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The Supervisor's Influence on Worker Safety in Construction Projects: A Case Study in Northern Region, Malaysia

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Abstract

Construction is one of the most hazardous businesses in the world, with countless accidents resulting in substantial loss of life and property damage. The fact that management conduct appears to be a key factor in workplace safety mishaps puts even more attention to the matter. The connection between managerial behaviors and workers' safety in the construction industry has not been well studied or correctly characterized. This paper is aimed at discovering those management behaviors which can significantly impact workers' safety in construction projects. The objectives of this study are to identify the dimensions of supervisory behavior related to workers' safety, to determine the impacts of poor supervision on workers' safety, and lastly to offer solutions to improve bad supervisory behavior to assure workers' safety. A quantitative study was conducted by the distribution of questionnaires, with 142 respondents taken from construction employees from different contractor firms. They were selected from contractors' companies registered under CIDB in three Northern states: Pulau Pinang, Kedah, and Perlis. The data were analyzed by using Statistical Package for the Social Science (SPSS). Normality, Validity, and Reliability Test with Cronbach's Alpha Coefficient has been adopted in this research. The repercussions include delays in job progress, expenditure overruns, rework, and disruption of the project's timeline and also to the productivity of the project. The impacts include delays in work progress, expense overruns, rework, mess with the project's schedule, and also to the productivity of the project. Based on these findings, a supervisory effort to modify bad supervising behavior may assist to protect worker safety.

Keywords: *Safety and Health, Construction Management, Construction Projects*

1. Introduction

Construction is one of the most dangerous industries in the world, with numerous accidents resulting in significant loss of life and property damage. According to the Health and Safety Executive (HSE), about 80% to 90% of all workplace injuries and incidents are caused by unsafe conduct, which has also been proven to be the leading cause of unintentional accidents (Choi et al., 2017). Despite the increased efforts, construction safety did not change nearly as much as in other industries to reduce accidents (Chong et al., 2018). In addition, decentralization and mobility are also considered in construction practices, where frontline employees have more latitude to make strategic behavioral choices and frequently change the environment of the workplace (Choi et al., 2017).

Accidents and fatal injuries are common in the construction industry. Inadequate supervision, as well as a failure

to adhere to safe work practices techniques, failure to put on personal protection equipment, as well as failure to adhere to the safe usage of equipment and vehicles, and machinery, are all factors that contribute to workplace accidents (Jimoh, et al., 2017). Abas et al., (2013) reported that 2,822 casual occupational injuries occurred in Malaysia, with an average yearly incidence of 9.2 fatal job-related injuries per 100,000 employees, based on secondary data from the Malaysia Social Security Organization (SOCSO). According to recently released data from the Department of Occupational Safety and Health (DOSH, 2020), statistics show that from 2015 to 2019, about a 116% increase in accident cases. The main causes of accidents are working in high, unsafe work practices or conditions, and failure of structure (Ismail & Othman, 2021).

This research is critical because it aims to determine the relationship between poor supervisory behavior and worker safety, as well as their dimensions and indicators (questionnaire items), to provide clear instructions and recommendations to construction practitioners about how supervisors may influence worker safety behavior. Therefore, the objectives of this study are discovered: to identify the dimensions of supervisory behavior related to workers' safety, to determine the impacts of poor supervision on workers' safety, and lastly to recommend the solutions to improve bad supervisory behavior to assure workers' safety.

1.1. Overview of Supervisor's Influence on Worker Safety in Construction Projects

Despite the introduction of an increasing number of occupational health and safety requirements in many nations, the frequency of accidents in building projects remains high (Chunlin et al., 2017). According to the International Labour Organization (ILO), there are around 313 million occupational accidents annually, with over 350,000 deaths, corresponding to over 800 thousand accidents, and 959 succumb every day (ILO, 2015). One of the key causes is that construction project managers lack safety leadership, which has been shown that if they mastered the thing, they would be capable of enforcing regulations and rules and reducing incongruity between managerial dedication and lower-level employees' conduct in high-risk, complex working environments (Grill et al., 2019, Chunlin et al., 2017). The construction industry poses special obstacles in ensuring safe work environments, such as highly variable, dangerous, and changeable work environments; short-term job and employment contracts; production constraints; and multiemployer work environments.

1.2. The Importance of Supervisors Towards Worker Safety Behavior

The supervisor is in charge of the productivity and actions of a small group of employees. In the past, Congress has argued where the line should be drawn between employees with varying levels of managerial responsibilities. Employees with major supervisory responsibilities, such as recruiting and firing, are often considered supervisors (Mayer & Shimabukuro, 2013). Supervisors are in charge of creating and maintaining the workplace environment in which accidents and injuries occur. Safety performance excellence is measured by how well supervisors influence their employees' actions (Gualardo., 2017).

Among the three management layers, supervisors have the most regular interaction with workers and are directly responsible for ensuring good safety performance in the workplace. Previous research by Grill et al. (2019) confirmed that organizational or supervisory factors are crucial to the formation of control over safety onsite. Their research reported that supervisors' injunctive safety norms (i.e., one type of social influence, such as what ought to be done) had positive effects on workers regarding workplace safety. The connection between senior and middle management and employee behavior, on the other hand, is neither direct nor unconditional. Instead, some mediating elements exist in the middle, such as the role of frontline operational management. Senior management commitment has no substantial direct impact on safety performance, rather, the relationships with safety initiatives and supervisors' involvement as mediating variables have more validity (Mustafa et al., 2022).

Other research has found that the relationship between frontline supervisors and workers is one of the most significant working connections in the construction business and that it has a considerable impact on individual safety performance. Because of the complicated and the building industry dynamic nature, construction employees rely significantly on their supervisors for task assignments and continuous advice and assistance.

Supervisors who deal with workers the most can so directly contribute to the improvement of the safety environment, which determines the attitudes of employees toward safety and actions, as opposed to middle or top management (Su et al., 2019).

Finally, in terms of worker safety behavior in construction, Grill et al. (2019) have proven the relevance of supervisors' involvement. As a result, it can be argued that supervisors' immediate and positive feedback on workers' problems and challenges in the workplace demonstrates their care and concern, which exemplifies outstanding safety leadership.

1.3. The Dimensions of Supervisory Behaviour Related to Workers' Safety

The studies shown below describe different kinds of contributory factors to exhibit unsafe supervisory behaviors that will impact workers' safety:

1.3.1 Communication

Regular communication with the supervisor is an important supervisory component that influences the degree of role conflict and ambiguity that the employee confronts. Role conflict occurs when a supervisor is confronted with two or more contradictory work demands from his organizational superiors, customers, family members, or other role partners. Workers suffer role ambiguity as a consequence of a lack of communication since they are confused about how to carry out their responsibilities (Fatima & Azam, 2016). Even though supervisors confront a variety of demands and job conflicts, supervisors who fail to communicate and manage their employees appropriately will push them to do unsafe jobs, which will almost certainly result in workplace accidents (Chunlin et al., 2017).

1.3.2 Consideration

Consideration is a leadership trait that focuses on connection development. Consideration refers to the extent to which managers foster a work environment of psychological support, helpfulness, friendliness, and mutual trust and respect. It simply refers to how well managers treat workers as individuals, with decency and respect. Supervisors exhibit a range of behaviors. Some individuals are attentive, while others are not. Some CEOs allow their staff to help create goals, while others do not (Grill et al., 2019, Uduji & Onwumere, 2013). When managers are unempathetic, they fail to see that their staff has personal goals and desires. Employee behavior is governed by restrictions and the possibility of repercussions. The subordinate's judgments of role conflict and ambiguity are adversely related to the supervisor's worry. Employees may feel pushed as a result of their supervisors' disregard for them, causing them to make errors on the job site and cause accidents (Newaz et al., 2019).

1.3.3 Feedback

Supervisory feedback is a significant tool for managing employee performance. Positive rather than negative feedback is more likely to be given to employees who perform at or above expectations (Fatima & Azam, 2016). Varied sorts of feedback have different effects on workers' job-related strain, organisational commitment, and so on. Su et al. (2019) also discovered that feedback had a negative relationship with role ambiguity. These findings show that both positive and negative output feedback will remind workers of the intended outcomes, which will help them improve their performance. Feedback can also enhance workers' knowledge in construction and prevent them from acting as they like because they already have guidance from supervisors and directly prevent them from any unwanted injuries (Zahiri et al., 2020).

1.3.4 Knowledge of Job

Unwillingness to gather complete information is a trait that is more common among supervisors who are less knowledgeable and consider that certain behaviors are irrelevant to the evaluation. On the other hand, competent supervisors pay attention to numerous aspects of employees' behaviors, distinguishing between degrees within dimensions, and therefore improving the accuracy of the rating process (Fatima & Azam, 2016, Chong et al., 2018).

1.3.5 Poor Direct Safety Management and Supervision

When dealing with safety issues, supervisors did not continue to demonstrate their confidence and competence. The supervisors' lack of authority and power, the lack of a distinct budget for safety, and the lack of suitable safety training at suitable levels were also cited as variables that shape the context and lead to risky behavior and the probability of error in the construction site. These findings confirm prior evidence that management should offer enough funding and support to fulfill safety objectives (Zahiri et al., 2020, Newaz et al., 2019).

1.3.6 Supervisors Provide an Unsafe Workplace Condition

Excessive noise levels were found to impede workers' focus and working in high temperatures was also viewed as hazardous to their safety. Indeed, aspects of bad social working environments have been connected to safety perceptions and may act as stressors (Xu et al., 2018). Workplace variables have the biggest impact on employees' sense of belonging to the company and help them engage in positive safety behaviors. Workers can manage better if unexpected problems arise in a good work environment, hence levels of worker involvement in safety actions could perhaps be increased (Wachter & Yorio, 2014).

1.3.7 Broader Organisational Factor

Workers who are subjected to dismissive safety supervision and workplace bullying are more prone to engage in risky behaviors. These findings were incorporated in a study (Obeidat et al., 2018) in which safety experts described their workplace bullying experiences and the extent to which they were pressured to make risk-based judgments. Employees who had experienced workplace bullying were more likely than those who had not engaged in a wide range of harmful and harmful behaviors. When safety issues arise, several participants in the current study stated that their supervisor employs a condescending tone and threatens workers and that workers are unable to criticize their behavior, resulting in a dispute between the workers and the supervisor. Many prior researchers have connected supervisory bullying to bad organizational outcomes such as the organization and employees engaging in risky activities and an increase in workplace errors among employees in industrial environments. Workplace bullying is a major contributor to occupational health and safety hazards, which can have long-term consequences. Workplace bullying can result in health problems such as job instability on both a quantitative and qualitative level, as well as a loss of self-esteem and confidence, which can lead to unethical behavior and workplace accidents (Haq et al., 2018, Xu et al., 2018).

1.4. The Impacts of Poor Supervision on Workers' Safety

The total effectiveness and efficiency of building projects are heavily influenced by the level of site supervision. One of the leading reasons for rework is considered to be insufficient monitoring (Hampson, 2017). Rework is described as an activity that is considered accomplished but does not meet the customer's expectations. Conventional construction management practice does not have a solid foundation in quality management concepts and techniques. As a consequence, rework is often regarded as an unavoidable part of the building process, raising the chances of project schedule and expense overruns and, ultimately, client displeasure. Rework expenses may run anywhere between 4% and 12% of the overall expenditure. Poor material quality, misunderstanding of the drawing, and other external variables all contribute to a substantial portion of these expenses. The growing quantity and expense of rework are essentially related to many supervisors' failure to organize work, communicate with employees, and supervise operations effectively (Mbatha, 2021).

The second effect of inadequate construction oversight is the delay in work. A delay is an act or occurrence that extends the time needed to complete a particular job needed under contract or contract frame, thus the delay is manifested as extra days or the late start of the following activity, which may or may not involve modifications in the scope of the contract (Khalid, 2019). Construction project delays, defined as the failure to complete and complete the project within the predetermined construction contract's time frame, are a frequent issue in the building sector (Mbatha, 2021). As a result, many construction projects fail to fulfill the deadlines set out in the planning schedule.

Poor construction project supervision poses a risk to people's lives and property. The overall execution and productivity of construction may be influenced by site supervision. Inadequate supervision may lead to poor planning and management of tools, equipment, supplies, and labor, all of which have an impact on productivity (Jimoh, et al., 2017). As a result, supervisors must be able to plan, organize, lead, monitor, and manage their teams. They must also have fundamental technical and interpersonal skills, as well as a thorough understanding of all operations under their supervision to prevent any losses for the building business. Based on this analysis of numerous studies and literature, it can be stated that inadequate construction project supervision may have several detrimental impacts on project length and completion. All of these consequences of inadequate supervision are often to blame for turning profitable projects into losing ones.

1.5. The Strategies to Improve Poor Supervisory Behaviour to Ensure Workers' Safety

Ways of reducing the negative impacts of improper supervisory behaviour can be explained as follows:

1.5.1 Safety Leadership Improvement

The core of this activity is that all project meetings have an occupational safety and health discussion as the opening session. The goal of this activity is to standardize and strengthen the safety of existing gatherings for discussion and communication of diverse topics, rather than to expand the frequency and variety of present project meetings (Grill et al., 2019, Shen et. al, 2017). Using a typical start as a safety session, meeting attendees would be persuaded time and time again that safety should be prioritized above all other project management concerns. The senior leader should attend and preside over the scheduled safety meeting, leading by example and emphasizing the significance of safety. As a result, it expresses a strong management commitment to safety, reinforcing the importance of safety as the top priority among all project objectives (Xu et al., 2018).

1.5.2 The on-site inspections on a regular basis

Constant presence onsite for safety inspections, training, and humanistic care for employees has proved to be a very successful leadership strategy (Zulkifli et al, 2020). The leadership aspects of idealized influence, intellectual stimulation, and personalized attention are theoretically predicated on regular onsite visits by project senior supervisors. The high frequency of construction accidents may be ascribed to a mismatch between management commitment and subordinates' behavior to a large degree (Grill et al., 2019, Shen et. al, 2017). Regular onsite visits are required for all project leaders including the top executives, the middle managers, and the lower-level workers, and are focused on safety concerns. Each visiting leader's frequency and length are also set according to their job responsibilities (Newaz et al., 2019).

1.5.3 Safety Training

Training has traditionally been linked with a one-on-one method of giving targeted feedback, encouraging, and increasing awareness to assist others to develop, grow, and reach a better level of performance (Zulkifli et al, 2020). Safety training is a successful approach for altering risky behaviors, dispelling false safety assumptions, and avoiding workplace mishaps. Appropriate and sufficient training programs have a direct impact on the safe behavior of employees (Xu et al., 2018).

2. Research Methods

In this study, one methodological approach used is a questionnaire survey. The questionnaire survey was created using the findings of a literature review. The questionnaires are distributed to the construction companies through Google Forms and WhatsApp to the workers of the companies. The targeted respondents are the construction workers who work under Grade 3 until Grade 6 companies that are related to civil engineering works.

2.1 Sample Size and Population

The intended respondents for this study are from three Northern states: Kedah, Pulau Pinang, and Perlis. In all three states, there are 2868 registered contractors from Grade 3 to Grade 6. The sample size for 2868 (the number of contractors registered in Kedah, Pulau Pinang, and Perlis) is 339, according to Krejcie and Morgan (1970) in Table 3.3. According to Miller (1991), 170 respondents are sufficient for analysis and reporting since they represent a 50% legitimate response rate. However, owing to time restrictions, the response rate for this survey is 42%, representing 142 respondents is not adequate. Adequacy of valid response for analysis and reporting (Sources Miller,1991) in Table 1 below:

Table 1. Adequacy of valid response for analysis and reporting

Valid Response Rate (%)	Adequacy for Analysis and Reporting
<50	Not adequate
50-59	Adequate
60-69	Good
70-100	Very good

Source: Miller (1991)

2.2 Questionnaire Design

The questionnaire is developed by using the Likert Scale method. The Likert Scale is a form of psychometric response scale in which respondents generally specify in five points their level of agreement to a statement which is (1) Strongly Disagree, (2) Disagree, (3) Neutral, (4) Agree and (5) Strongly Agree. The questionnaire was divided into four sections: Section A: Background information (4 questions), Section B: Dimensions of Supervisory Behaviour (19 questions), Section C: Impacts of Poor Supervision (5 questions), and Section D: Strategies to Improve Poor Supervisory Behaviour (5 questions). Overall, there are 33 questions in the survey.

2.3 Data Analysis

Preliminary analyses were also conducted to analyze the normality, reliability, and descriptive tests.

2.3.1 Normality, Reliability, and Descriptive Analysis

Normality tests are commonly utilized to assess whether a dataset can be accurately modeled by a normal distribution and to determine the probability of a random variable underlying the dataset being normally distributed (Creswell et al., 2004). The data of this questionnaire survey were also analyzed by using Statistical Package for the Social Sciences (SPSS) to check the reliability of the data by using Cronbach's Alpha test (Hair et al., 2010). Cronbach Alpha reliability test was used for Sections B, C, and D of the questionnaire in the pilot study. This type of test refers to a table that displays Cronbach's Alpha value and its level of reliability. Since Section B, C, and D of the questionnaire consists of multiple Likert questions, it can identify how closely a group of test items is related to one another based on the value of the Cronbach's Alpha obtained. Table 2 shows the range of values of Cronbach's Alpha and its level of reliability. The value of alpha increases as the questionnaire's items become more correlated to each other. Thus, increasing the level of reliability of the test.

Table 2. Guideline of Cronbach's Alpha Coefficient Range Reliability

Alpha Coefficient Range	Strength of Association
$\alpha > 0.9$	Excellent
$0.8 > \alpha > 0.9$	Very Good
$0.7 > \alpha > 0.8$	Good
$0.6 > \alpha > 0.7$	Moderate
$\alpha < 0.6$	Poor

Source: Essential of Research Business Method (Hair et al., 2010)

Descriptive statistics were also used in this study to obtain the mean and ranking for all the objectives. A descriptive analysis was used for Sections A, B, C, and D of the questionnaire. This summarized the set of data from Sections A, B, C, and D into a frequency and mean distribution table. It also listed all the variables from Sections A, B, C, and D and the rank obtained for each variable. This analysis is useful to simplify large volumes of data and reveal patterns in the frequency of various responses (Creswell et al., 2004).

3. Result and Discussion

3.1 Normality Analysis

Two sets of tests were analyzed to determine the normality and distribution of data and there are the normality test and the Normal Q-Q plot in SPSS. The result obtains from Table 3 shows, the significance value is 0.200, which is greater than 0.05. Therefore, the data is normal. To consider normally distributed, the scatter should be as close to the trend line as possible without any apparent pattern straying from it. As shown in Figure 1, shows that the scatter dots are clustered around the trend line and are considered normally distributed.

Table 3. Tests of Normality for all factors

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig
Compute all	.061	142	.200*	.990	142	.448

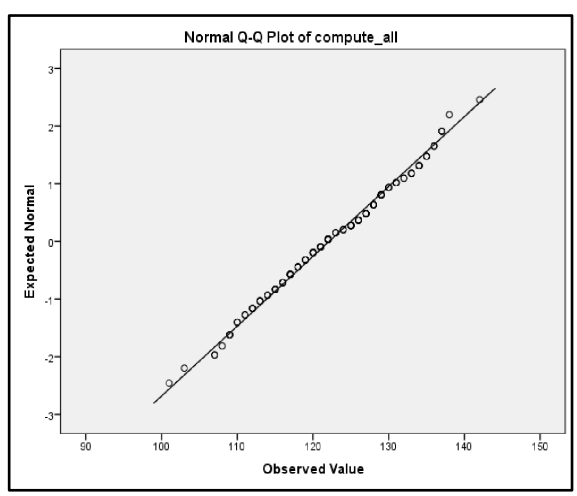

Figure 1. Normal Q-Q Plot Test Trendline

3.2 Reliability Analysis

The reliability test was also tested using Cronbach's Alpha Coefficient. Cronbach's Alpha is the most used indicator of reliability for internal consistency. Usually, it is utilized when it consists of numerous Likert scale-type questions in a questionnaire, and one wants to verify whether the scales are reliable. The reliability of the questionnaire depends on the Cronbach's Alpha achieved, as shown in Table 3 below. Based on the analysis, Cronbach's Alpha coefficient for Section B is 0.789 (good). While Section C resulted in 0.909 (excellent) and Section D resulted in 0.926 (excellent). The result showed that the result collected is viable and effective to be used for the study.

3.3 Descriptive analysis

This section discussed the respondents' background, the dimensions of supervisory behaviour, the impacts of poor supervision, and the strategies to improve poor supervisory behaviour.

3.3.1 Respondents' Background

Figure 2 shows the respondents' detail according to their grade of the company in the construction field. The highest percentage is respondents from Grade 3 with 43.7% and the second highest is respondents from Grade 4 with 28.9%. The lowest percentage of respondents are from Grade 6 with only 12%. The data obtained shows that among the 142 respondents, 62 respondents are from Grade 3, 41 respondents are from Grade 4, 22 respondents are from Grade 5 and 17 respondents are from Grade 6.

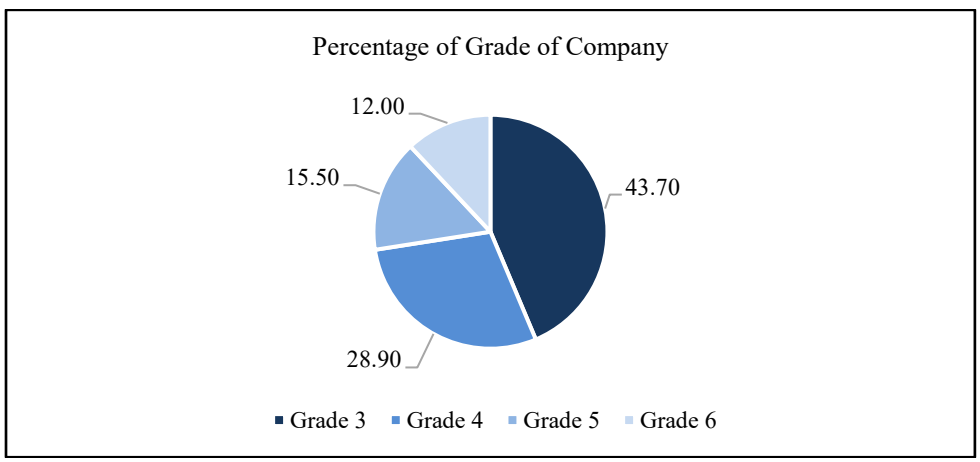

Figure 2. Respondents' detail according to the Grade of the Company

Figure 3 shows the respondents' detail according to the workers' involvement in the construction industry. The highest percentage is respondents with less than five years of work experience at 53.5% while the second highest percentage is respondents with 6 to 10 years of work experience at 23.9%. The lowest percentage of respondents are respondents with 11 to 15 years or more of work experience with 11.3%.

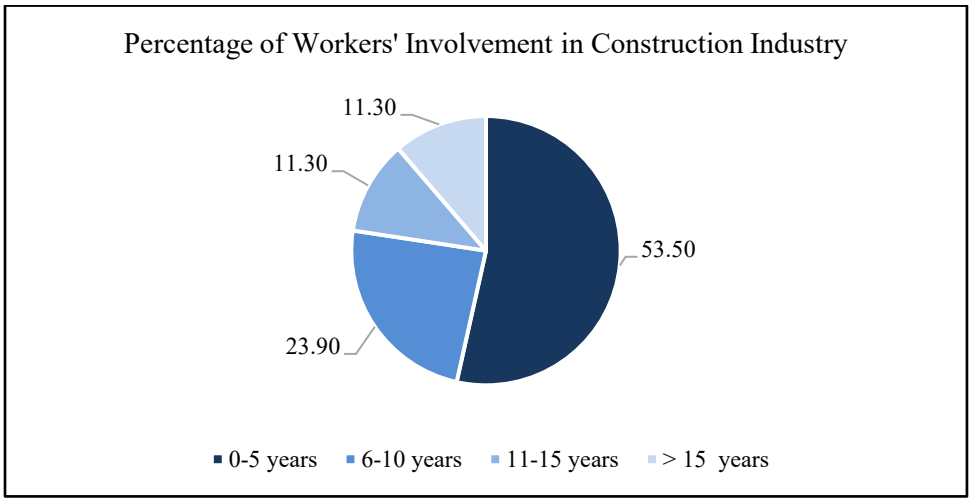

Figure 3. Respondents detail according to Workers' Involvement in Construction Industry

Figure 4 shows the respondents' detail according to the supervisors' involvement in the construction industry. The highest percentage is respondents with 6 to 10 years of work experience at 32.4% while the second highest percentage is respondents with less than five years of work experience at 31.7%. The lowest percentage of respondents are respondents with more than 15 years of work experience at 16.9%.

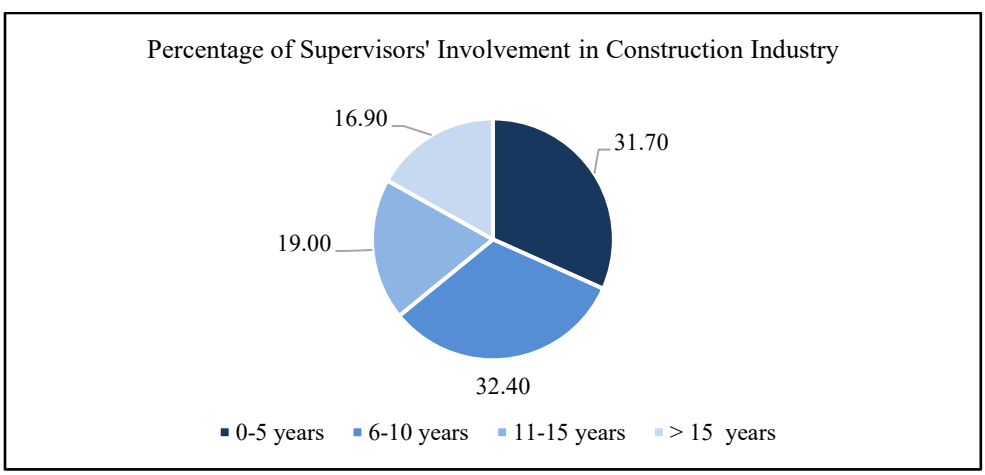

Figure 4. Respondents' detail according to Supervisor's Involvement in Construction Industry

Based on the information provided, it can be concluded that all the respondents have had good experiences with supervisory involvement in the construction industry.

3.3.2 The Dimensions of Supervisory Behaviour Related to Workers' Safety (RO1)

Figure 5 illustrates the average mean for dimensions of supervisory behavior related to worker safety. There are seven dimensions included for Section B in the questionnaire survey which are communication, consideration, feedback, knowledge of the job, poor direct safety management and supervision, supervisors providing an unsafe workplace condition, and broader organizational factor. The broader organizational factor ranks first in the chart shown with an average mean of 4.5. Zahiri et al. (2020) asserted that supervisors have a role in promoting hazardous actions and mistakes, and in some cases, causing physical harm. Additionally,

organizational factors such as prolonged working hours and excessive job demands are also contributors to workplace injuries. For instance, extended working hours have been linked to higher rates of workplace injuries, decreased worker productivity, and diminished well-being (Su et al., 2019).

Poor direct safety management and supervision is in the second rank with an average mean of 4.47, followed by the third rank which is knowledge of job with an average mean of 4.32. Supervisors' assurance and proficiency in safety matters were found to be inadequate. Conversely, capable supervisors meticulously observe various aspects of employee behavior, distinguishing between different degrees within each dimension, thereby enhancing the precision of the evaluation process (Fatima & Azam, 2016).

On the other hand, communication is in the last rank of the seven dimensions with an average mean of 3.21. Maintaining regular communication with the supervisor is a crucial element of supervision that impacts the level of role ambiguity and conflict experienced by employees (Fatima & Azam, 2016; Su et al., 2019).

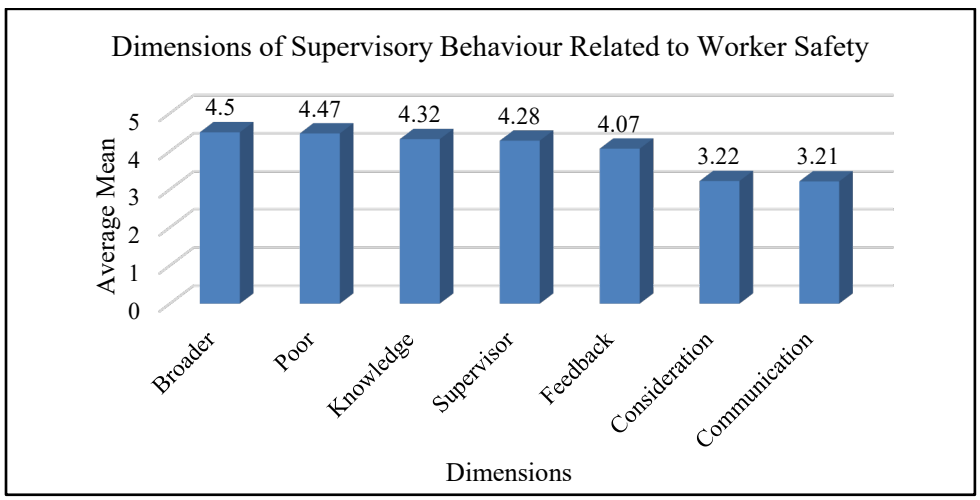

Figure 5. Average mean for dimensions of supervisory behaviour related to workers' safety

3.3.3 The Impacts of Poor Supervision on Workers' Safety (RO2)

Figure 6 shows the mean for impacts of poor supervision on workers' safety. Based on the chart, the highest rank of the overall mean is Impact_4 which is site supervision can influence the overall execution and productivity of construction with a mean of 4.59. Numerous entities were involved in the construction project, including the contractor, subcontractor, engineer, safety officer, architect, consultant, and others. However, the project must be completed within the specified timeframe and budget, while maintaining the highest possible quality standards. Thus, inadequate supervision during construction can have adverse effects on the project (Clemente et al., 2017). Poor supervision can lead to various consequences, including higher chances of rework and construction expenses, project delays, and a threat to overall productivity.

The second highest rank is Impact_5 which is inadequate supervision may lead to poor planning and management of tools, equipment, supplies, and labor, all of which have an impact on productivity with a mean of 4.56, followed by the third rank which is Impact_3 that stated construction projects fail to fulfill the deadlines set out in the planning schedule and cause a delay in work progress with the mean of 4.51. Insufficient supervision can result in ineffective planning and management of resources such as tools, equipment, supplies, and labor, all of which can significantly affect productivity (Jimoh et al., 2017). Therefore, supervisors need to possess the skills to plan, organize, lead, monitor, and manage their teams effectively. They must also have a strong technical and interpersonal skill set, as well as comprehensive knowledge of all operations under their supervision to avoid any losses for the construction company.

Meanwhile, the lowest rank of the overall mean in this section is from Impact_1 which stated that insufficient monitoring can lead to rework and mess with the project's schedule with a mean of 4.42. The degree of site supervision has a significant impact on the overall effectiveness and efficiency of construction projects. Inadequate monitoring is considered one of the primary causes of rework (Hampson, 2017).

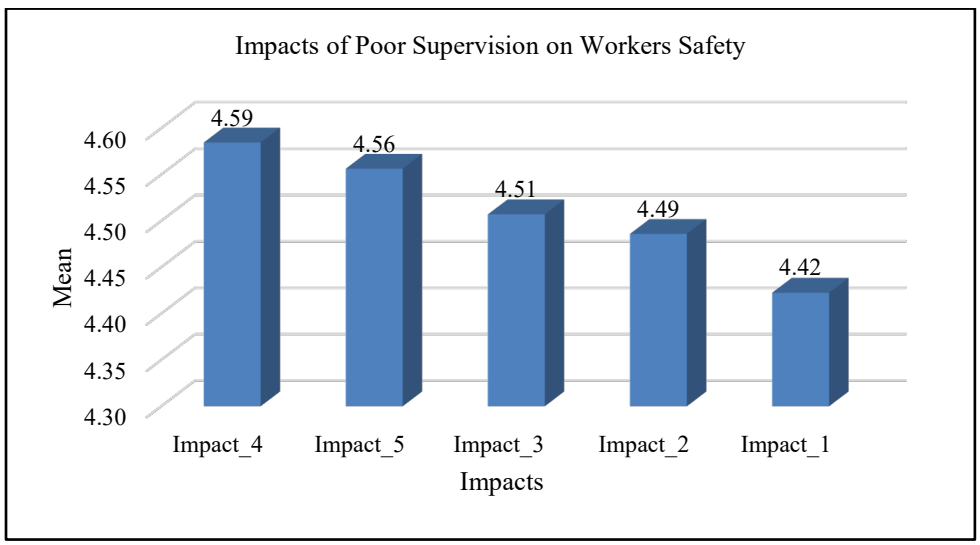

Figure 6. Mean for impacts of poor supervision on workers' safety

3.3.4 The Strategies to Improve Poor Supervisory Behaviour to Ensure Workers' Safety (RO3)

Figure 7 shows the mean for strategies to improve supervisory behavior to ensure worker safety. Based on the chart, the highest rank of the overall mean is Strategy_5 which is safety training for a supervisor that can increase their level of sensitivity while working and can prevent workers from any injuries on the construction site with a mean of 4.65. Safety training is an effective method for modifying hazardous behaviors, correcting misconceptions about safety, and preventing workplace accidents. Well-designed and comprehensive training programs directly influence the safe conduct of employees (Xu et al., 2018).

The second highest rank is Strategy_3 which is monitoring safety compliances by supervisors in all activities can prevent any unwanted injuries with a mean of 4.63, followed by the third rank which is Strategy_1 and Strategy_4 stated organizing a fixed meeting about safety once a week can ensure worker's safety and supervisors need to go to safety training regularly with the mean of 4.60. All project leaders, including top executives, middle managers, and lower-level workers, must conduct regular onsite visits that specifically address safety concerns. The frequency and duration of each leader's visit are determined based on their job responsibilities (Newaz et al., 2019).

Meanwhile, the lowest rank of the overall mean in this section is from Strategy_2 which stated that increase inspection of workers' safety awareness can ensure worker safety with a mean of 4.58. Zulkifli et al. (2020) found that a leadership approach that includes consistent onsite presence for safety inspections, training, and demonstrating humane care for employees is a highly effective strategy.

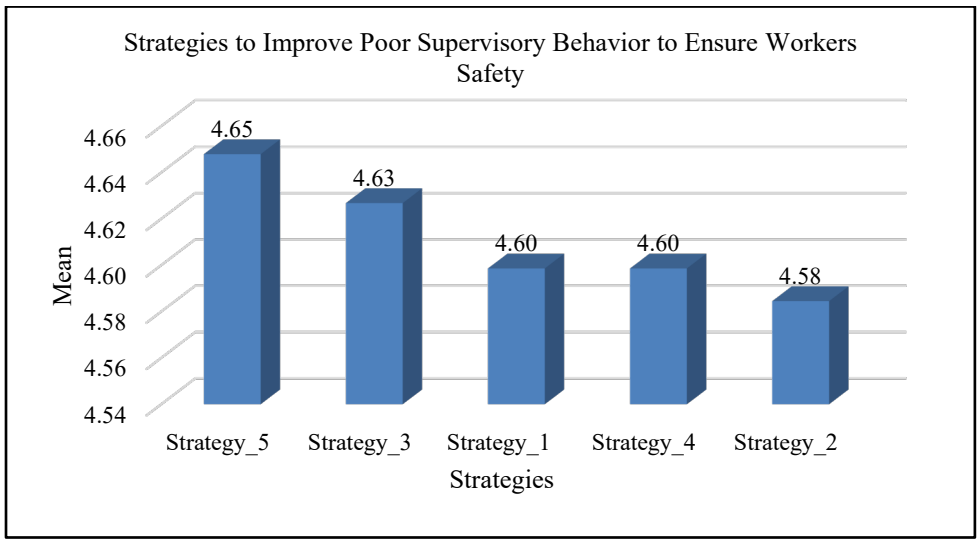

Figure 7. Average mean for dimensions of supervisory behaviour related to worker safety

4. Conclusion

The main purpose of this research was to investigate the supervisor's effect on worker safety in construction projects in Pulau Pinang, Kedah, and Perlis employees from contactor's businesses of Grade 3 to Grade 6. Based on the findings of this study, it is possible to infer that the first research objective, identifying the elements of supervisory behavior relevant to worker safety, has been met. It has been shown that all seven elements of supervisory behavior have an impact on worker safety. Broader organizational factors, inadequate direct safety management and supervision, and job knowledge was shown to have the greatest effect on worker safety in construction projects.

Meanwhile, the second research objective, which is to determine the impacts of poor supervision on worker safety in construction projects, has also been met, with the most important thing being site supervision, which can influence the overall execution and productivity of construction, followed by inadequate supervision, which can lead to poor planning and management of tools, equipment, supplies, and labor, all of which have an impact on productivity. Construction projects fail to meet the dates outlined in the planning timetable, causing work to be delayed. Finally, inadequate monitoring might result in rework and disrupt the project's timetable. Rework also increases the likelihood of cost overruns and, ultimately, customer dissatisfaction.

Finally, the last objective is to provide solutions to change bad supervisory behavior to assure worker safety. From the standpoint of project management, there are a few ideas that have been discovered to enhance supervisory behavior in building projects. First, supervisors must attend safety training regularly. Safety training for supervisors may enhance their level of sensitivity while working and prevent people from being injured on the job. Second, by holding a weekly safety meeting, it is possible to assure worker safety in a building project. Increased inspection of worker safety awareness and supervisory monitoring of safety compliances in all operations may undoubtedly avoid any undesirable injuries in the construction field.

In future research, it is essential to focus on the relationship between worker safety perception and the influence of supervisors to gain a better understanding of how these factors are connected. Additionally, studies should also consider worker behavior, which can lead to accidents and compromise safety in construction projects. Future researchers may consider expanding the study to other locations to gain a broader perspective on the subject. This paper holds significance for both theoretical advancement and practical skills, with a particular focus on the role of supervisors in reducing safety-related incidents that may arise due to the negligence of certain parties. It emphasizes the importance of recognizing that supervisors play a crucial role in promoting

worker safety, as they are leaders on the front lines of a construction site and have the potential to directly influence the safety environment and subsequent worker behavior. By reducing the number of unwanted incidents, the quality of work within the construction industry can be enhanced.

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Declaration of Conflicting Interests

All authors declare that they have no conflicts of interest.

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