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Research Article

Evaluation Of Confined Space Safety Regulation Compliance And Worker Awareness In Hong Kong

Dr WONG Chung Tong[1*]

[1*]Director, Tomg Yin Consulting Engineers Limited Email:-tongyin113@gmail.com

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ABSTRACT

Purpose: Safety issues have become increasingly important in the construction business. In an effort to reduce accidents, eliminate illness, and provide an ideal working atmosphere on their built-up sites, several construction businesses worldwide are using ecological, health, and safety oversight strategies. Personal Protective Equipment (PPE), specific processes, and engineering safeguards have been the mainstays of traditional prevention of infections methods. Among Hong Kong construction workers, this research examined the linear and curvilinear correlations between gender and safety performance (accident rates and occupational injuries), as well as safety attitudes.

Method: This study examines at the connections between psychological stresses (distress and fulfilment with employment on the psychological level), safety performances (self-reported accident and injury rate at workplace), and safety environment (safety attitudes and interactions). 375 construction workers from 27 sites in Hong Kong, China (M = 365, F = 9, mean age = 35.64 years) were given an interview. In-depth interviews and questionnaires were used to gather data between February and May 2018.

Results: Using a path analysis conducted using the EQS-5, the proposed model of the interaction among the safety the surroundings, safety performance, and psychological stressors was evaluated. The results provide some support for the idea, as psychological distress and safety attitudes both predict the prevalence of accidents and work-related injuries. The analysis gave important information on eight components of safety in construction, involving security procedures and specifications, safety organization as well, safety training, inspection of hazardous circumstances, personal protection program, machinery and supplies, promotion of safety, and managerial behaviour.

Conclusion: The survey findings give managers of building projects and safety in construction professionals with practical information to help them keep their sites safe. This article presents insights and comments. Variability in organisational and individual characteristics can explain a large portion of the diversity in self-protective conduct in health care environments. Moreover, a mediator in the relationship between safeguarding mentality and the number of accidents was shown to be psychological distress. Examined is the effect of these results on psychological counselling in the construction industry.

Keywords: - Construction Industry, Health, And Environmental, Sites Safer, Psychological Strains, Safety Climate, Construction Safety, Space Safety, Hong Kong, Personal Protective Equipment (PPE), Protection Program, Health Care, Accident Rates.

I. INTRODUCTION

Over the years, Hong Kong's safety on construction sites record was terrible. In 1994, there were 275 reportable injuries per 1,000 employees per year; [1], by 2000, the ratio was about 150. In contrast with Japanese numbers, 10 out of every 1,000 construction workers are injured each year, whereas the figure in the United Kingdom is roughly 50 [1]. The equivalent injury rates remain high in the city of Hong Kong [1, 2]. The reasons to accomplish this are numerous and will not be addressed in this paper [2, 3]. The emphasis will instead be

on describing an effective method for dealing with site safety issues on construction projects [3, 4]. The security of construction sites is currently gaining widespread acceptance as a critical concern in Hong Kong's sector of construction. CAP59, [4, 5], Factory and Industries Undertaking Ordinaries (FIUO), and CAP509, Occupational Well-being and Safety ordinances, are the current construction-related safety laws and regulations in the city of Hong Kong [5, 6]. The Factory and Industrial Undertakings Ordinance (FIUO) empowers the Labour Department's Occupational Safety and Health Bureau to implement these restrictions [6]. Problems with the environment on building occupations are monitored by the Administration of the Hong Kong Special Administrative Area's Environmental Protection Department [6, 7]. The Hong Kong governments has moved away from prescription safety laws and toward performance-based health and safety management throughout the last 10 years. With an unintentional fatality rate of 0.39 per 1,000 workers in construction in Hong Kong in 2003, this technique has shown to be a great success. The total number of construction-related deaths fell to 17 LD in 2004 [7].

Working in Confined Sectors (CS) is extremely hazardous because such areas are not planned or intended for prolonged human occupation. Strict regulations, like the manufacturing goals Code of Practice for Improve Working in Confined Space (ICOP) 2010, [7], the Occupational Safety and Health Administration's (OSHA) 1994, and the Factories and Machinery (Safe, Health, and Welfare) Regulations of 1970, are in place because confined spaces are places of employment where there is a risk of injury for everyone who works there as well [7, 8]. These are used to ensure the security of employees and assets.

When working in computer science, disregarding standard operating procedures may result in both property damage and possibly deadly illnesses or injuries. Certain CS, [8, 9], including storage tanks, silos, sewers, and wells, are obvious; on the other hand, less obvious CS, like chambers or pipelines, could be just as dangerous [9]. Confining space may be dangerous due to several reasons such as temperatures that produce a considerable rise in the temperature of the body, excessive accumulations of dust, [9, 10], fire or explosion threats, and low oxygen consumption. Data from the Census of Frequent Occupational Injuries (CFOI) from the US Bureau of Labour Statistics show that 1030 people suffered injuries or wounds from CS between 2011 and 2018 [10].

18 CS-related accidental deaths have occurred in Hong Kong between 2004 and 2014, translating to an annual rate of death of 0.08 per 100,000 employees Fig. 1. In Hong Kong, there were 45 fatal computer science accidents between 2009 and 2019 [11]. The bulk of these incidents were brought on by inadequate risk evaluation documents, knowledge, or competency, as well as secure working conditions. There were 13 CS deaths in 2020 according to the Hong Kong Division of Occupational Health and Safety, which is up from 6 in 2019 [11, 12]. The bulk of occupation-specific mortality rates, according to the fatalities [12]. Accident Characteristics and Epidemiological (FACE) research, is related to water supply in municipalities and sanitary infrastructure, including the maintenance and repair of storage tanks, waste water treatment plants, and sewers. Construction (particularly the building of water systems and sewers, which is done via autonomous trade contracts), manufacturing, [12], electricity companies, agriculture, and modes of transportation are other businesses linked to CS mortality [13].

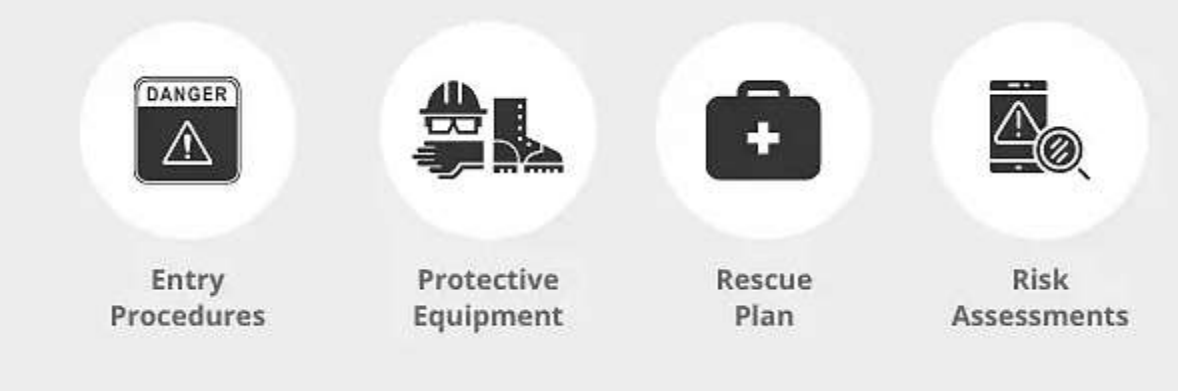

Fig. 1 Confined Space Safety.

To increase the safety of workers on the projects of a leading construction business, Tsinghua University's Tsinghua-Gammon Constructs Safety Study Centre was entrusted with a two-year research study in Hong Kong, China [13, 14]. The objective was to evaluate and pinpoint any safety vulnerabilities by examining the extent to which the company was appropriately implementing its environmental, health, and safety protocols on its projects. Without a doubt, the public's interest as well as the daily operations of any construction firm now place a greater emphasis on welfare, well-being, and the conservation of the environment [15]. This means that it is necessary to recognize the company's safety concerns, make plans for them, and keep an ongoing eye on them. The article serves as a case study, [15, 16], outlining the essential elements of a top-tier health and safety administration system for a construction company in Hong Kong as well as standards of excellence for associated matters that a building company should adhere to in order to fulfil its duties for protection of the environment and health and safety of employees [17]. This investigation's main objective is to identify methods for greatly enhancing the security of construction sites on the projects the organization undertakes [17].

Numerous studies have revealed that safety atmosphere is a powerful determinant of performance in safety. One of the main causes of accidents is employee conduct that is unsafe. Safety climate is considered to be more responsive and proactive than normal safety measurements in terms of offering knowledge related to safety and predicting safety behaviour and implications [17]. The benefits of developing and evaluating a safety climate are numerous. These benefits include:
(1) Identifying safety management inadequacies;
(2) Provide both internal and exterior benchmarks; [18],
(3) Prioritize safety initiatives to enhance specific regions; and
(4) Optimize safety-related resources as well as time.

1.1 Safety Attitude and Performances

Due to alterations in the physical environment and working circumstances for workers, developments in "human factors" have drawn special attention to the bodily and cognitively components of work. There have been notable improvements in workplace security as a consequence of the use of ergonomic principles and procedures [18, 19]. Nonetheless, a lot of companies have found that after years of consistent growth, the accident rate plateaus. This has raised interest in social-psychological concerns, such as safety attitudes, and prompted the quest for novel approaches and concepts [19]. We shall use an attitudinal approach, specifically with regard to safety attitudes, to address this concern. The underlying premise of this strategy is that "many accidents are within the control of the parties that caused them [19, 20]."
Even if none of the individuals involved meant for the catastrophe to happen, they knew what they were doing and deliberately behaved in a way that contributed to it. This is in opposition to the idea that a slip or a momentary lapse in concentration leads to an accident [20, 21]. They developed a Safety Attitude Questionnaire (SAQ) with sixteen subscales in order to measure attitudes. The rationale was that asking employees about their opinions on safety and measuring the results using questionnaires seemed to be comparable to management safety checks [21]. Over the course of six years, safety research using the SAQ in over 40 businesses shown that attitudes toward safety can be assessed in an honest and trustworthy way and that these attitudes are unquestionably predicted of security performances [22].
The effectiveness of an intervention study intended to enhance the corporation safety performance of a significant UK energy producing corporation was shown via the application of the SAQ. Additional protection at work perspective measurements were developed by certain studies, and these precautions were connected to injury-related factors such staff security procedures, stress levels, and rates of accidents [21, 22]. For instance, the best indicators of work satisfaction were managerial and supervision safety protocols. These results suggest that it should be feasible to forecast the organization's probable accident rate and take prompt remedial action if the division's safety attitude is surveyed.

1.2 Health and safety Attitude and Climate

The 16 measures that made up the Safety Attitudes Questionnaires (SAQ) were designed to gauge attitude. The rationale was that measuring safety attitude among employees using questionnaires seemed to be akin to management safety audits [22]. The Safety Attitudes Questionnaire was used in safety studies at over 40 companies over a duration of six years, and it was shown to be a feasible, dependable tool for predicting safety performance [22, 23]. These results suggest that it is feasible to assess the likelihood of accidents occurring inside the department and take preventative remedial action by measuring the division's safety attitudes.

1.3 Communications and Safety Climate

One essential component of the safety atmosphere was communication (about safety issues brought up in meetings), and it was shown that employees with different communication styles reported having different perspectives on workplace risks. The safety environment and communications (an open, [23], freely flowing discourse about safety-related matters) were also shown to have a significant influence on accident attributions by the authors. Previous studies have indicated that one of the elements of psychological environment is communication. Because of this, the current study has added communications—an honest, fluid dialogue with managers on challenges inside the department or company—as a component of the safety atmosphere in addition to safety attitudes [23, 24].

1.4 Psychosocial strain and safety performance

Workplace stress and worker safety are related [25, 26. According to Spector's study, workers' negative reactions to work pressures—including psychologically stress—are known as job strains. Psychological stresses are emotional and attitude-based psychological reactions that include dissatisfaction with one's job and concern or discomfort [26]. Research on psychological stress and safety performance is inconclusive. Certain research indicate a favourable relationship between job dissatisfaction and work-related accidental or serious injuries.

1.5 Causal models between safety climate and performance

Early in the 1980s, research on security in the ecosystem got underway. Discussed how leadership influences company security rather than employees [26, 27]. We used the non-linear dynamics catastrophic model,

specifically the cusp technique, with personal traits added, to examine the incidence of workplace events and stress-related medical issues in diverse professional contexts [27]. For instance, significant levels of stress and anxiety were present when accidents among transportation workers happened which may have hindered the operators' ability to react appropriately to potentially hazardous situations. The two factors that put medical professionals at greater risk of accidents are depressive symptoms and working shifts.

1.6 Objectives of the study

- Evaluate Hong Kong companies' compliance with existing confined space safety rules.
- Collect comments from stakeholders, including employees, supervisors, safety officials, and regulatory authorities, on current confined space safety standards.
- Analyse data on events and accidents in tight places to determine causes and frequency.

II.LITERATURE REVIEW

(Ju, C., & Rowlinson, S. 2020) [28] Regulations regarding safety are a component of an organisation's institutional environment. A successful and resilient institutional framework will most likely have a combination of regulatory, conventional, and cultural-cognitive institutional aspects. This research examined at the relationship—if any—between safety regulations and other kinds of institutions across time. Using Hong Kong as an example, this study demonstrated the simultaneous development of safety regulations and a safety-defined organization field, relying on historical records, books, papers on research and interviews. It was determined that the organizational field evolved from the government as the only player to a network governance framework, throughout four stages in a centuries: early days, the beginning stages, the golden time, and the time of transition.

(Man-Kam, L. F. 2014) [29] This study investigated important Occupational Safety and Health Management (OSHM) issues in Hong Kong's Property Management (PM) industry. It focuses on essential theoretical and practical difficulties originated from efficient, effective, and reliable OSH Administration advocated for industrial application, as well as Loss Control and Prevention (LCP) and OSH Standard Improvement (IOS). To summarize, stakeholders should overcome the challenges of implementing OSHM, reduce potential job hazards, and develop the best proposals for their LCP, IOS, and other benefits from OSHM. Methodology: This research begins with an initial review of the existing literatures relevant to the OSH and PM operations, such as safety during construction, LCP, CSR, accident research, legal case studies, and news clips.

(Hung-kwong, M. L. 2022) [30] This book is intended for students doing job-related health and safety courses at educational institutions, the Construction Industry the Council, and the Occupational Safety and Health Commission. This book is a valuable resource for registered safety officers, management, insurance land surveyors, project managers, site agents, safety engineers, and those working to promote workplace security and prevent accidents on construction sites.

(Tam, V. W., 2011) [31] Tower cranes are often utilized for lifting items on construction projects. The majority of building sites are small and accessible to the general population. Accidents involving tower cranes put bystanders as well as workers at building locations at peril. The present paper examines the safety of towering cranes in the context of comprehending and abiding by the legal and informal guidelines that govern their use in Hong Kong's building industry. Questionnaires and organized interviews are used in surveys. Tower crane safety is related to human factors. It has been shown that tower crane operators are ineffective in fulfilling obligations or regulations.

2.1 Hypothesis

H1: *The safety performances (accidentally rate and occupational injuries) is predicted by the safety environment (attitudes and interactions).*

H2: *The relationship between performance in security (accident rates and occupational accidents) and safety environment (safety attitudes and interaction) is mediated by psychological discomfort.*

H3: *Mediators of job satisfaction the relationship between the safety performance (accident rates and workplace injuries) and the security ecosystem (safety attitude and interactions.*

III.METHOD

The study used a combination of qualitative and quantitative methodologies [32]. According to the survey, in-person questionnaire answers and quantitative in-depth interviews were conducted to gather both subjective as well as objective data.

3.1 Pre-survey interview

Before the survey, a total of eighteen quantitative, in-depth interviews were done. High-ranking corporate personnel participated in pre-survey interviews to make sure important both independent and dependent factors weren't overlooked while creating the final questionnaire instruments. [32–33].

3.1.1 Survey Sampling and Procedure

Using the purposeful sample approach, data was gathered from 374 workers working on 27 construction sites between the months of February and May 2018.

There were in-person surveys conducted with the staff. To make up for the amount of time they spent completing questionnaires after interviews, every participant received a token amount of HK$ 50 (US$ 7) [33]. 97.9% of the 375 replies (n = 365) were from males, and just 1.4% (n = 8) were from women. The sample's average age was 34.7 years. The average time spent working for the present company was 3.18 years (range 0.07–18 years), while the average time spent in the current position was 8.12 year (range 0-39 year).

3.1.2 Surveying Instruments.

The research questionnaires included multiple sections of the Safety Attitudes Questionnaire to evaluate performances (workplace injury and incidence rates) as well as the security atmosphere (attitudes and interaction) [33, 34]. These were released into Hong Kong via the reverse translation by an experienced translator. The questionnaire also included items that assessed psychological stresses and demographic details. In detail, the various scales included.

3.1.3 Demographic factors

Parameters including gender, age, years of training, professional expertise, and the number of days of absenteeism owing to injuries were used to gather personal data on those who participated [35].

3.2 Overview of pre-survey results of interviews

An analysis of the quantitative answers revealed that workers' disregard for safety regulations and standards was the main factor contributing to accidents or deaths among construction employees. [35, 36]. In terms of organizational duties, the majority of respondents believed that supervisors should be responsible for conveying safety understanding and laws to employees. Additionally, the majority of responders acknowledged the need of workshops and safety committees.

IV.RESULT

4.1 Scale Reliability

Based on the study, every element of a measure were evaluated by analysing the interaction between parts using the non-metric Multidimensional Scaling (MDS) technique of Smallest Space Assessment (SSA-I). The first step of the SSA-I software is to determine the organization coefficient between every two questionnaire replies. The items are then represented as points in a dimension space [36], and the lengths between each point represent the inter-item correlation coefficient's inverted ranking. Two points have a greater positive association the closer they are in space. Generally speaking, a coefficient of alienation of 0.2 or less is considered appropriate.

The association coefficient used in the investigation was Guttman's μ [37]. According to the findings, the alienation coefficient (also known as Guttman's μ) is 0.18, which is deemed appropriate. The many divisions of psychological distress, safety attitudes, conversations, and work satisfaction components are shown in the SSA plots. The correlation coefficient (α) of every element indicates its internal consistency; values for α range from 0.21 to 0.84. Only 33 items out of 45 were included for further analysis after SSA-I demonstrated the validity of the safety attitude structure, which consists of three facets: responsibilities inside a company, safety object, and behavioural a modality, and published it in another study [36, 37].

In the last 6 months, approximately 17% (n=63) of respondents described being involved in a mistake or near miss at work that did not need absence. Among the seven types of work-related injuries, a contusion and bruises occurred most frequently in the previous six months (28.1%, n = 104); these were followed by sprains and strains (28.9%, n = 106). The mean duration of nonattendance due to the injury was 3.74 days. For every scale, Table 1 displays the mean, S.D., [37], range, coefficient α, and correlation.

Table 1 Inter-correlations of major variables.

	α	Mean	S. D.	Range	1	2	3	4	5	6
Safety Attitude (33 Items)	0.95	196.59	18.96	140.98-890.99	-					
Communication (7 Items)	0.98	32.29	5.96	29.98-39.89	0.96***	-				
Psychological Distress (12 Items)	0.54	38.96	19.96	59.49-49.9	0.55***	-0.04**	-			
Job Satisfaction (2 Items)	0.59	8.94	1.98	9.89-8.97	0.19**	-0.59**	0.95***	-		
Occupations injuries (7 Items)	n.a.	6.90	3.59	9.89	-0.89*	0.21**	0.479***	0.09**	-	
Accidents Rates (1 Items)	n.a.	6.89	3.98	18.96	0.21*	0.09**	0.649**	0.62**	0.96*	-

4.2 Path analysis

As seen in Fig. 1, we used the EQS tool to conduct a path analysis in order to evaluate the hypotheses and good deeds of fit of the suggested model linking the safety environment, psychological stresses, and safety performances. A variety of metrics are included in the EQS program to evaluate the fit of the model [38, 39]. To evaluate the models' goodness of fit, the study project used the Chi-squared values (χ2), Comparison Fit Index (CFI), Bentler-Bonett Non-Normed Fit Indexes (NNFI), and Bentler-Bonett Normed Fit Index (NFI). Strong model fit to the gathered data is demonstrated by CFI, NFI, and NNFI values of 0.8 or greater [38].
The χ2 and indices of fit for measurements structure nested analysis of models are shown in Table 2. Model 1 examines the relationships between safety atmosphere and performance in a direct as well as indirect manner [39]. The results show that attitudes toward safety have an impact on occupational injuries, while psychological distress is a predictor of accident rates. Furthermore, there exists an indirect connection between safety attitudes and accidents through psychological distress. The route coefficients connecting interaction to injury or accident rates, however, do not show statistical significance. Additionally, one of the three indices [39, 40] is less than 0.9. According to a Wald test, the lines pertaining to interactions and psychological distress, as well as safety attitude and rates of accidents, should be removed.

Table 2 Combining Three Alternative Models to Compress the Hypothetical Structure Models.

	X^2	D.f.	NFI	NNFI	CFI	RMSEA
Model 1	9.89	2	0.08	0.94	0.99	0.14
Model 2	5.49	6	0.14	0.96	0.91	0.06
Model 3	2.96	7	0.39	0.98	0.95	0.08

The adjusted Model 2 has a small χ2-value and all three indices are over 0.9, indicating an important increase in fit. However, by including the relationship between accident rate and work-related injuries, Model 3 yields even better findings [41]. Consequently, we choose Model 3 as the completed model, as shown in Figure 2.

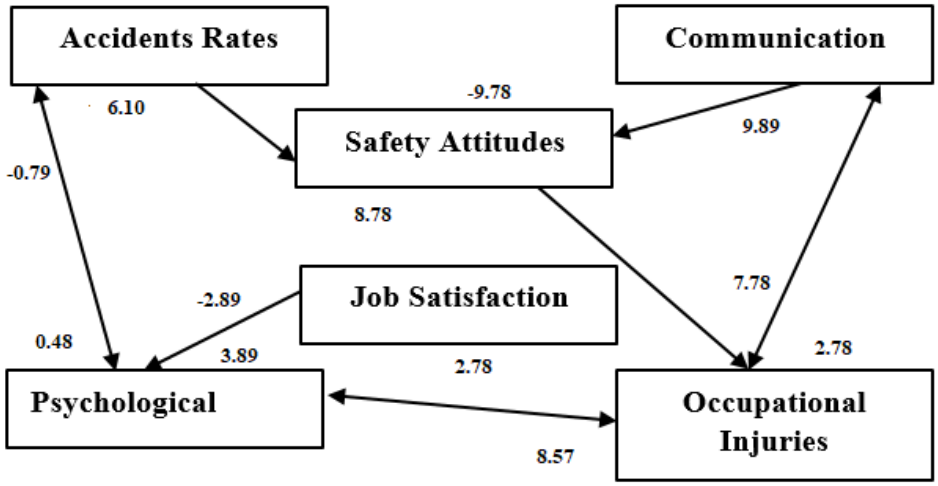

Fig. 2 The finished models include path coefficients. Standard parameters for structural integrity are reported.

Figure 2 demonstrates that safety attitudes is linked to workplace accidents but not accident frequency, whereas interaction are unable to predict safety performance [41, 42]. Therefore, it is only feasible to verify Hypothesis 1 in part (H1). Since Fig. 2 also demonstrates that psychological distress predicted incident rates but not accidents experienced at work, Hypothesis 2 (H2) is only partially validated. Nevertheless, job satisfaction is not a reliable indicator of safety performance (accidents and working accidents). Hypothesis 3 (H3) is therefore not conformable. Figure 2 also shows that the frequency of accidents may be estimated using psychological discomfort, which is strongly predicted by safety attitudes [42].

V.DISCUSSION

5.1The accuracy and dependability of the instrument

In order to offer cross-cultural validation, the research aimed to reproduce the work in surveying Hong Kong construction workers using a subset of their SAQ. Before the poll was conducted, in-depth interviews were done. The interview's findings, as reported by senior and intermediate management, indicate that the SAQ focuses on responsibility and the root causes of workplace accidents and injuries. As a result, the SAQ's content correctness has been demonstrated. High α values on all axes imply good device dependability [42, 43]. The various parts of the instrument were each described using an SSA diagram. As a result, in the current investigation, the condensed, Hong Kong-specific version of the SAQ serves as a trustworthy safety analysis.

5.2 The connection between safety atmosphere, performance, and psychological pressures

The purpose of the research is to ascertain if psychological in nature stressors, such as job satisfaction and psychological stress, directly or indirectly affect the relationships among productivity and security in the environment. The suggested framework receives some support from Structural Equation Modelling findings [42, 43]. Although there are some weak links among the coefficients, the model as a whole fits the data rather well, as shown in Figure 1. This study's findings support previous research conducted in Western countries by demonstrating that safety attitudes are a predictor of workplace injuries [43].

The current study also discovered a relationship between accident rates and workers' their psychological discomfort levels. This study's findings are consistent with earlier research conducted in Western nations. Future research need to concentrate on comprehending the origins of human psychological stressors. As mentioned before [45], there is a dearth of studies in Hong Kong society linking job stress to worker safety. This study is one of the few that shows how psychological discomfort mediates the link between safety attitudes and frequency of accidents [44, 45]. It suggests that if workers witnessed management or staff employees at their workplace having a bad attitude toward safety, they would be more likely to be involved in an accident at working. Psychological stress affects accident rates directly and indirectly, as we would have predicted. As previously said [46], we contended that respondents to our research would prioritize completing the job at hand above the security of the way they worked if they perceived pressure to do exceptionally well at work. They would find themselves more inclined to participate in dangerous behaviours as a consequence. Given the risk of layoffs, it is likely that the respondents who spoke of a strong safety culture at work felt pressure to perform well (Quality Manufacturing). Consequently, they may have focused more on getting the job done and less on following security regulations [46].

The causative model of the present research adds to the concepts of work-related psychological research, although being different from previous causation models [47, 48]. The results of the current research are particularly interesting for their practical implications. These results have important regulatory and practical ramifications, including the need that leadership teams in the construction industry take the mental health of staff members into account. Stressed-out workers are more prone to get into accidents or suffer injuries at work. Because of this, in such businesses, a stress audit should sometimes be used as a diagnostic procedure in combination with a safety audit. Treatments may also recommend that staff members attend lectures or seminars on stress management. An additional avenue for future investigation among Hong Kong's construction workers is the relationship between workplace stress and safety.

VI.CONCLUSION

For evaluating the safety atmosphere (Safety Attitudes and Interaction) among Hong Kong workers in construction, the Safety Attitude Survey version specifically designed for Hong Kong seems to be a viable and trustworthy instruments. It could be used as a preventative measure in Hong Kong's construction and other industries. Additionally, in order to achieve the goals of preventative intervention, we recommend that a stress audit be conducted on a regular basis to gauge the amount of occupational pressure and strain experienced by employees.

6.1 Suggestions and Reducing Accidents

A multimodal strategy including worker training, following regulations, and putting best practices into effect is needed to reduce accidents in tight areas. Here are a few ideas to improve security and lower the number of mishaps in Hong Kong's cramped areas.

Verify adherence to current laws, such as Hong Kong's Factories and Industries Undertakings (Confined Spaces) Regulation. This comprises:

- Before beginning any activity in confined areas, doing comprehensive risk assessments.
- Creating and carrying out a plan for entering a confined place.
- Making sure that in advance of arrival, the required permits are obtained.
- Recognizing confined spaces and being aware of the hazards involved.
- Appropriate handling of safety gear, such as gas detectors and Personal Protective Equipment (PPE).
- Rescue operations and procedures for emergencies.
- Make sure there is enough ventilation in small areas in order to prevent dangerous gas development.
- To find any harmful concentrations of gases like carbon monoxide methane, or hydrogen sulfide, use continual air quality monitoring equipment.
- To reduce human entry, employ robotic or remote-controlled equipment for preliminary inspections.
- Implementing in place real-time tools to track the whereabouts and health of employees in tight locations.
- Regularly participating in workouts and role-plays.
- Ensuring rescue crews have the necessary tools and training to manage crises involving confined spaces.
- Having an efficient emergency communication system in place.

- Make sure that confined areas are regularly maintained and inspected to spot any dangers including structural flaws or the presence of hazardous materials. Make sure safety equipment is in good operating order by giving it regular maintenance and inspections.
- Pressuring employees to report dangerous situations and near-misses.
- Consistently emphasizing the value of confined space safety.
- Including employees in the preparation and decision-making processes for safety.
- Determine that contractors who operate in restricted areas follow the same safety regulations as staff members. This entails confirming their education and making certain they adhere to the set safety procedures.
- Decrease the quantity of employees that access restricted areas and set a time restriction for their exposure. Establish a buddy system to make sure no employee is left in a small area by themselves.
- Regularly audit and evaluate safety procedures to find areas that need improvement. Utilize audit results to regularly update safety protocols and procedure.

By implementing these tactics into practice, businesses may guarantee the security and welfare of their employees while drastically lowering the chance of mishaps in small areas.

6.2 Limitations

One of the study's drawbacks is that only a cross-sectional questionnaire was feasible due to financial and scheduling restrictions; also, the survey sample was not selected at random. These limitations stem from the reality of establishing relationships with contractors and subcontractors. The study team conducted pre-survey interviews and evaluated employees from as many different places as they could in an effort to solve these problems. Another potential issue with the research is its dependence on self-reported accident and injury data. Subsequent research endeavour's have to use impartial metrics to supplement and cross-reference these data sources.

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