Behavioural-Based Safety and Workplace Culture Approaches Instituted in Construction Firms in Ghana: A Systematic Review

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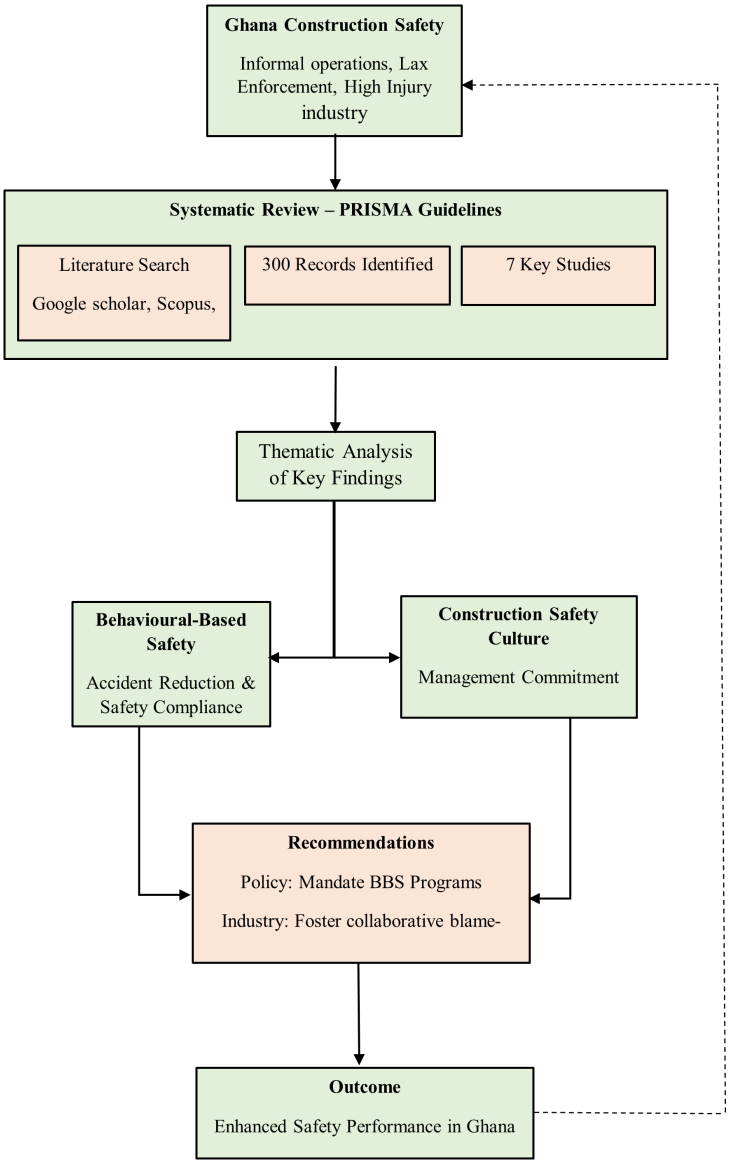
Graphical Abstract



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Abstract

The construction industry is an injury-prone business area given the nature of its operational activities. Ghana's construction industry must grapple with informal operations, small-scale operations, lax regulatory enforcement, and uneven worker safety knowledge and training, which threaten safety. To prevent workplace accidents and injuries, behavioural-based safety (BBS) strategies and a safety culture must be established. Recognizing the role of research in safety enhancement, this study examined the literature on the implementation of BBS approaches and workplace culture initiatives in Ghana. The data were presented based on the guidelines provided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). To compile a comprehensive collection of academic works, a search was conducted using Google Scholar, Scopus, and Web of Science. In total, 300 records were retrieved and after the filter process, seven peer-reviewed journal articles published between 2016 and 2023 were shortlisted and included in the present review. Descriptive and thematic analyses were then employed to analyse and synthesise the relevant literature. The review found behavioural-based approaches (Accident Reduction and Safety Compliance) and Construction safety culture (Management Commitment and Employee Engagement) as the key safety issues previous studies being practiced to achieve safety by construction firms in Ghana. To successfully implement behavioural-based safety (BBS) and improve workplace culture in construction firms in Ghana, this review study recommended that regulations be created requiring the incorporation of BBS programs into safety management systems. Moreover, it is strongly recommended that firms cultivate a collaborative safety culture where workers are encouraged to report hazardous actions and propose enhancements without fear of reprisal.

Keywords: behavioural-based safety; workplace culture; work culture; construction; firms; Ghana.

1 Introduction

Owing to its vital role in developing infrastructure and creating job opportunities, the construction sector is essential for the economic growth of countries [1]. This industry fosters economic development by facilitating the construction of vital structures, such as highways, bridges, buildings, and other crucial infrastructures that sustain diverse economic endeavors [2, 3]. Nevertheless, it is acknowledged as one of the most hazardous sectors, distinguished by the elevated frequencies of accidents and injuries. Love et al. [4] found that the inherent volatility of construction labour amplifies the likelihood of accidents. The significance of safety in construction is therefore paramount, considering the possibility of grave repercussions such as fatalities, injuries, and financial setbacks. Consequently, the prioritization of improving safety protocols in construction sites has emerged as a crucial area of interest for both scholars and practitioners. Efforts to enhance safety are constantly evolving, integrating cutting-edge technology, strict laws, and thorough training programs to mitigate risks and safeguard workers' well-being [5].

Behavioural-based safety (BBS) strategies, which focus on identifying and altering hazardous behaviours to avoid workplace accidents and injuries, have become imperative for implementation in construction industries [6]. BBS entails the observation and analysis of workers' behaviours, provision of feedback, and reinforcement of safe activities while discouraging dangerous ones [7, 8]. This strategy follows a systematic strategy to analyse the reasons behind workers' engagement in risky behaviours and aims to address the underlying issues to provide a safer work environment. This strategy has become prominent because of its proactive nature, which prevents accidents in advance, rather than responding to occurrences after they occur [9, 10].

Through the promotion of a culture centered on ongoing observation and feedback, BBS approaches foster heightened awareness among workers about their behaviours and possible outcomes [11, 12, 13]. The BBS has been extensively used across several sectors, including construction, because of the dynamic and often unexpected nature of the work environment, which renders conventional safety precautions inadequate [14]. The difficulty of ensuring safety in construction is influenced by variables such as the dynamic nature of working sites, the varied range of jobs involved, and the various skill levels of the workers [15]. Hence, the BBS provides a customised solution that effectively addresses these problems by prioritising behavioural modification, eventually resulting in a substantial decrease in workplace accidents and injuries.

Additionally, there is a need for the construction sector to alter workplace culture to promote and sustain safety. An affirmative safety culture in construction enterprises is essential for the effective execution of safety programs including BBS [16, 17]. Safety culture comprises the dedication of management to safety, active participation of employees, efficient communication, and ongoing improvement procedures. Mujtaba et al. [18] found that efficient communication guarantees that safety requirements are comprehensively grasped and that employees feel at ease when reporting dangers or occurrences, without any apprehension of retaliation. Continuous improvement techniques, such as frequent safety training and feedback sessions, strengthen safe practices and tackle developing hazards. A robust safety culture encourages employees to follow safety protocols and to practice safe work habits, thereby reducing accidents and injuries. This enhances employee well-being, operational efficiency, and project success, ultimately benefiting the entire organisation.

The construction sector in Ghana faces significant safety challenges due to prevalent informal operations, small-scale operations, limited regulatory enforcement, and inconsistent safety awareness and training among workers [19, 20]. Informal operations often lack the resources and structured systems needed to implement comprehensive safety measures, leading to inconsistent safety practices [21]. In addition, limited regulatory enforcement means that safety regulations are not always strictly followed, resulting in unsafe working conditions. These factors contribute to a heightened risk of accidents and underscore the need for effective safety interventions [22, 23].

The adoption of BBS and cultivation of a robust safety culture present viable strategies for addressing these safety challenges. BBS can help to systematically identify and rectify unsafe behaviours, while a strong safety culture ensures continuous commitment to safety at all organizational levels [24]. Moreover, targeted safety training programs can enhance workers' awareness and understanding of safety practices, significantly reducing the likelihood of accidents [25]. By integrating these approaches, construction firms in Ghana can create safer work environments, ultimately protecting workers and improving the overall productivity and project outcomes.

This paper examines existing studies to understand the behavioural-based and work safety culture approaches existing in Ghana's construction sector. The review findings on behavioral-based safety approaches and construction work safety culture in Ghana's construction industry contribute directly and indirectly to several United Nations Sustainable Development Goals (SDGs). It particularly support SDGs 3 (Good Health and Well-Being), 8 (Decent Work and Economic Growth), 9 (Industry, Innovation, and Infrastructure), 11 (Sustainable Cities and Communities), and 17 (Partnerships for the Goals) by promoting safer, more productive, and sustainable construction practices in Ghana [26, 27]. Future policies should integrate these safety approaches into national occupational health and safety (OHS) frameworks to accelerate SDG progress.

2 Materials and Methods

This study employed secondary data from the PRISMA 2020 Checklist. This review aimed to assess behaviour-based safety and workplace culture approaches instituted in construction firms in Ghana. It is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) with a PRISMA flowchart. To gather an extensive body of literature, a search was performed using Google Scholar, Scopus, and Web of Science. The search strategy utilised a blend of keywords and terms about BBS and workplace culture approaches instituted in construction firms in Ghana (behavioural-based safety, workplace culture, work culture, construction, firms, Ghana). Seven articles were included in the review, with a custom range between 2016 and 2023.

2.1 Eligibility Criteria

This review included research that directly examined the Behavioural-based safety and workplace culture approaches construction industries. The eligible articles included original research, observational studies, and review articles that were published in English Language. The research should present factual data and a concise description of the behavioural-based safety components and workplace culture that were investigated. The review omitted sources that were not focused on construction industries, lacked empirical data, or were published in languages other than English.

2.2 Information Sources

To gather an extensive body of literature, a search was conducted across multiple electronic databases including Scopus, Web of Science, and Google Scholar for relevant studies or sources used in this work. A custom range between 2016 and 2024 was allowed in the search.

2.3 Search Stratyegy

The search strategy utilised a blend of keywords and terms about BBS and workplace culture approaches instituted in construction firms and companies such as "behavioural-based safety", "workplace culture", "work culture", "construction", "firms", and "Ghana". To optimize the retrieval of pertinent studies, the search was customized for each database. Filters were applied to restrict the search results to articles published over a decade to ensure data currency and relevance. The articles were imported into reference management software, where duplicates were removed. The titles and abstracts of the articles were screened to determine their suitability based on the established inclusion criteria. Again, the articles that met the initial screening criteria were assessed based on predefined inclusion and exclusion criteria.

2.4 Selection Process

The selection process began by compiling articles from various sources into reference management software to eliminate duplicate entries. A multi-stage screening approach ensured a thorough evaluation and selection of relevant studies. First, two independent reviewers screened titles and abstracts against predefined inclusion and exclusion criteria. Articles that did not meet the criteria were excluded, with reasons documented. This step helped narrow down potentially relevant studies. Next, the reviewers conducted a full-text assessment of the remaining articles, meticulously verifying their alignment with the review's inclusion criteria. Any disagreements between reviewers were resolved through discussion or consultation with a third reviewer. This rigorous screening process ensured that only the most relevant and high-quality studies were included, enhancing the systematic review's reliability and validity.

2.5 Study Risk of Bias Assessment

The risk of bias in each of the selected studies was assessed by two independent reviewers using standardized evaluation criteria. Based on predefined assessment guidelines, each study was categorized as having a "Low Risk," "High Risk," or "Unclear Risk" of bias. Discrepancies between the reviewers' evaluations were resolved through deliberation or, when necessary, by consulting a third reviewer. This structured approach ensured an objective and rigorous assessment of potential biases, thus maintaining the integrity of the review. The process aligned with the PRISMA 2020 guidelines, reinforcing the reliability of findings on behavioral-based safety and workplace safety culture approaches in construction firms in Ghana.

2.6 Synthesis Methods

The study utilized a thematic analysis approach to synthesize the data, organizing it into key themes derived from the research. These themes covered aspects of behavior-based safety (BBS) strategies and construction workplace safety culture initiatives. The BBS components examined included factors such as accident reduction and safety compliance, with an assessment of how Ghanaian construction firms adopted these measures. Additionally, the study explored safety culture approaches used by these companies, focusing on elements like management commitment and employee involvement.
The research aimed to identify the specific BBS and safety culture practices implemented by firms to enhance workplace safety. A narrative synthesis was conducted for each theme, summarizing key findings and comparing results across studies. This process helped identify commonalities and differences in safety strategies among companies, providing insights into the effectiveness of various BBS techniques, safety culture factors, and precautionary measures

3 RESULTS

The initial step involved the identification of 300 records from the database. Before the screening process, 18 duplicate records were removed and 52 records were marked as ineligible by the automation tools. In addition, 197 records were removed for other reasons, resulting in 497 records for screening. Of the 213 records screened, 50 were excluded. After screening, 163 reports were retrieved. However, 100 reports were not retrieved for review. Of the retrieved reports, 63 were assessed for eligibility. Of the 63 reports assessed, 56 were excluded for various reasons that are not specified in the provided information. Finally, 7 studies were included in the systematic review after rigorous screening and assessment. The limited number of studies highlights the strict criteria used to ensure the review focused on the research subject and was based on the most relevant, high-quality evidence available. Figure 1 below illustrates the systematic approach and flow of the review process used to select the studies for the review.

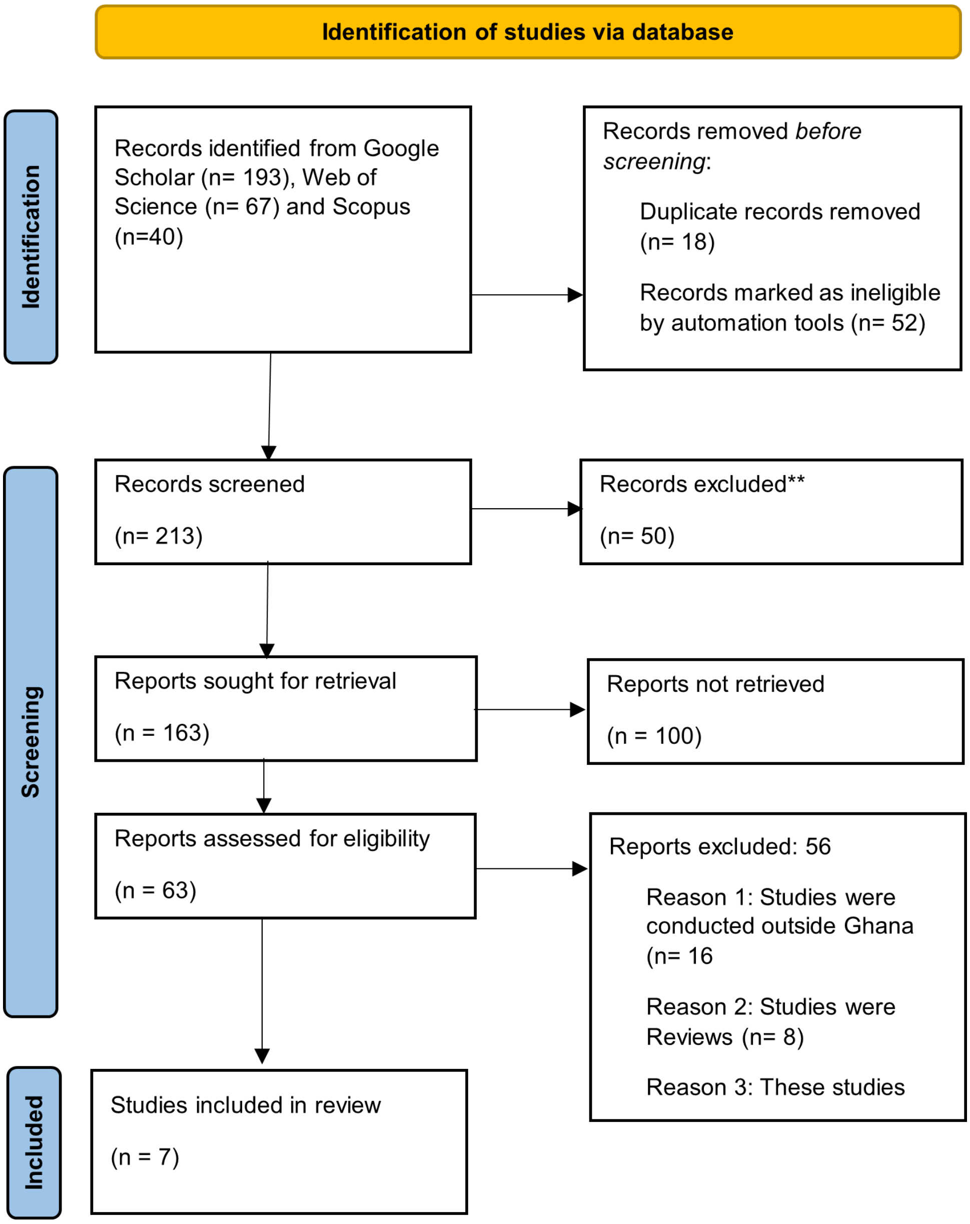

Figure 1: PRISMA process chart of the study. Source: Authors' construct, 2023.

3.1 Thematic Analysis

To understand behavioural-based safety and workplace safety culture approaches instituted in Ghana construction firms, the authors integrated the findings from the seven (7) studies used in this review through a thematic analysis technique synthesizing key findings. Themes found in the studies are primarily classified into two (2); behavioural-based safety approaches and construction workplace safety culture approaches. The two themes further have sub-themes including; accident reduction and safety compliance for BBS and management commitment and employee engagement for construction workplace culture. Table 1 presents a summary of these themes. Each theme was reviewed to identify common strategies, findings, and obstacles reported in the included papers of the review.

Table 1: Summary of Themes and Sub themes

Main themes	**Behavioural-Based Safety**	**Workplace Safety Culture**
Sub themes	Accident Reduction	Management Commitment
	Safety Compliance	Employee Engagement

4 DISCUSSION

4.1 Behavioural-based Safety Approaches

4.1.1 Accident Reduction

The minimisation of accidents in the construction industry is an essential objective that highlights the need for strong safety protocols and procedures. Appiah's [28] research on auto craftsmen in Kokompe, Accra, sheds light on the insecure and risky working circumstances experienced by many informal labourers. The study highlights a notable deficiency in safety culture, linking elevated accident rates to sub-organisational frameworks, insufficient safety rules, and inadequate utilisation of Personal Protective Equipment (PPE). The precarious working circumstances of craftsmen, marked by improvised buildings, congestion, and exposure to harsh weather conditions, heightens the likelihood of accidents. The absence of established safety regulations and inadequate training exacerbate these hazards, resulting in frequent injuries and accidents [28].
Further evidence is provided by a study on compliance with welfare facilities and PPE requirements on construction sites in Ghana by Tannor et al. [29]. This study revealed that a significant number of construction firms in Ghana do not adhere to crucial health and safety rules, namely, in terms of providing adequate sanitary facilities, housing, washing facilities, changing rooms, and eating facilities. Furthermore, the study uncovered a pervasive deficiency in personal protective equipment (PPE) and inadequate compliance with user instructions, as the majority of companies failed to provide essential protective gear. The lack of adherence to safety regulations greatly contributes to the high frequency of accidents and injuries at construction sites, as workers are exposed to many risks without sufficient protection [29].
Both studies emphasised the need to implement a comprehensive strategy to enhance safety culture and minimise accidents at construction sites in Ghana. Adopting behavioural-based safety (BBS) programs and fostering a strong safety culture are essential. These interventions may improve safety consciousness, promote the use of personal protective equipment (PPE), and cultivate a proactive mindset to prevent accidents. Construction enterprises can achieve safer work conditions and significantly reduce workplace accidents and injuries by rectifying gaps in organisational policy, training, and compliance with safety standards.

4.1.2 Safety Compliance

Ensuring safety compliance in the construction sector is crucial for the welfare of workers and overall achievement of building projects. The research conducted by Segbenya and Yeboah [30] shed light on significant concerns regarding adherence to occupational health and safety (OHS) regulations within Ghana's construction industry. Although the Factories, Offices, and Shops Act 1970 (Act 328) [31] and Labour Act 2003 (Act 651) [32] provide regulatory frameworks, the implementation and enforcement of these rules are uneven. The research revealed that several construction companies have implemented occupational health and safety (OHS) policies. However, the absence of consistent health and safety training, inadequate supply of personal protective equipment (PPE), and insufficient enforcement of safety protocols contribute to persistent safety issues. Workers often encounter perilous circumstances without adequate safeguards, which results in elevated levels of accidents and injuries. This highlights the need for more rigorous adherence to and supervision of compliance measures [30].

Dorkenoo [33] also underscores significant challenges in safety compliance among Ghanaian construction firms, particularly highlighting the influence of organizational culture on safety practices. The findings reveal that many firms lack a robust safety culture that is critical for fostering compliance with safety regulations. Inadequate training and insufficient enforcement of safety protocols were identified as the primary issues. Workers often do not receive regular health and safety training, and the enforcement of safety measures such as the use of Personal Protective Equipment (PPE) is inconsistent. This gap in safety compliance not only endangers workers, but also impacts overall project performance and productivity. Enhancing organizational culture to prioritise safety through continuous training and strict adherence to safety protocols is essential for improving compliance and reducing workplace accidents [33].

Safety compliance in the construction sector is crucial for minimising risks and ensuring a safe working environment. The study by Opoku et al. [17] underscores significant challenges in safety compliance in the Ghanaian mining industry, which can be extrapolated to the construction sector. The findings highlight that, while regulatory frameworks exist, enforcement and adherence to safety protocols are often inconsistent. Many firms fail to provide adequate training and safety equipment, leading to a culture of noncompliance. This lack of commitment to safety standards has resulted in frequent accidents and unsafe working conditions. This study emphasises the importance of cultivating a robust safety culture through continuous education, proper enforcement of safety measures, and ensuring that all employees are aware of and adhere to safety protocols. By enhancing safety compliance, construction firms can significantly reduce workplace accidents and improve their overall safety outcomes [17].

4.2 Construction Workplace Safety Culture in Ghana

4.2.1 Management Commitment

Boadu et al. [34] find that a lack of strong management commitment limits the effective implementation of rigorous health and safety procedures in construction firms in Ghana. The study emphasises that several managers in the construction industry fail to prioritise safety because of the lack of strict regulatory enforcement and the significant expenses involved in developing complete safety programs. The absence of dedication from management often leads to insufficient safety training, inadequate supply of Personal Protective Equipment (PPE), and inadequate safety monitoring of building sites. The research proposes that improving management commitment entails not only strengthening the legal framework but also fostering an organisational culture that regards safety as essential for achieving operational success. Through persistent and unwavering dedication to safety, management can significantly reduce workplace accidents and provide a more secure working environment for all workers [34].

4.2.2 Employee Engagement

In addition, Tear et al. [35] found that the level of commitment shown by management towards safety has a substantial impact on the safety behaviour of workers. The report emphasises that when top-level executives prioritise safety, it establishes a standard that permeates all levels of the company, cultivating a culture where safety is seen as essential for achieving operational success. This dedication is demonstrated via tangible activities such as dedicating resources to safety training, guaranteeing the accessibility of Personal Protective Equipment (PPE), and actively participating in safety audits and meetings. Moreover, the study emphasises that employees are more inclined to follow safety procedures and engage in safety programs when they believe that their leadership is dedicated to their welfare. However, if management does not demonstrate a clear commitment, it may result in complacency and a diminished safety culture, which in turn increases the chances of accidents and injuries occurring at construction sites. Management commitment is a key component that influences both safety compliance and the attitudes and behaviours of workers towards safety [35].

5 Conclusions and Recommendations

The construction industry is acknowledged as one of the most hazardous sectors, distinguished by the elevated frequencies of accidents and long-term injuries. This is unacceptable in modern society and it also makes the industry inefficient. This review study aimed to examine existing studies to understand the behavioural-based and work safety culture approaches existing in Ghana's construction sector to inform a broader adoption framework for enhancing safety in the industry. The review found behavioural-based approaches (Accident Reduction and Safety Compliance) and Construction safety culture (Management Commitment and Employee Engagement) as the key safety issues previous studies being practiced to achieve safety by construction firms in Ghana. This review findings recommends for policy, practice, and research as follows;
Policy
To effectively implement behavioural-based safety (BBS) and enhance workplace culture in construction firms in Ghana, it is crucial to develop policies that mandate the integration of BBS programs into safety management systems. The government should establish guidelines for the adoption of BBS practices, ensuring that construction firms incorporate behavioural observation and feedback mechanisms into their daily operations.
Practice
Construction firms should actively integrate BBS approaches into their safety management practices by focusing on behaviour modification and reinforcing safe practices. This involves training supervisors and managers to observe and provide constructive feedback on workers' behaviours, promoting a proactive safety culture. Firms should also foster a participatory safety environment in which employees feel empowered to report unsafe behaviours and suggest improvements without fear of reprisal. To build a strong safety culture, management must demonstrate a visible commitment to safety, regularly engage with workers on safety issues, and lead by example, in adhering to safety protocols.
Research
Further research is required to evaluate the effectiveness of BBS programs and workplace culture interventions in the Ghanaian construction industry. Studies should focus on identifying the specific behavioural factors that contribute to safety incidents and examining the impact of BBS on reducing these behaviours. Research should also explore the relationship between management commitment, employee engagement, and safety outcomes in order to develop a comprehensive understanding of how workplace culture influences safety performance. Longitudinal studies tracking the long-term effects of BBS and safety culture initiatives can provide valuable insights into the best practices and areas for improvement.

Conflicts of Interest: The authors declare no conflicts of interest regarding the publication of this paper.

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