.98	0.13	Excellent
GRAND MEAN	3.82		Excellent

Table 2.6 indicates the safety behaviors perceived by the respondents. It was determined that the statement with the highest mean score is 'I try to improve the safety of my workplace.' (M = 4.00, SD = 0.00) While the items with the lowest mean score are "I use all personal protective equipment and safety equipment" and 'I report dangerous situations to the supervisor or safety officer,' (M = 3.92, SD = 0.28). The results show that the respondents exhibit excellent safety behavior during the night shift, with a grand mean score of 3.96 out of 4, The participants reported that they follow safety rules and instructions, pay attention to safety warnings and signs, use personal protective equipment, prioritize safety during their job, report dangerous situations to supervisors or safety officers, and intervene when they see unsafe behavior. This indicates that the responses are consistent and reliable. Notably, respondents scored highest on the indicator related to trying to improve the safety of the workplace, with a mean score of 4.0. Overall, these findings indicate that the respondents are committed to safety during the night shift and are taking steps to maintain a safe work environment.

Findings gathered from the interviewees complement the above data, as they revealed that construction

workers become more anxious about their safety behavior during the night shift as they put in extra effort to control the possible risk they may encounter at night. In addition, they are ensuring that they have enough sleep or rest for a nighttime shift. They also check for one another's safety. Furthermore, they follow the instructions given to them, and they can also report things that seem to be malfunctioning or lapses in the work. They also assure that they will have a manageable workload because working at night is such a challenge for the mental and physical capabilities of the workers. Hence, this finding is supported by the study of Matsil and Ismail (2012), which concludes that there is enough room for improvement due to the understanding that good behavior can be sharpened toward behavioral safety compliance and occupational safety and health improvement in the construction industry. Active involvement in behavioral safety compliance identified will result in greater influence among employees and improve safety behavior. The significant role of employers' behavioral safety compliance factors can add value and benefit construction, elevating safety concerns and cultivating a vision for the future.

Another goal of this study is to determine the safety performance of construction workers while working day and night shifts; specifically, the safety locus of control, situation awareness, and safety behavior. Hence, Table 3, 4 and 5 provides a comparative analysis of the associated variables.

Table 3: Descriptive Statistics of the total scores obtained from variable Safety Locus of Control

Shif	N	Mean	Std. Dev	df	t-value	Sig.	Interpretation
Day	62	4.79	0.48	122	-1.813	0.072	Insignificant
Night	62	4.93	0.32				

For Safety Locus of Control, the difference between day and night shifts was found to be statistically insignificant ($p > 0.05$), with a t-value of -1.813 and a p-value of 0.072. The results show that there is no significant difference between the two groups in terms of their Safety Locus of Control.

Table 4: Descriptive Statistics of the total scores obtained from variable Situation Awareness

Shif	N	Mean	Std. Dev	df	t-value	Sig.	Interpretation
Day	62	3.04	0.66	122	3.415	0.001	Significant
Night	62	2.95	0.63				

For Situation Awareness, the difference between day and night shifts was found to be statistically significant ($p < 0.05$), with t-values of 3.415 and corresponding p-values of 0.001 The mean values for Situation Awareness were 3.04 and 2.95 for day and night shifts.

Table 5: Descriptive Statistics of the total scores obtained from variable Safety Behavior

Shif	N	Mean	Std. Dev	df	t-value	Sig.	Interpretation
Day	62	3.82	0.31	122	-3.231	0.002	Significant
Night	62	3.96	0.14				

For Safety Behavior, the difference between day and night shifts was also found to be statistically significant ($p < 0.05$), with t-values -3.231 and p-values of 0.002. The mean values for Safety Behavior were 3.82 and 3.96 for day and night shifts.

Comparative analysis was applied to identify the relationship between the safety performance of day and night shift construction workers. Through data analysis, the results of three different statistical tests examine the differences between day and night shift construction workers regarding their safety locus of control, situation awareness, and safety behavior.

Precisely in the result, it was found that there is no significant difference between day and night shift construction workers in terms of their safety locus of control. Ultimately, it has been known that construction workers involve inherent risks, and workers are aware that accidents can occur if proper safety measures are not taken. Therefore, they tend to take safety precautions seriously and believe they have control over their safety. Ultimately, it has been known that construction workers involve inherent risks, and workers are aware that accidents can occur if proper safety measures are not taken. Therefore, they tend to take safety precautions seriously and believe that they have control over their safety. This is supported by the claim of Haas and Yorio (2019), whose findings showed that safety is often emphasized in the construction industry through safety training programs and safety protocols. This can lead to an increased sense of responsibility for safety among workers and a belief that they can negatively impact their situation awareness. Studies have shown that sleep-deprived workers have reduced cognitive abilities and may have difficulty perceiving and comprehending their environment, leading to decreased situation awareness (Akersted and Wright Jr., 2009). This statement complements the study of Banks (2019), where situation awareness of day and night shift workers can differ significantly due to environmental factors, fatigue, and sleep disruption. Overall, the findings show that day-shift construction workers have higher levels of situational awareness than night-shift workers.

On the other hand, the safety behavior of night shift workers has a higher average score (mean of 3.96) than that of day shift workers (mean of 3.82). This indicates that the time of day when construction work is performed may impact worker safety behaviors and attitudes. A study conducted by Furst (2023) at the University of Tennessee found that day shift workers tended to interact more with supervisors and coworkers, which could lead to better communication and a greater sense of accountability for safety. In addition, the National Institute for Occupational Safety and Health (2014) also found that night-shift workers reported experiencing more sleepiness and fatigue than day-shift workers. This could increase the risk of accidents and injuries on the job. Another study by Pietrzak et al. (2022) found that night-shift workers were likelier to engage in unsafe behavior than day-shift workers. The researchers speculated that this could be because night shift workers put in more effort to cope with factors that can threaten their safety. There may be some differences in safety behavior between day-shift and night-shift construction workers. With night shift workers potentially being at higher risk for accidents and injuries, they tend to have a solution and an alternative way to prevent them. Also, the researchers conclude that these factors that affect why night shift workers tend to have higher safety behaviors are reduced distractions, lower traffic, a different work pace, and a different worker profile. Reduced distraction means that during the night shift, there may be fewer distractions, such as noise and interruptions, which can help workers focus on their tasks and safety. There may also be less traffic and fewer people around during the night shift, which can help reduce the risk of accidents and injuries. Also, night shift workers may work at a slower pace, which can help reduce the risk of accidents and injuries resulting from rushing or overexerting.

Moreover, lastly, night shift workers may have different characteristics and experience levels than day shift workers. For example, night shift workers may be more experienced and have higher seniority, which could lead to higher safety behavior. This shows that it is important for employers to be aware of these differences and take steps to mitigate any potential safety hazards.

IV. SUMMARY OF FINDINGS, CONCLUSIONS, RECOMMENDATIONS

4.1 Summary of Findings

Construction workers play a critical role in building our infrastructure, but the job is also one of the most dangerous in the world. Working on construction sites involves a variety of hazards, and safety is always a concern. Safety performance for construction workers can differ between the day and night shifts, as each shift presents new challenges.

Consequently, the goal of this study involved assessing the safety locus of control, situational awareness, and safety behavior as variables for the safety performance of the day and night shift construction workers. It also aimed to examine the

relationships among these variables to identify the safety performance of the construction workers during day and night shifts. To best delineate the purpose of the study, the researchers used a mixed method in which a total of 124 construction workers, 62 from the day shift and 62 from the night shift, participated. There were 24 of them who joined the interview, while 124 responded to the three sets of questionnaires measuring safety locus of control, situational awareness, and safety behavior. Hence, through data analysis, the following key findings were observed:

1. Both day-shift and night-shift construction workers can find solutions to possible accidents on the site. They can have an excellent safety locus of control level, with an average mean of 4.79 for the day shift and 4.93 for the night shift. The high level of situation awareness for the day shift with a mean score of 3.04, and a high level for the night shift with a mean score of 2.95. Even though there is little difference in safety behavior, they both score excellent levels, with the corresponding mean of 3.82 for the day shift and 3.96 for the night shift
2. For the Safety Locus of Control, the difference between day and night shifts was statistically insignificant ($p > 0.05$), with a t-value of -1.813 and a p-value of 0.072. The results show that there is no significant difference between the two groups in terms of their Safety Locus of Control. For Situation Awareness, the difference between day and night shifts was statistically significant ($p < 0.05$), with t-values of 3.415 and corresponding p-values of 0.001. The mean values for Situation Awareness were 3.04 and 2.95 for day and night shifts. This shows that day shift workers have a higher level of situation awareness than night shifts.
3. For Safety Behavior, the difference between day and night shifts was also statistically significant ($p < 0.05$), with t-values of -3.231 and p-values of 0.002. The mean values for Safety Behavior were 3.82 and 3.96 for day and night shifts. This shows that night shift workers have a higher level of safety behavior than day shifts.
4. Based on the problem statement, the day shift and night shift construction workers described the three variables (safety locus of control, situation awareness, and safety behavior) based on their own experiences and observations on the site. The qualitative and quantitative data gathered from both shifts indicated that there were no significant differences in safety locus of control between day and night shift workers. However, there were significant differences in both situation awareness and safety behavior. Furthermore, this study can utilize the collected data, perceptions, and various factors that contribute to accidents on the site as potential topics for safety seminars. The study successfully addressed all five research questions, which explored how safety locus of control, situation awareness, and safety behavior were described by day and night shift construction workers, whether there were significant differences between the shifts in terms of safety locus of control, situation awareness, and safety behavior, and the feasibility of using the study findings as a topic for safety seminars.

Nonetheless, although there have been studies conducted regarding the variables of this study, this paper provides continuity of the previous aim with a more specific sample and in the context of the safety performance of construction workers in the Philippines. It also succeeded in providing an outcome that belongs to the first local literature with this nature of the study. In addition, one unique contribution of this paper was the close observation of the construction workers. It has been concluded that the safety locus of control, situation awareness, and safety behavior contribute positively to the safety performance of construction workers.

4.2 Conclusion

Based on the indicated key findings, the following conclusions were drawn:

1. Both day-shift and night-shift construction workers maintain a high level of safety awareness, always focusing on the possible harm and risks that may arise on the site. While their situational awareness differs in some factors, such as being expected to be productive despite limited lighting conditions, the night shift workers exhibit slightly different safety behaviors as they put in extra effort to ensure their safety.
2. Construction workers during day and night shifts have the same safety locus of control levels. Day

and night shift workers tend to take safety precautions seriously and believe they have control over their safety.

3. Day shift workers demonstrate significantly higher levels of situational awareness than night shift workers, which can be attributed to factors such as the environment and fatigue. It is recommended that construction workers on the night shift provide adequate training to construction workers to help improve their situational awareness. This can include training on hazard identification, risk assessment, and situational awareness techniques.
4. Night shift workers also exhibit safer behaviors than day shift workers, potentially due to factors such as increased effort in managing safety at night. Hence, it is recommended that clear communication between workers and supervisors is essential for maintaining a safe work environment. Employers should ensure that workers feel comfortable speaking up about safety concerns and that supervisors are responsive to these concerns. Regular safety meetings can also promote communication and keep everyone on the same page regarding safety practices.

4.3 Recommendations

4.3.1 Recommendations to the Stakeholders

The researchers were able to determine the difference between the three variables mentioned and determine the effects on safety performance. Hence, with the key findings obtained, the following recommendation should be observed by the affected people:

1. For the construction workers, as this study revealed the effects of the three mentioned variables on their safety performance in reducing workplace accidents, it is recommended that they improve the three stated variables to have good safety performance that can increase their safety, efficiency, productivity, etc.

2. For the safety officers, as this study shows all the results and findings, it can be used as a guide to improving the safety performance of the employees at the site, it can also be used as a tool for implementing seminars about the given topic, and it can also open the possibility for the contractor of having more safety officers in night shift work.
3. For the site engineer, it can be an eye-opener about the risks and hazards that can happen on the site if one of the construction workers is having trouble with their safety performance. Thus, they can have proper screening, orientation, and immediate actions to prevent possible accidents.

4. For the construction industry, this study can help the industry be more aware and focused on the safety of the employees in their workplace. It can also open up a good opportunity for all aspiring field workers to go to work if the industry can maintain a good safety performance among their employees.

4.3.2 Limitations and Recommendations for the Future Research Expansion

This study assessed the day and night shift construction workers in terms of their safety locus of control, situation awareness, and safety behavior. It also successfully revealed that the three variables greatly impact the safety performance of the construction workers, either day or night. However, despite the significance and insignificance of the day and night shifts in the three variables, several limitations and future expansions can be noted. First and foremost, the quantitative part was conducted under descriptive comparative analysis, delimited into three variables: safety locus of control, situation awareness, and safety behavior. Additionally, these variables' effects were considered to identify the significant difference between day and night shifts. However, the ability of the workers to endure and have a high level of safety performance was not ranked.

As such, the following recommendations for the future researchers are as follows:

1. Other statistical methods are suggested to be utilized, including regression analysis and path analysis, which can determine the causal relationship of the variables. These are efficient techniques that can establish whether a variable has the potential to be a predictor of another.
2. Include all the employees on the site, like the safety officers, site engineers, workers, etc. As they also experience the risks and hazards on the site.

3. Utilize their qualitative approach by interviewing safety officers rather than construction workers because they give orders and instructions about safety. They are also the ones facilitating and observing possible lapses on the site.
4. Also, utilize their quantitative approach by using different questionnaires for the day and night shifts.
5. Include a ranking ranging from low to excellent about the safety performance of their projected subject respondent to show how employees at the site act when problems can affect their safety.
6. If there is the latest data about accident rates in construction for the day and night shifts, it is also recommended to include it to compare the data better.
7. Include the advantages and disadvantages of working day and night shifts.
8. Lastly, the researchers recommend taking a local Review of Related Literature.

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