Article

Safety Climate in the Indonesian Construction Industry: Strengths, Weaknesses, and Influential Demographic Characteristics

Abdul Kadir 1,⁎, Fatma Lestari 1,2,⁎, Riza Yosia Sunindijo 3, Dadan Erwandi 1, Yuni Kusminanti 4, Robiana Modjo 1, Baiduri Widanarko 1 and Noor Aulia Ramadhan 2

1 Department of Occupational Health and Safety, Faculty of Public Health, Universitas Indonesia, Depok 16424, Indonesia; dadan@ui.ac.id (D.E.); robiana@ui.ac.id (R.M.); baiduri@ui.ac.id (B.W.)
2 Disaster Risk Reduction Center, Universitas Indonesia, Depok 16424, Indonesia; noorauliramadhan22@gmail.com
3 School of Built Environment, UNSW Sydney, Sydney, NSW 2052, Australia; r.sunindijo@unsw.edu.au
4 Occupational Health, Safety and Environmental Unit, Universitas Indonesia, Depok 16424, Indonesia; yekananti@gmail.com
* Correspondence: abdul_kadir@ui.ac.id (A.K.); fatma@ui.ac.id (F.L.)

Abstract: The Indonesian construction industry is a significant contributor to economic growth in Indonesia. However, poor safety performance limits its contributions due to the negative impacts of poor safety on project performance. This research aims to assess the level of the safety climate in the Indonesian construction industry, identify its strengths and weaknesses, and understand the influence of individual demographic characteristics on the safety climate. Data were collected using a questionnaire survey from 1757 respondents working in six large state-owned construction companies in Indonesia. Results indicate that the overall safety climate level is fairly good. However, the safety climate scores of individual safety climate items are observed to vary widely. The scores reveal that construction employees understand the importance of safety and management demonstrates a degree of safety commitment, particularly by having regular safety communications. In contrast, the implementation of safety is limited in reality because safety is not considered a priority at work. Lack of safety resources and limited enforcement of safety rules further hinder the implementation of safety at the project level. Large state-owned construction companies such as those where data were collected should take the lead in changing the work practices in the Indonesian construction industry to improve safety performance. Level of education, length of work experience, position, permanency of job status, work location (project or office-based), and type of project are individual demographic characteristics that influence the level of the safety climate. Understanding the influence of these characteristics on the safety climate allows specific intervention strategies to be used to improve safety.

Keywords: safety climate; occupational health and safety (OHS); Indonesia; construction industry

1. Introduction

The construction industry is one of the most prominent sectors that contributes significantly to the gross domestic product (GDP) of many nations [1,2]. For example, in the US, the value added of the construction industry in 2020 was 4.4% [3], while the rates in Russia and the United Kingdom were even bigger at about 5.7 [4] and 6% [5], respectively. In Malaysia, the contribution of the sector to the national economy was 12.4% [6], while in Ghana, its contribution was about 13.7% [7]. In Indonesia, the total number of construction companies in 2021 were 203,403, consisting of 167,605 small organizations, 34,048 medium-sized organizations, and 1750 large companies [8]. The Indonesian construction industry contributes more than 10% to the GDP and has sustained steady growth at approximately 5% per year [9].
Unfortunately, the construction industry is also considered a sector that has poor health and safety. Construction is a high-risk industry [10], exposing its employees to a wide range of hazards, such as falling from a height, being struck by machinery or heavy equipment, exposure to dangerous chemicals, electrocution, and so on [11,12]. As a result, this sector often reports the largest number of fatalities [13–15], where about 20% of total work-related deaths are accounted for in the construction industry [1,16]. A study reported that there are 60,000 occupational fatalities in construction industries globally, which is equivalent to one death every 10 min [17].

A study conducted by Chen et al. reported that there was a positive association between safety performance such as lower injury rates and the safety climate [18,19]. Safety climate is defined as a ‘snapshot’ of an employee’s perceptions toward safety [20]. According to the American Industry Hygiene Association, the safety climate influences employees’ perceptions on whether or not they feel empowered to raise safety concerns [21]. It consists of the perceptions about safety aspects of the work environment that are shared across individuals, teams, and units within an organization [22]. In addition, the safety climate as part of the organizational climate is a treasured resource because it affects the loyalty and commitment of employees [23]. In the end, the safety climate has a significant impact on the reliability, competitiveness, and profitability of the organization [24].

Due to its impact on organizational performance, there have been a wide range of studies on the safety climate in the construction industry [25]. One research area is the identification of the dimensions of the safety climate. For example, a systematic study identified six dimensions of the safety climate, which include management commitment, safety procedures and rules, employees’ involvement, personal risk appreciation, communication, and supervisory system [26]. Another research area focuses on finding the relationship between the safety climate and various performance indicators. For example, Wang et al. reported that developing a safety climate improves workers’ safety behaviour and awareness [27]. Moreover, Chan et al. reported that the safety climate is highly linked to safety participation and safety compliance [28]. Despite the size of the Indonesian construction industry, research on the safety climate in this context is limited. Zhou et al. reviewed research on the safety climate in construction across countries worldwide and did not identify any research from Indonesia [29]. Upon conducting further searches, we found a limited number of publications reporting on the safety climate in the Indonesian construction industry. Mufidah et al. reported that the level of the safety climate in construction projects in Bandung was quite low and improvements are particularly required in terms of making safety a priority and not tolerating safety risks [30]. Another study by Amalina et al. shows that safety climate dimensions, comprising management empowerment, hazard and risk intolerance, communication, and learning, are correlated with workers’ safety behavior [31]. Contributing to safety climate research in the Indonesian construction industry, Sunindijo et al. compared the safety climate levels in infrastructure and building projects and found that the safety climate level in the building projects is higher than that in the infrastructure projects. They also highlighted the influence of project complexity on the safety climate [32]. Further, Loosemore et al. assessed safety climate levels in the Indonesian and Australian construction industry and surprisingly found that the levels are not significantly different, demonstrating cultural and institutional influences relative to safety climate research [33]. In addition, a recent study of the safety climate in the Indonesian construction conducted by Lestari et al. [34] reported that the level of the safety climate was moderate. The study identified several issues, such as perceived conflicts between production and safety, poor safety communication, and poor work conditions. To improve the safety climate in the Indonesian construction industry, Lestari et al. recommended strategies at the project, organizational, and industry level. Despite the importance of Lestari et al.’s research in advancing knowledge on the safety climate in this particular context, the sample size of this research was small, and data were mainly collected from a few projects in Jakarta. There is a need to collect more data to validate the findings. Furthermore, the safety climate is perceived differently by different groups within the population. Understanding these
differences is important to recommend tailored strategies to improve the safety climate within each group.

Advancing safety climate research in the Indonesian construction industry, our research focuses on large construction companies that are considered leaders in the country. These companies have strong influence on the industry’s culture and practices and on health and safety law and regulations in Indonesia. Assessing their safety climate, therefore, is important to understanding the current safety climate in the industry, identifying strengths and weaknesses, understanding the influence of individual characteristics on the safety climate, and recommending safety climate improvements that can lead to safety performance improvement across the sector [16,35,36]. The following research questions were established: (a) What is the level of the safety climate in the Indonesian construction industry? (b) What are the safety climate dimensions that require urgent improvements? (c) What is the influence of demographic profiles on the safety climate? (d) How can the safety climate in the Indonesian construction industry be improved?

2. Literature Review

The implementation of the occupational health and safety management system (OHSMS) in Indonesia is governed by Law Number 1 of 1970 about occupational safety. This law clearly regulates the obligations of employers and workers in terms of occupational safety. In addition, the government also set up a more detailed and updated regulation on OHSMS under Government Regulation Number 50 of 2012. In the construction sector, the Ministry of Public Works and Housing established ministerial regulation Number 21 of 2019 regarding construction safety management system guidelines. It defines the construction work implementation management system to ensure construction safety. In line with this regulation, construction safety refers to, the implementation of safety, health, and sustainability standards that ensure construction engineering safety, workers’ safety and health, public safety, and environmental protection.

Despite these laws and regulations, safety performance in the Indonesian construction industry is poor, and health and safety records are inaccurate due to underreporting and an inadequate recording system [33]. It is estimated that 32% of occupational accidents occur in the construction industry, a large proportion compared to other industrial sectors [37–39].

Improving the safety climate has been seen as a way to improve poor health and safety in the construction industry, and research has proven that the safety climate influences safety performance [40]. A study, for instance, confirmed that a supportive safety climate is correlated with reduced occupational injuries [41]. As such, the safety climate has become a leading indicator to identify strengths and weaknesses, to identify latent or tacit factors prior to the occurrence of accidents, and to develop strategies to improve safety [35].

The concepts of safety culture and safety climate are frequently utilized synonymously. Both of them are based on a broad body of research on organizational culture and climate. Culture is defined as the values, beliefs, and fundamental assumptions in the organization, while climate refers to the employees’ perception on the atmosphere of the organization at a specific moment. Flin et al. stated that the former reflects the core organizational beliefs, while the latter expresses people’s attitudes and perceptions, in the case of the safety climate, toward occupational safety [1,42]. Indeed, safety culture can be developed to enhance safety performance, and the safety climate can be utilised as an early screening mechanism to assess the state of safety culture in the organization [43].

The safety climate was first proposed by Zohar in 1980, who defined it as a summary of molar perceptions that employees share about their work environments. He also pointed out that these perceptions work as a reference for employees on how to behave. Hence, those at the management level can look at the change of attitudes and perceptions among their employees to manage safety. Another definition proposed by Schneider defines safety climate as “incumbents’ perceptions of the events, practices, and procedures and the means of behaviors that get rewarded, supported, and expected in a setting” [44,45]. Likewise, Griffin
and Neal consider safety climate as a predictive factor of safety knowledge and motivation, reflecting how employees perform and perceive an appropriate safe behavior [46].

The safety climate has been investigated in various industries and countries [25]. A questionnaire survey is the main instrument used to assess the safety climate in these studies [1]. A study in the Netherlands focused on the dimensions of cooperation, rewards, and cooperation among 48 units in different companies and found that the safety climate is linked with all levels of management in the organization as well as the individual climate perception [23]. Yangok and Choosong studied the safety climate in the manufacturing sector by assessing seven dimensions encompassing management priority and ability, management empowerment, safety and justice, worker commitment, safety priority and risk non-acceptance, communication and learning, and workers’ trust [47]. They found that the safety climate, particularly the safety priority and risk non-acceptance dimension, can predict the rate of occupational injuries. Stiehl and Forst pointed out that safety climate perceptions have associations with individuals’ professional or union affiliation, relational sources of perception, and previous experience and training [48]. Research in the construction industry has identified various safety climate dimensions as summarized in Table 1. These studies demonstrate the importance of understanding the relationship between individual perceptions, safety behavior, and organizational practices, policies, and values. The safety climate, therefore, can be used as a diagnostic tool to identify strengths and vulnerabilities so that strategies can be developed and adopted to improve safety performance.

Table 1. The studies of the safety climate in construction sectors.

| No | Title                                                      | Country         | Dimension                                                                 | Reference |
|----|------------------------------------------------------------|-----------------|---------------------------------------------------------------------------|-----------|
| 1  | A safety climate measure for construction sites           | Maryland, USA   | 1. Management concerns                                                    | [49]      |
|    |                                                            |                 | 2. Management safety activities                                           |           |
|    |                                                            |                 | 3. Employee risk perception                                               |           |
|    |                                                            |                 | 4. Management commitment                                                 |           |
|    |                                                            |                 | 5. Workers involvement                                                   |           |
| 2  | Safety Climate in Construction Site Environment           | -               | 1. Commitment                                                            | [50]      |
|    |                                                            |                 | 2. Communication                                                         |           |
|    |                                                            |                 | 3. Safety rules and procedures                                            |           |
|    |                                                            |                 | 4. Supportive environment                                                |           |
|    |                                                            |                 | 5. Supervisory environment                                               |           |
|    |                                                            |                 | 6. Workers’ involvement                                                 |           |
|    |                                                            |                 | 7. Personal appreciation of risk                                          |           |
|    |                                                            |                 | 8. Appraisal of hazards                                                  |           |
|    |                                                            |                 | 9. Work pressure                                                         |           |
|    |                                                            |                 | 10. Competence                                                           |           |
| 3  | Measuring safety climate to enhance safety culture in the | Pakistan        | 1. Management dedication                                                 | [51]      |
|    | construction industry of Pakistan                        |                 | 2. Employee’s engagement                                                 |           |
|    |                                                            |                 | 3. Employee’s participation                                               |           |
|    |                                                            |                 | 4. Employee’s involvement                                                |           |
|    |                                                            |                 | 5. Safety rules                                                          |           |
|    |                                                            |                 | 6. Work pressure                                                         |           |
|    |                                                            |                 | 7. Safety knowledge                                                      |           |
|    |                                                            |                 | 8. Responsibility for safety                                             |           |
| 4  | Safety climates in construction industry: Understanding   | Portugal         | 1. Construction site safety climate                                      | [52]      |
|    | the role of construction sites and workgroups             |                 | 2. Supervisor’s safety responses                                          |           |
|    |                                                            |                 | 3. Co-workers’ safety response                                           |           |
|    |                                                            |                 | 4. Worker’s safety response                                               |           |
Table 1. Cont.

| No | Title                                                                 | Country   | Dimension                                                                 | Reference |
|----|-----------------------------------------------------------------------|-----------|--------------------------------------------------------------------------|-----------|
| 5  | Safety climate improvement:                                          | China     | 1. Safety regulation                                                     | [53]      |
|    | Case study in a Chinese construction company                          |           | 2. Safety supervision                                                    |           |
|    |                                                                       |           | 3. Safety training                                                        |           |
|    |                                                                       |           | 4. Workmate’s support                                                     |           |
|    |                                                                       |           | 5. Management commitment                                                 |           |
|    |                                                                       |           | 6. Safety attitudes                                                       |           |
| 6  | Effect of STOP technique on safety climate in a construction company | Iran      | 1. Management commitment                                                 | [54]      |
|    |                                                                       |           | 2. Communication                                                          |           |
|    |                                                                       |           | 3. Priority of Safety                                                     |           |
|    |                                                                       |           | 4. Safety Rules                                                           |           |
|    |                                                                       |           | 5. Supportive environment                                                 |           |
|    |                                                                       |           | 6. Involvement                                                            |           |
|    |                                                                       |           | 7. Personal priorities                                                    |           |
|    |                                                                       |           | 8. Appreciation of risk                                                   |           |
|    |                                                                       |           | 9. Work environment                                                       |           |
|    |                                                                       |           | 10. Co-operation                                                          |           |
|    |                                                                       |           | 11. Competence                                                            |           |
|    |                                                                       |           | 12. Management Style                                                      |           |
|    |                                                                       |           | 13. Managing change                                                       |           |
|    |                                                                       |           | 14. Shared values                                                          |           |
|    |                                                                       |           | 15. System compliance                                                     |           |
|    |                                                                       |           | 16. Safe behaviors                                                        |           |
|    |                                                                       |           | 17. Accidents and Incidents                                               |           |
| 7  | Safety climate and safety culture policies of construction organizations in Nigeria | Nigeria | 1. Strategic factors                                                      | [55]      |
|    |                                                                       |           | 2. Operational factors                                                    |           |
| 8  | Comparing safety climate in infrastructure and building projects in Indonesia | Indonesia | 1. Management Commitment                                                 | [32,33]  |
|    |                                                                       |           | 2. Safety communication                                                   |           |
|    |                                                                       |           | 3. Safety rules and procedures                                             |           |
|    |                                                                       |           | 4. Supportive environment                                                 |           |
|    |                                                                       |           | 5. Personal safety involvement and needs                                   |           |
|    |                                                                       |           | 6. Safety training                                                         |           |
| 9  | A safety climate framework climate for improving health and safety in the Indonesian construction industry | Indonesia | 1. Management commitment                                                 | [34]      |
|    |                                                                       |           | 2. Communication                                                          |           |
|    |                                                                       |           | 3. Rules and procedures                                                   |           |
|    |                                                                       |           | 4. Supportive environment                                                 |           |
|    |                                                                       |           | 5. Personal accountability                                                |           |
|    |                                                                       |           | 6. Training                                                               |           |

3. Methods

3.1. Questionnaire Development

The questionnaire survey consists of two sections. The first section sought to collect the demographic information of the respondents (gender, age, level of education, length of work, position level, job status, work location, and project). The second section captures nine safety climate dimensions, which were developed based on previous studies, as summarized in the literature review section. A 5-point Likert scale format ranging from strongly disagree to strongly agree was used in this section. The level of the safety climate was scored based on four categories: <2.70 is classified as low (requiring urgent improvements), 2.70–2.99 as fairly low (requiring considerable improvements), 3.00–3.30 as fairly good (requiring minor improvements), and >3.30 as good (allowing for maintaining and continuing improvement) [56]. Table 2 summarizes the content structure of the section.
Table 2. Safety climates dimension development.

| No. | Dimension                      | Description                                                                 | Total of Items |
|-----|--------------------------------|-----------------------------------------------------------------------------|---------------|
| 1.  | Management Commitment          | Workers’ perception towards management commitment of OHS in the organization | 10            |
| 2.  | Priority of safety             | Workers’ perception regarding how the organization considered OHS as priority | 4             |
| 3.  | Communication                  | Workers’ perception towards the characteristics and effectiveness of OHS communication | 10            |
| 4.  | OHS Rules                      | Workers’ perception towards regulation, rules, standards of OHS                | 6             |
| 5.  | Supportive Environment         | Workers’ perception towards work environment in supporting the implementation of OHS | 4             |
| 6.  | Involvement                    | Workers’ involvement towards the implementation of OHS                       | 4             |
| 7.  | Work environment               | Workers’ perception towards work environment related to OHS                   | 7             |
| 8.  | Personal priorities and need for safety | How the workers assess OHS risk in their activities/job                | 7             |
| 9.  | Personal appreciation of risk  | How the workers prioritize an OHS for themselves                               | 4             |
|     | TOTAL                          |                                                                             | 55            |

3.2. Sampling

The potential respondents were construction employees in 15 large state-owned construction companies in Indonesia who were members of the Indonesian Construction Quality, Health, Safety and Environment Construction Forum (QHSE BUMN) networks. As such, purposive sampling was adopted in the research, and the questionnaires were distributed to these 15 companies. The sample sizes from 9 companies, however, were less than 15 respondents, while the remaining 6 had sample sizes of more than 100 respondents each. Therefore, 1946 data collected from these 6 companies were used for further analysis. Prior to data collection, ethics approval was obtained from the Research and Community Engagement Ethical Committee of the Faculty of Public Health, Universitas Indonesia (approval number 434/UN2.F10.D11/PPM.00.02/2020).

3.3. Reliability and Validity

Cronbach’s alpha was used to test the reliability of the questionnaire, while concurrent validity was used to test its validity. It is generally accepted that a reliability coefficient of $\geq 0.60$ indicates that the questionnaire is reliable, while in order to be considered valid, the validity coefficient has to be $\geq 0.30$. The reliability tests showed that all the reliability coefficients are higher than 0.7, while the validity tests reveal that all elements of the safety climate have a validity coefficient ranging from 0.362–0.760. The details of validity and reliability coefficient on each element are: management commitment (10 questions; validity coefficient: 0.397–0.757; reliability: 0.876); priority of safety (4 questions; validity coefficient: 0.492–0.714; reliability coefficient: 0.789); communication (10 questions, validity coefficient: 0.371–0.751; reliability coefficient: 0.888); OHS rules (6 questions; validity coefficient: 0.546–0.651; reliability coefficient: 0.826); supportive environment (4 questions; validity coefficient: 0.417–0.626; reliability coefficient: 0.732); involvement (4 questions; validity coefficient: 0.612–0.760; reliability coefficient: 0.849); personal priorities and need for safety (7 questions; validity coefficient: 0.527–0.719; reliability coefficient: 0.855); personal appreciation of risk (4 questions; validity coefficient: 0.362–0.718; reliability coefficient:
0.741); and work environment (6 questions; validity coefficient: 0.421–0.726; reliability coefficient: 0.842). These results demonstrate that the instrument is reliable and valid.

4. Results

4.1. Characteristics of Respondents

A total of 1946 construction workers participated in this study, but only 1757 responses are considered valid. The respondent characteristics are presented in Table 3. The majority of the respondent are male (88.7%) and are younger than 35 years old (58.1%). More than 60% of the respondents have completed university education. Many of the respondents (42.2%) worked in their current companies for less than three years.

Table 3. Characteristics of respondents.

| Variable              | Number | Percentage |
|-----------------------|--------|------------|
| Construction          |        |            |
| Construction 1        | 234    | 13.3       |
| Construction 2        | 142    | 8.1        |
| Construction 3        | 221    | 12.6       |
| Construction 4        | 411    | 23.4       |
| Construction 5        | 468    | 26.6       |
| Construction 6        | 281    | 16.0       |
| Gender                |        |            |
| Female                | 198    | 11.3       |
| Male                  | 1559   | 88.7       |
| Age                   |        |            |
| 18–24 years           | 176    | 10.0       |
| 25–34 years           | 845    | 48.1       |
| 35–44 years           | 417    | 23.7       |
| 45–54 years           | 264    | 15.0       |
| 55–64 years           | 53     | 3.0        |
| >65 years             | 2      | 0.1        |
| Level of education    |        |            |
| Primary school        | 12     | 0.7        |
| Junior high school    | 44     | 2.5        |
| High school           | 438    | 24.9       |
| Associate             | 147    | 8.4        |
| Undergraduate         | 1026   | 58.4       |
| Graduate              | 90     | 5.1        |
| Length of work        |        |            |
| ≤3 years              | 741    | 42.2       |
| 4–6 years             | 330    | 18.8       |
| 7–10 years            | 271    | 15.4       |
| >10 years             | 415    | 23.6       |
Table 3. Cont.

| Variable                                      | Number | Percentage |
|-----------------------------------------------|--------|------------|
| **Position Level**                            |        |            |
| Workers, tradespeople, foremen, and external non-managerial staff | 150    | 8.5        |
| Internal non-managerial staff                 | 857    | 48.8       |
| Supervisor                                    | 245    | 13.9       |
| Assistant Manager                             | 38     | 2.2        |
| Manager                                       | 202    | 11.5       |
| Project Manager                               | 94     | 5.4        |
| Division Manager                              | 33     | 1.9        |
| General Manager                               | 9      | 0.5        |
| Other, e.g., lab staff, H&S officer.          | 129    | 7.3        |
| **Job Status**                                |        |            |
| Permanent Employee                            | 694    | 39.5       |
| Contract Employee                             | 815    | 46.4       |
| Outsourcing                                   | 183    | 10.4       |
| Wholesale Workers/Daily Workers               | 65     | 3.7        |
| **Work Location**                             |        |            |
| Office                                        | 359    | 20.4       |
| Project                                       | 1398   | 79.6       |
| **Type of Project**                           |        |            |
| Infrastructure                                | 809    | 46.0       |
| Building                                      | 421    | 24.0       |
| Engineering Procurement Construction (EPC)    | 224    | 12.7       |
| Plant                                         | 34     | 1.9        |
| Railway                                       | 70     | 4.0        |
| Other                                         | 199    | 11.3       |

4.2. Safety and Test of Normality

Kolmogorov–Smirnov analysis was used to determine data normality, and further analysis was conducted based on the normality of data distribution. Mann–Whitney and Kruskal–Wallis tests were used if the data distribution was not normal. Table 4 shows the results of the normality test using Kolmogorov–Smirnov. It reveals that all significance values are smaller than 0.05, indicating that the data are not normally distributed. Therefore, non-parametric Mann–Whitney and Kruskal–Wallis tests were used for further analysis. In general, the overall safety climate score is 3.14, which can be classified as a ‘fairly good’ level. Considering the score of each dimension, priority of safety has an average score of 1.92, OHS rule has an average score of 1.95, supportive environment has an average score of 2.03, and work environment has an average score of 2.24. These dimensions are categorized to have a ‘low’ level of safety climate. The average score of the personal appreciation of risk dimension is 2.81, indicating a fairly low level. In contrast, the average scores of personal priorities and need for safety, communication, management commitment, and involvement are 4.44, 4.41, 4.37, and 4.07, respectively, indicating a ‘good’ level of safety climate.
Table 4. Description of elements of the safety climate and test of normality.

| Variable                        | Mean  | Median | Standard Deviation | Interquartile Range | 95% CI         | Statistics Value |
|---------------------------------|-------|--------|--------------------|---------------------|----------------|------------------|
| Management commitment           | 4.37  | 4.50   | 0.60               | 0.90                | 4.34–4.39      | 0.001            |
| Priority of safety              | 1.92  | 1.75   | 0.92               | 1.25                | 1.88–1.96      | 0.001            |
| Communication                   | 4.41  | 4.60   | 0.90               | 0.57                | 4.39–4.44      | 0.001            |
| OHS Rules                       | 1.95  | 1.83   | 1.00               | 0.85                | 1.91–1.99      | 0.001            |
| Supportive Environment          | 2.03  | 2.00   | 1.25               | 0.89                | 1.98–2.07      | 0.001            |
| Involvement                     | 4.07  | 4.25   | 1.50               | 0.85                | 4.03–4.11      | 0.001            |
| Personal priorities and need for safety | 4.44  | 4.57   | 0.86               | 0.55                | 4.42–4.47      | 0.001            |
| Personal appreciation of risk   | 2.81  | 2.75   | 1.50               | 1.02                | 2.76–2.85      | 0.001            |
| Work environment                | 2.24  | 2.17   | 1.33               | 0.93                | 2.20–2.29      | 0.001            |
| Safety Climate Score            | 3.14  | 3.10   | 0.39               | 0.40                | 3.12–3.16      | 0.001            |

* Based on Kolmogorov–Smirnov test.

4.3. Safety Climate and Demographic Profiles

Comparative analysis was conducted using Mann–Whitney and Kruskal–Wallis tests to analyse the differences in the safety climate level based on respondents’ demographic profiles, including level of education, length of work, position, job status, work location, and field of work. The results are presented in Table 5.

4.3.1. Safety Climate and Level of Education

Table 5 shows that there are significant differences in safety climate levels across the level of education groups (p value = 0.005). Respondents with a primary school education level have the highest score at 3.48, while those who have completed a master’s degree have the lowest score at 3.07. In fact, the higher the level of education, the lower the safety climate score.

Table 5. Difference of the safety climate.

| Variable                        | Safety Climate |
|---------------------------------|----------------|
|                                | Mean | Standard Deviation | 95% CI | Mean Rank | p-Value |
| Level of education              |      |                    |        |           |        |
| Primary school                  | 3.48 | 0.56               | 3.12–3.83 | 1219.96 | 0.005  |
| Junior high school              | 3.35 | 0.57               | 3.17–3.52 | 1053.20 |        |
| High school                     | 3.18 | 0.49               | 3.13–3.23 | 916.31  |        |
| Associate (diploma)             | 3.14 | 0.39               | 3.07–3.20 | 886.17  |        |
| Undergraduate (Bachelor)        | 3.11 | 0.34               | 3.09–3.13 | 856.74  |        |
| Post-Graduate (Master)          | 3.07 | 0.27               | 3.02–3.13 | 808.82  |        |
| Length of work                  |      |                    |        |           | 0.001  |
| ≤3 years                        | 3.18 | 0.45               | 3.14–3.21 | 910.92  |        |
| 4–6 years                       | 3.15 | 0.35               | 3.11–3.19 | 907.69  |        |
| 7–10 years                      | 3.14 | 0.37               | 3.10–3.19 | 893.56  |        |
| >10 years                       | 3.06 | 0.33               | 3.02–3.09 | 789.68  |        |
Table 5. Cont.

| Variable                        | Safety Climate |          |          |        |
|--------------------------------|----------------|----------|----------|--------|
|                                 | Mean           | Standard Deviation | 95% CI   | Mean Rank |
| Position Level                  |                |          |          |        |
| Workers, tradespeople, foremen, | 3.32           | 0.63     | 3.21–3.42 | 1031.74 |
| and external non-managerial staff |                |          |          |        |
| Internal non-managerial staff   | 3.13           | 0.38     | 3.10–3.15 | 864.80  |
| Supervisor                      | 3.12           | 0.34     | 3.08–3.16 | 890.50  |
| Assistant Manager               | 3.16           | 0.35     | 3.05–3.28 | 933.47  |
| Manager                         | 3.07           | 0.28     | 3.03–3.10 | 809.99  |
| Project Manager                 | 3.08           | 0.25     | 3.03–3.13 | 844.11  |
| Division Manager                | 3.07           | 0.22     | 2.99–3.15 | 813.30  |
| General Manager                 | 3.04           | 0.29     | 2.82–3.27 | 740.89  |
| Other, e.g., lab staff, H and S officer | 3.19     | 0.47     | 3.11–3.27 | 917.79  |
| Job Status                      |                |          |          |        |
| Permanent Employee              | 3.08           | 0.31     | 3.05–3.10 | 815.11  |
| Contract Employee               | 3.17           | 0.42     | 3.15–3.20 | 920.37  |
| Outsourcing                     | 3.11           | 0.37     | 3.06–3.17 | 858.12  |
| Wholesale Workers/Daily Workers | 3.38           | 0.71     | 3.20–3.55 | 1101.22 |
| Work Location                   |                |          |          |        |
| Office                          | 3.07           | 0.38     | 3.04–3.11 | 771.58  |
| Project                         | 3.15           | 0.40     | 3.13–3.17 | 906.58  |
| Type of Project                 |                |          |          |        |
| Infrastructure                  | 3.15           | 0.40     | 3.13–3.18 | 898.38  |
| Building                        | 3.15           | 0.38     | 3.11–3.19 | 920.23  |
| Engineering, procurement and construction (EPC) | 3.06     | 0.33     | 3.01–3.10 | 755.78  |
| Plant                           | 3.08           | 0.23     | 3.00–3.16 | 836.13  |
| Railway                         | 3.16           | 0.43     | 3.08–3.29 | 900.51  |
| Other                           | 3.13           | 0.45     | 3.07–3.19 | 851.43  |

4.3.2. Safety Climate and Length of Work

There are significant differences in safety climate levels among respondents with different lengths of employment ($p = 0.001$). Those with the lowest length of employment ($\leq$3 years) have the highest score at 3.18, while those with the longest length of employment ($>10$ years) have the lowest score at 3.06. The results indicate that the longer the length of employment, the lower the safety climate level.

4.3.3. Safety Climate and Position

A $p$ value of 0.007 indicates significant differences in safety climate levels among respondents with different positions. The group of workers, tradespeople, foremen, and external non-managerial staff has the highest safety climate level at 3.32, while the general manager group has the lowest level at 3.04. Further analysis actually reveals that the safety climate level of the group of workers, tradespeople, foremen, and external non-managerial staff is significantly different with the levels in the other group. Considering the safety climate scores further, it seems that those at the manager level, i.e., manager, project manager, division manager, and general manager, have similar scores.
4.3.4. Safety Climate and Job Status

Significant differences \((p = 0.001)\) in safety climate levels are also found within the respondents classified based on their job status, including permanent employee, contract employee, outsourcing, and wholesale worker/daily worker. Wholesale workers/daily workers have the highest safety climate score at 3.38 and this score is significantly higher than the other respondent groups. The score of the permanent employee group is the lowest at 3.08.

4.3.5. Safety Climate and Work Location

There is a significant difference \((p = 0.001)\) in safety climate levels between office-based employees and project-based employees. The safety climate score of the office-based employees is 3.07, significantly lower than the score of project-based employees at 3.15.

4.3.6. Safety Climate and Type of Project

There are significant differences \((p = 0.003)\) in safety climate levels among the respondents who work in different types of projects, including infrastructure, building, engineering, procurement and construction (EPC), plant, railway and other types of projects. The respondents who worked in EPC projects have the lowest safety climate score at 3.06, while those working in building and infrastructure projects have the highest score at 3.15.

5. Discussion

5.1. Overall Safety Climate Score

The overall safety climate score is 3.14, which can be considered as ‘fairly good’ and which seems to appropriately describe the health and safety situation among large companies in the Indonesian construction industry \([38,39,57]\). This result is not too dissimilar from a previous study that found that the overall safety climate in the Indonesian construction industry was reasonably good \([34,39]\).

When observing the dimensions of the safety climate, however, it is clear that the scores vary widely, ranging from 1.92 (‘low’) to 4.44 (‘good’). The companies demonstrated a ‘good’ level of safety climate in the following dimensions: personal priorities and need for safety (4.44); communication (4.41); management commitment (4.37); and involvement (4.07). These results are encouraging. They show that individual employees understand the importance of safety and the need to work safely. Management commitment is strong and is reflected by regular safety communication across the companies. As a result, employees are adequately engaged and involved in safety implementation.

In contrast, priority of safety (1.92), OHS rules (1.95), supportive environment (2.03), and work environment (2.24) have ‘low’ safety climate scores. This is concerning because even though safety is being highlighted and communicated often in the companies, it seems that its actual application at work is limited. This condition indicates a gap between management “words” and management “actions”. Safety priority is the lowest dimension, indicating that safety is not as important as other objectives in the companies. As a result, OHS rules tend to be enforced selectively. When time and cost pressures come, safety becomes secondary. Likewise, the overall environment does not support safety because safety is a priority only on paper. In reality, there are inadequate resources and support to enforce and manage safety. This is a typical condition in developing countries, where actual safety implementation is lacking because other objectives take precedence in practice \([34]\).

Lastly, the mean of personal appreciation of risk is 2.81, which can be classified as “fairly low”. Even though the respondents understood the importance of safety, they did not consider safety as a priority when performing their work. This reflects the actual work environment as discussed earlier. Because safety is not considered a priority in actuality, there is no incentive for individual employees to prioritize safety in their works.
5.2. Safety Climate and Level of Education

Those with higher education levels perceived that the safety climate score is lower than those with lower education levels. In contrast, previous research found that higher-educated workers express more positive perceptions regarding safety than their lower-educated counterparts [38,51,58]. One possible explanation of this contrasting result is that those with a lower education level, particularly primary school and junior high school graduates, tend to be non-permanent workers, working from project to project. It is well known that large state-owned construction companies in Indonesia have better safety standards and implementation than others. Compared to their past project experiences, these workers might perceive that safety standards in their current projects were higher.

5.3. Safety Climate and Length of Work

As shown in Table 5 the longer the length of work, the lower the safety climate score. This outcome has been observed in previous research, which found that the amount of work experience correlates negatively with safety perception at work [59]. Those with more work experience have seen the reality and associated safety risks of working in the construction industry. They tend to be more skeptical about management commitment toward safety.

5.4. Safety Climate and Position

Frontline workers (workers, tradespeople, foremen, and external non-managerial staff) had a higher level of safety climate than those with managerial positions [60]. This result is in contrast to previous studies which usually indicate that those in higher positions tend to have higher safety perceptions. The context of the research, i.e., large state-owned companies, may influence the result as discussed earlier. These frontline employees work from project to project, and the safety climate in these large companies was higher than the climate in their past experiences. Collecting data from Indonesia may also influence the result as frontline employees in construction in a developing country typically have lower expectations of safety because other needs are more pressing. Working in a relatively good work environment, such as those in these large companies, can elevate their safety perceptions in their workplace. Furthermore, frontline workers directly face safety risks in their daily work. As such, they may have higher safety needs and priorities which are further reflected in their higher safety climate scores.

5.5. Safety Climate and Job Status

Wholesale and daily workers have a higher safety climate than the other types of workers (contract, outsourcing, and permanent). This confirms the argument proposed earlier that these non-permanent employees appreciated the better work environment in these large state-owned companies than what they experienced in their previous projects.

5.6. Safety Climate and Work Location

Project workers have a higher safety climate score than office workers. This result is interesting because project workers naturally face higher safety risks than office workers. Due to their work tasks and environments, they have higher personal appreciation of safety risks and prioritize safety at work, which increases their overall level of the safety climate. This result aligns with another study which indicated that construction project workers experience higher risks than office workers, resulting in a higher safety climate level [61].

5.7. Safety Climate and Type of Project

EPC projects have the lowest safety climate score among different project types. Previous research found that building projects have a higher safety climate than infrastructure projects because building projects are less complex [34]. Likewise, EPC projects are typically complex infrastructure projects. Therefore, the high degree of complexity lowers the level of safety climate because performing complex and uncommon construction works are
inherently riskier due to the high degree of uncertainty and the lack of awareness of how to perform such works that have not been completed previously.

6. Conclusions

The level of safety climate in large state-owned construction companies can be classified as fairly good. However, there is a concerning gap between safety management on paper and its actual implementation in the project level. Even though the employees understand the importance of safety and management seemingly demonstrates safety commitment, particularly through regular safety communication, safety is not considered as a priority at work, especially when projects have other objectives considered more pressing. As a result, safety rules are not strongly enforced, and resources to implement safety measures are inadequate. There is an urgent need, therefore, to close this gap and ensure that management not only shows safety commitment at a superficial level but demonstrates commitment by providing adequate resources to manage safety and integrating safety into daily construction activities and processes. This means integrating safety into project costs and schedules to ensure its practical implementation. Large state-owned construction companies should be at the forefront of this effort and lead a cultural change in the Indonesian construction industry to improve its safety performance.

There are demographic characteristics that influence the level of safety climate. Therefore, it is important for a company to consider and understand its influence in implementing specific intervention strategies to improve safety. In addition, more research is needed to identify the sources that cause differences in the safety climate level among various respondent groups. Based on the results in this research, there is a need to equip employees who have a lower level of education, less work experience, and non-permanent job status with safety knowledge so that they are aware of what it truly means to have a high level of safety in construction projects. Complex projects will also require more efforts to ensure that safety is planned adequately, integrated into the overall project plan, and its implementation is enforced and supported with adequate resources.

This study, however, has several limitations. First, the study was conducted through an online questionnaire due to the COVID-19 pandemic, which limited our ability to collect data directly. Second, since the safety climate was collected based on workers’ perceptions, it tends to be subjective. Therefore, further study is recommended by exploring another perspective at a group and organizational level. To obtain comprehensive data for the safety culture in a company, other tools could be utilized such as measuring the safety maturity level and behavior observation.

Author Contributions: Conceptualization, F.L., A.K., Y.K., R.M., B.W.; methodology, F.L., A.K., Y.K.; software, A.K., N.A.R.; validation, R.Y.S., F.L., A.K.; formal analysis, A.K., N.A.R.; investigation, A.K., F.L., R.Y.S., D.E., R.M., B.W.; writing—original draft preparation, F.L., A.K., R.Y.S., R.M.; writing—review and editing, A.K., F.L., R.Y.S., D.E., R.M., B.W., Y.K., N.A.R.; visualization, A.K., N.A.R.; supervision, F.L., R.Y.S., D.E., R.M., B.W., Y.K.; project administration, N.A.R. All authors have read and agreed to the published version of the manuscript.

Funding: This research is funded by Directorate of Research and Development, Universitas Indonesia under UI Grant with contract number NKB-0137/UN.R3.1/HKP.05.00/2019.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki. The research was conducted based on the research ethics guideline and have been approved by the Ethics Committee of the Faculty of Public Health, Universitas Indonesia (No. 434/UN2.F10.D11/PPM.00.02/2020).

Informed Consent Statement: Informed consent was obtained from the subject participant involved in the study.

Data Availability Statement: The dataset utilized and/or analysed during the present study are available on reasonable request from the corresponding author.
Acknowledgments: The authors would like to thank you to Occupational Safety and Health Department, Faculty of Public Health, Universitas Indonesia, and six construction industries for taking part in this study.

Conflicts of Interest: The authors declare no conflict of interest.

References
1. Lingard, H.; Rowlinson, S. Occupational Health and Safety in Construction Project Management, 1st ed.; Spon Press: London, UK; New York, NY, USA, 2005.
2. BGR. Construction Raw Materials in India and Indonesia Market Study and Potential Analysis, Preliminary Report; BGR: Berlin, Germany, 2020.
3. U.S. Bureau of Economic Analysis. Value Added by Industry: Construction as a Percentage of GDP [VAPGDPC]. Available online: https://fred.stlouisfed.org/series/VAPGDPC (accessed on 16 January 2022).
4. Khaertdinova, A.; Maliashova, A.; Gadelshina, S. Economic Development of the Construction Industry as a Basis for Sustainable Development of the Country. In Proceedings of the 2nd International Scientific Conference on Socio-Technical Construction and Civil Engineering, Web Conference, 21–28 April 2021; Volume 274. [CrossRef]
5. Global Construction Review. Actual UK construction GDP is “Almost Double” Official Measure, Report Says. Available online: https://www.globalconstructionreview.com/actual-uk-construction-gdp-almost-double-official/ (accessed on 15 January 2022).
6. Alaloul, W.S.; Musarat, M.A.; Rabbani, M.B.A.; Iqbal, Q.; Maqsoom, A.; Farooq, W. Construction Sector Contribution to Economic Stability: Malaysian Gdp Distribution. Sustainability 2021, 13, 5012. [CrossRef]
7. Boadu, E.F.; Wang, C.C.; Sunindijo, R.Y. Characteristics of the Construction Industry in Developing Countries and Its Implications for Health and Safety: An Exploratory Study in Ghana. Int. J. Environ. Res. Public Health 2020, 17, 4110. [CrossRef] [PubMed]
8. Central Bureau of Statistics. Banyaknya Perusahaan Konstruksi 2019–2021. Available online: https://www.bps.go.id/indicator/4/216/1/banyaknya-perusahaan-konstruksi.html (accessed on 19 April 2022).
9. Soemardi, B.W.; Pribadi, K.S. The Construction Sector of Indonesia. In Proceedings of the 17th Asia Construct Conference, New Delhi, India, 13–15 December 2012; pp. 9–17.
10. Ramya, M.; Ramadasan, T.D. Analysis on Causes for Accidents in Construction and Its Safety Measures. Int. J. Mod. Trends Eng. Sci. 2016, 3, 127–132.
11. Onuvava Mathew, Y. The Occupational Health and Safety in the Construction Industry: Causes of Accidents and Preventions. Int. J. Eng. Res. Technol. 2016, 5, 602–616.
12. OSHA. Construction Industry. Available online: https://www.osha.gov/construction (accessed on 16 January 2022).
13. Udo, U.E.; Usip, E.E.; Asuquo, C.F. Effect of Lack of Adequate Attention to Safety Measures on Construction Sites in Akwa Ibom State, Nigeria. J. Earth Sci. Geotech. Eng. 2016, 6, 113–121.
14. Amiri, M.; Ardeshir, A.; Fazel Zarandi, M.H. Fuzzy Probabilistic Expert System for Occupational Hazard Assessment in Construction. Saf. Sci. 2017, 93, 16–28. [CrossRef]
15. Bureau of Labor Statistics. Occupational Safety and Health Statistics. Available online: https://www.labour.gov.hk/eng/osh/pdf/Bulletin2016.pdf (accessed on 16 January 2022).
16. Han, B.; Son, S.; Kim, S. Measuring Safety Climate in the Construction Industry: A Systematic Literature Review. Sustainability 2021, 13, 10603. [CrossRef]
17. Yilmaz, F. Analysis of Occupational Accidents in Construction Sector in Turkey. J. Multidiscip. Eng. Sci. Technol. 2014, 1, 3159–3199.
18. Chen, Q.; Jin, R.; Soboyejo, A. Understanding a Contractor’s Regional Variations in Safety Performance. J. Constr. Eng. Manag. 2013, 139, 641–653. [CrossRef]
19. Schwatka, N.V.; Hecker, S.; Goldenhar, L.M. Defining and Measuring Safety Climate: A Review of the Construction Industry Literature. Ann. Occupational. Hygine J. 2021, 60, 537–550. [CrossRef]
20. Prasad, S.; Reghunath, K. Empirical Analysis of Construction Safety Climate—A Study. Int. J. Eng. Sci. Technol. 2010, 2, 1699–1707. [CrossRef]
21. AHIA. How to Improve the Safety Climate on Your Construction Site; AHIA: Falls Church, VA, USA, 2018.
22. Griffin, M.A.; Curcuruto, M. Safety Climate in Organizations. Annu. Rev. Organ. Psychol. Organ. Behav. 2016, 3, 191–212. [CrossRef]
23. Van Vianen, A.E.; de Pater, I.E.; Bechtoldt, M.N.; Evers, A. The Strength and Quality of Climate Perceptions. J. Manag. Psychol. 2010, 26, 77–92. [CrossRef]
24. Cooper, D. Improving Safety Culture: A Practical Guide. Appl. Behav. Sci. 2021, 19, 1–27. [CrossRef]
25. Czarnocki, J.; Silveira, K.; Czarnocka, F.; Szaniawskas, E.; Safety, K. Climate Assessment and Its Impact on Productivity of the Construction Enterprise. Int. J. Econ. Manag. Eng. 2018, 12, 1243–1248.
26. Niu, M.; Leicht, R.M.; Rowlinson, S. Overview and Analysis of Safety Climate Studies in the Construction Industry. In Construction Research Congress 2016; American Society of Civil Engineers: Reston, VA, USA, 2016; pp. 2926–2935. [CrossRef]
27. Wang, M.; Sun, J.; Du, H.; Wang, C. Relations between Safety Climate, Awareness, and Behavior in the Chinese Construction Industry: A Hierarchical Linear Investigation. Adv. Civ. Eng. 2018, 2018, 6580375. [CrossRef]
28. Chan, A.P.C.; Javed, A.A.; Wong, F.K.W.; Hon, C.K.H.; Lyu, S. Evaluating the Safety Climate of Ethnic Minority Construction Workers in Hong Kong. J. Prof. Issues Eng. Educ. Pract. 2017, 143, 04017006. [CrossRef]
29. Zhou, Z.; Gob, Y.M.; Li, Q. Overview and Analysis of Safety Management Studies in the Construction Industry. Saf. Sci. 2015, 72, 337–350. [CrossRef]

30. Mufidah, I.; Rohmahwati, A.A. Evaluasi Safety Climate di Proyek Konstruksi Perumahan dan Apartemen: Study Kasus di Bandung. J. Rekayasa Sist. Ind. 2018, 5, 32. [CrossRef]

31. Amalina, R.; Nurirzika, R.H.; Maharani, F.T. Hubungan Safety Climate Dengan Unsafe Act Pada Pekerja Proyek Apartemen Pt. Multikon Tahun 2020. JPH Recode 2020, 4, 122–129.

32. Sunindijo, R.Y.; Loosemore, M.; Lestari, F.; Kusminanti, Y.; Widanarko, B. Comparing Safety Climate in Infrastructure and Building Projects in Indonesia. MATEC Web Conf. 2019, 258, 02024. [CrossRef]

33. Loosemore, M.; Sunindijo, R.Y.; Lestari, F.; Kusminanti, Y.; Widanarko, B. Comparing the Safety Climate of the Indonesian and Australian Construction Industries: Cultural and Institutional Relativity in Safety Research. Eng. Constr. Archit. Manag. 2019, 26, 2206–2222. [CrossRef]

34. Lestari, F.; Sunindijo, R.Y.; Loosemore, M.; Kusminanti, Y.; Widanarko, B. A Safety Climate Framework for Improving Health and Safety in the Indonesian Construction Industry. Int. J. Environ. Res. Public Health 2020, 17, 7462. [CrossRef] [PubMed]

35. Zohar, D. Thirty Years of Safety Climate Research: Reflections and Future Directions. Accid. Anal. Prev. 2010, 42, 1517–1522. [CrossRef] [PubMed]

36. Wu, C.; Song, X.; Wang, T.; Fang, D. Core Dimensions of the Construction Safety Climate for a Standardized Safety–Climate Measurement. J. Constr. Eng. Manag. 2015, 141, 04015018. [CrossRef]

37. Wee, S.T. Factors of Work Accident at Construction Site in Medan, Indonesia. Occup. Med. Heal. Aff. 2017, 05, 30. [CrossRef]

38. Mangiring, P.; Lestari, F. Construction Project Safety Climate in Indonesia. KnE Life Sci. 2018, 4, 250. [CrossRef]

39. Kementerian PUPR: Jakarta, Indonesia, 2018.

40. Wirawati, K.; Rakasanagara, A.; Gondodiputro, S.; Sunjaya, D.K. Safety Climate as a Risk Factor of Occupational Accidents in a Textile Industry. J. Community Med. Public Heal. 2020, 36, 59–64. [CrossRef]

41. Beus, J.M.; Payne, S.C.; Bergman, M.E.; Arthur, W. Safety Climate and Injuries: An Examination of Theoretical and Empirical Relationships. J. Appl. Psychol. 2010, 95, 713–727. [CrossRef]

42. Glendon, A.I.; Stanton, N.A. Perspectives on Safety Culture. Saf. Sci. 2000, 34, 193–214. [CrossRef]

43. Díaz, R.I.; Cabrera, D.D. Safety Climate and Attitude as Evaluation Measures of Organizational Safety. Accid. Anal. Prev. 1997, 29, 643–650. [CrossRef]

44. Schneider, B.; Barbera, K.M.; Schneider, B.; Barbera, K.M. Introduction: The Oxford Handbook of Organizational Climate and Culture; Oxford University Press: Oxford, UK, 2014. [CrossRef]

45. Hofmann, D.A.; Setzer, A. The Role of Safety Climate and Communication in Accident Interpretation: Implications for Learning From Negative Events. Acad. Manag. J. 1998, 41, 644–657. [CrossRef]

46. Griffin, M.A.; Neal, A. Perceptions of Safety at Work: A Framework for Linking Safety Climate to Safety Performance, Knowledge, and Motivation. J. Occup. Health Psychol. 2000, 5, 347–358. [CrossRef] [PubMed]

47. Yangok, A.; Choosong, T. Factors Related to Safety Climate in Production Line Workers of Food Manufacturing. Int. J. Eng. Technol. 2018, 7, 18–22. [CrossRef]

48. Stiehl, E.; Forst, L. Safety Climate among Nontraditional Workers in Construction: Arguing for a Focus on Construed External Safety Image. New Solut. 2018, 28, 33–54. [CrossRef]

49. Dedobbeleer, N.; Béland, F. A Safety Climate Measure for Construction Sites. J. Saf. Res. 1991, 22, 97–103. [CrossRef]

50. Mohamed, S. Safety Climate in the Construction Site Environments. J. Constr. Eng. Manag. 2002, 9364, 11. [CrossRef]

51. Masood, R.; Choudhry, R.M. Measuring Safety Climate to Enhance Safety Culture in the Construction Industry of Pakistan. In Proceedings of the CIB W099 Safety and Health in Construction Conference: Prevention: Means to the End of Construction Injuries, Illnesses, and Fatalities, Washington, DC, USA, 24–26 August 2011; Volume 54, pp. 1243–1249.

52. Silva, S.; Araújo, A.; Costa, D.L.; Meliá, J. Safety Climates in Construction Industry: Understanding the Role of Construction Sites and Workgroups. Open J. Saf. Sci. Technol. 2013, 03, 80–86. [CrossRef]

53. Zhou, Q.; Fang, D.; Mohamed, S. Safety Climate Improvement: Case Study in a Chinese Construction Company. J. Constr. Eng. Manag. 2011, 137, 86–95. [CrossRef]

54. Darvishi, E.; Maleki, A.; Dehestaniathar, S.; Ebrahimzadeh, M. Effect of STOP Technique on Safety Climate in a Construction Company. J. Res. Health Sci. 2015, 15, 109–112. [CrossRef]

55. Ademola, A.J.; Olugbenga, A.O. Safety Climate and Safety Culture Policies of Construction Organisations in Nigeria. Am. J. Eng. Res. AER 2021, 02, 81–95.

56. NFA. Interpreting the Nordic Occupational Safety Climate Questionnaire NOSACQ-50 Results. Available online: https://nfa.dk/da/Vaerktoejer/Sporgeskemaer/Safety-Climate-Questionnaire-NOSACQ50/How-to-use-NOSACQ50/Interpreting-NOSACQ50-results (accessed on 10 January 2022).

57. Weaver, S.J.; Weeks, K.; Pham, J.C.; Pronovost, P.J. On the CUSP: Stop BSI: Evaluating the Relationship between Central Line–Associated Bloodstream Infection Rate and Patient Safety Climate Profile. Am. J. Infect. Control 2014, 42, S203–S208. [CrossRef] [PubMed]

58. Choudhry, R.M.; Fang, D.; Lingard, H. Measuring Safety Climate of a Construction Company. J. Constr. Eng. Manag. 2009, 135, 890–899. [CrossRef]
59. Boadu, E.F.; Sunindijo, R.Y.; Wang, C.C. Health and Safety Consideration in the Procurement of Public Construction Projects in Ghana. *Buildings* **2021**, *11*, 128. [CrossRef]

60. Sunindijo, R.Y.; Zou, P.X.W. Aligning Safety Policy Development, Learning and Implementation: From Boardroom to Site. In Proceedings of the 19th CIB World Building Congress, Brisbane, Australia, 5–9 May 2013.

61. Ansley, J.; Dastjerdi, E.L.; Dyreborg, J.; Kines, P.; Jeschke, K.C.; Sundstrup, E.; Jakobsen, M.D.; Fallentin, N.; Andersen, L.L. Safety Climate and Accidents at Work: Cross-Sectional Study among 15,000 Workers of the General Working Population. *Saf. Sci.* **2017**, *91*, 320–325. [CrossRef]