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Construction Practitioners' Perception of Construction Site Safety Performance in Ghana

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Abstract

There are significant literature gaps in Ghana's construction sector regarding safety performance, worker satisfaction levels, and safety performance challenges, needing a more extensive and mixed-methods study. Hence, the study adopted a mixed-methods approach in studying the construction sites practitioners' perception across 79 sites in five regions by evaluating 534 surveys and 36 interviews through descriptive and inferential analysis and thematic analysis, respectively. The findings revealed that construction project sites have a generally positive safety culture, with a strong emphasis on reducing accidents and injuries. Despite acknowledging areas for improvement, respondents expressed great satisfaction with safety performance, key factors being motivation, compliance, worker participation, and management. A variety of safety performance challenges were raised: leadership commitment, communication barriers, PPE management, compliance, operational welfare, and regulatory challenges. The Kruskal-Wallis test revealed significant differences in perceptions of some of the safety performance and satisfaction metrics, suggesting the need to consider multiple occupational perspectives when evaluating safety performance and satisfaction. The study proposes all-encompassing approaches to enhance construction safety in Ghana, including educational initiatives, legislative changes, and doable actions like frequent safety audits and incident reporting. Reliance on self-reported data, restricted geographic coverage, and a limited focus on safety performance are among the limitations, underscoring the necessity of more research to fill up these gaps. With useful insights for contractors, lawmakers, and stakeholders, this study advances knowledge of safety performance in Ghana's construction industry.

Keywords: Safety Performance, Ghanaian Construction Sites, Construction Practitioners, Challenges, Satisfaction, Mixed Methods Approach

1. Introduction

The construction sector is critical to generating economic growth and meeting global goals for social development, industrialization, sustainable development, and urbanization (Alaloul et al., 2021). The industry includes a wide range of projects, encompassing residential and commercial structures, energy, defense, transportation, and infrastructure development, such as roads, bridges, and dams. The

construction industry in Malaysia makes a substantial contribution to the country's GDP and social progress by producing revenue and capital and creating jobs (Khan et al., 2014).

Yet, this sector is well-known for its high-risk profile, dynamic, transitory, and fragmented character, making it one of the most dangerous enterprises (Li et al., 2015). Construction projects represent enormous hazards to society, the economy, and the environment due to their complex structures, volumes, and processes that need advanced structural design, site, and construction technologies. Large-scale projects have a longer construction duration, a harsh working environment, and a significant workload and working processes, all of which heighten safety dangers (Grote, 2012; Lee and Son, 2021; Li et al., 2021). Worldwide, the industry experiences an elevated risk of accidents and injuries, owing to factors like complicated construction work, non-standard and short-term tasks, varied technology, and vulnerability to macroeconomic changes (Luo et al., 2022; Soundarya Priya et al., 2023; Yuan et al., 2022). Such difficulties highlight the necessity for improved safety measures in the construction sector.

The Ghanaian construction sector, like others globally, generates jobs and lowers poverty, making a substantial contribution to the GDP growth and economic development of the nation (Arthur-Aidoo et al., 2016). But it is beset by accidents and fatalities (Amissah et al., 2019; Simpson, 2017). Inefficient safety management systems compound the problem (Agyekum et al., 2018; Liu et al., 2020).

Despite studies having been conducted on safety performance in Ghana's construction industry (Boakye et al., 2022; Botchway et al., 2024; Segbenya and Yeboah, 2022), as well as other industries such as oil and gas (Nkrumah et al., 2021; Ofori et al., 2023), there is still little information available about the safety performance of active large and medium-sized construction project sites in Ghana. Though Simpson and Sam (2020) investigated safety management strategies, concentrating mostly on big sites in Accra and Kumasi, their research provided just a brief glimpse into real safety performance. Botctway et al. (2024) conducted a quantitative study on safety performance on building sites in Ghana's Kumasi Metropolis, identifying ten key indicators, ten obstacles to successful implementation, and eight strategic strategies for enhancing safety in the construction industry but used a sample size of only 41 respondents. Deeper and more complete research encompassing both big and medium-sized sites across many regions using mixed methods is required to enhance safety delivery in Ghana's construction sector.

Research has demonstrated that safety performance has a considerable influence on employee and owner satisfaction (Bayram, 2018; Bayram, 2019; Bayram et al., 2016; Dziuba et al., 2020; Onubi et al., 2023). However, there is a knowledge gap in terms of construction workers' satisfaction with on-site safety performance management. Simpson and Sam (2020) conducted a similar study in Accra and Kumasi, reporting on participants' satisfaction with the condition of health and safety (H&S) delivery on building sites. A chi-square test was used to find no statistically significant difference in satisfaction ratings between junior and management staff in their survey, which included 170 respondents. Yet, further study is required to build a fuller knowledge of safety performance satisfaction, including a broader geographical scope and a bigger sample size, as well as an expanded collection of evaluation questions.

Again, previous research has found OHS challenges in Ghana's construction sector (Boadu et al., 2021; Segbenya and Yeboah, 2022). However, these investigations were limited in scope and used quantitative approaches. This study addresses this gap by utilizing only qualitative methodologies to analyze construction practitioners' perspectives on the topic, providing more contextual factors and expanding on prior research (Segbenya and Yeboah, 2022; Boadu et al., 2021).

Ultimately, this study aims to address the foregoing vacuums by investigating the perceptions of construction project site practitioners in Ghana on safety management performance, satisfaction levels with safety performance, and challenges with safety performance.

The research questions that drive this study are

1. How do the construction project site practitioners perceive the safety performance at their projects' sites?
2. How satisfied are the construction project site practitioners with regard to safety performance at their projects' sites?
3. What are the challenges facing safety performance at their project sites?
4. What are the statistical differences in safety performance and satisfaction perception among the practitioners?

The findings will lead to recommendations for improving construction project site safety management, policy formation, and research progression by academics and various OHS experts.

1.2 Safety performance

Safety performance refers to the efforts of organizations to reduce accidents and injuries to workers, playing a crucial role in achieving anticipated outcomes (Otitolaiye et al., 2021). It describes how well individuals or organizations follow safety laws and procedures, eliminating workplace accidents, injuries, and other safety-related difficulties. It includes both adherence to safety standards and proactive involvement in safety-related actions (Christian et al., 2009; Moon et al., 2018).

Safety performance is an important predictor of organizational productivity since it influences workplace outcomes such as accident rates, injuries, and overall operational efficiency. Managers that understand the value of safety performance frequently use efficient employee selection methods to hire employees who exhibit strong safety orientation, which corresponds to the proclivity to participate in safe behavior and follow safety regulations at work (Pourmazaherian and Musonda, 2022). Employees with a strong commitment to safety are more inclined to follow safety standards, use personal protective equipment (PPE), and avoid dangerous circumstances (Pourmazaherian and Musonda, 2022).

Safety performance is frequently measured using two different but related components: safety compliance and safety participation (Christian et al., 2009). Safety compliance refers to mandated behaviors, such as wearing PPE or observing specified safety protocols, whereas safety participation refers to voluntary actions, such as encouraging coworkers to participate in safety activities and supporting a safe atmosphere (DeArmond et al., 2011). Safety participation includes acts that go beyond compliance, such as utilizing equipment appropriately and implementing work practices that reduce risk exposure (Fugas et al., 2011). Safety participation improves workplace safety and predicts fewer micro-accidents, property damage, and lost-time injuries (Curcuruto et al. 2015; Saracino et al. 2015).

From Qayoom (2019), safety manager conduct, notably safety communication, has a considerable influence on middle management's safety performance. Decentralizing decision-making and encouraging employee safety-conscious behavior both improve safety performance. Effective incident reporting and investigation are critical contextual variables, and safety supervisor competence is an important psychological characteristic. Worker dedication, knowledge, skills, training, and experience all have an impact on safety performance, and appropriate housekeeping practices help to create a safer work environment.

Employee behavior is critical to maintaining and increasing safety performance (Hoffman, 1998). Safety compliance, devotion, and interpersonal relationships among coworkers have a major influence on safety outcomes (Farndale and Murrer, 2015). Safety training and initiatives improve employees' knowledge and abilities, resulting in improved safety performance (Griffin and Hu 2013). Worker competency and safety orientation are additional factors that impact safety results (Pourmazaherian and Musonda, 2022). Positive safety commitment behaviors and employee participation help to increase adherence to safety laws (Ghosh et al., 2014; Ellinger et al., 2014; Viitanen and Siljander, 2021).

Safety performance is also influenced by various organizational and environmental variables like management techniques, resources at hand, site management, worker characteristics, and the organizational environment. Top management and government agencies must work together to enhance safety performance on project sites (Durdyev et al., 2017). Safety performance is significantly influenced by organizational goals, management commitment, safety training, and proper safety teams and budgets (Abbasianjahromi and Golafshani, 2021).

According to Ofori et al. (2023), safety training is the most important factor influencing safety performance, and safety knowledge and culture are the best ways to moderate this relationship. The findings also show that an additional safety management technique that can support the creation of a successful safety policy is efficient safety training.

Yu et al. (2021) measured safety performance using criteria such as fewer accidents, injuries, equipment failures, and economic losses in the preceding month. They also suggested that an ideal age structure among construction teams might help to improve safety performance. This is consistent with the wider notion that employee qualities and actions have a major influence on safety results. Effective safety performance necessitates a multidimensional strategy that involves safety regulation implementation, leadership, safety planning, performance evaluation, risk assessment, inspections, and safety culture development (Khalid et al., 2021).

Given the insufficient construction safety performance literature in Ghana as highlighted in the introduction, it is critical to undertake recent research concentrating on construction practitioners' views regarding the current state of safety performance at the active, safety-conscious project sites. This will assist in finding useful information and improving awareness of industrial safety procedures.

1.3 Employee satisfaction

Having a safety management system may reduce accidents, health hazards, and material damage, thereby increasing employee happiness, productivity, and product quality (Fernández-Muñiz et al., 2009). Effective safety management may boost a company's competitiveness and revenues. Yet, gaining employees' trust and dedication is critical to minimizing workplace accidents and enhancing safety performance (Wachter and Yorio, 2014). But little research in the occupational safety literature addresses the impact of occupational health and safety (OHS) management practices linked with employee satisfaction on occupational accidents and illnesses (Wachter and Yorio, 2014). Fernández-Muñiz et al. (2012) found that employee satisfaction increases a company's viability. Torp and Moen (2005) found that when modifications are implemented, employees are more satisfied and engage in OHS activities. Wachter and Yorio (2014) found that there is a clear negative association between accident rates and emotional and cognitive engagement levels among occupational safety-oriented personnel.

Occupational safety performance improves employee satisfaction and reduces accident costs (Bayram et al., 2016), and employee satisfaction increases significantly when safety performance is excellent.

Furthermore, safety training and competency have an indirect effect on employee satisfaction by increasing employee participation and involvement (Bayram, 2019). Bayram (2018) discovered that management's commitment to OHS has a favorable influence on worker satisfaction, which directly improves safety performance. This commitment also indirectly increases safety performance by increasing employee satisfaction. Dziuba et al. (2020) discovered a favorable relationship between job satisfaction and workplace safety, with pleased employees performing better, being more responsible, and feeling more linked to the firm. Onubi et al.'s (2023) study revealed that owner satisfaction is significantly positively impacted by H&S performance. These studies provide the notion that safety performance influences employees and owners satisfaction. The number of physical injuries, material damage, employee engagement, and absenteeism or lost time are all important indicators of satisfaction with previous safety performance. Fewer accidents and hazards, reduced material damage, more employee motivation, and lower absenteeism are all signs of strong safety measures, which lead to positive performance assessments (Kim et al., 2019).

The preceding literature has highlighted a significant gap in literature on the satisfaction with safety performance levels in the construction industry. From the introduction, insufficient information remains concerning construction practitioners' views on satisfaction with safety performance in construction project sites' safety delivery in Ghana. This makes this study relevant and critical to address this gap and improve safety performance in Ghana.

1.4 Safety performance challenges

The construction industry has major health and safety (H&S) performance obstacles. Key challenges include a lack of stakeholder participation, inadequate legislation, and insufficient training (Kukoyi and Adebowale, 2021). Other issues include inefficient communication, noncompliance with laws, and psychological concerns such as stress and exhaustion (Samanta and Gochhayat, 2023). The recommendations include providing proper safety training, revising safety standards, and performing thorough accident investigations (Umar and Wamuziri, 2016). Furthermore, resolving flaws in safety management systems, government commitment, and insurance practices is critical (Awwad et al. 2016).

Ghana's H&S standards are confronted with various problems, namely high material costs, low labor literacy, and a lack of clarity around H&S concerns (Segbenya and Yeboah, 2022). Other concerns include the difficulty of finding qualified personnel, management's lack of commitment, and employees' unwillingness to report incidents (Segbenya and Yeboah, 2022). The adoption of OHS in Ghana faces challenges such as a lack of skilled staff, budgetary constraints, a lack of a clear compliance framework, weak OHS laws, insufficient enforcement, and unethical inspector behaviour (Boadu et al., 2021). Botchway et al. (2024) identified ten major barriers to safety performance on Ghanaian construction sites in Kumasi, including insufficient resources, a lack of qualified and competent personnel, inadequate welfare facilities, a lack of government inspection, a lack of commitment to OHS programs, professional negligence, ineffective safety risk management strategies, a lack of safety policies, and insufficient worker training programs.

The foregoing literature has shed light on some safety performance challenges in other nations, including Ghana. This study fills a research vacuum in Ghana by utilizing a qualitative approach to investigate contextual variables impacting H&S performance across regions, building on prior research.

1.5 Conceptual framework

By examining practitioners' perspectives concerning safety performance, satisfaction levels, and challenges, this study fills in gaps in the literature on safety performance in Ghana's construction sector. To enhance safety performance in Ghana's construction sector, the research is guided by a conceptual framework (Figure 1) and uses a mixed-methods approach for research questions 1 and 2, qualitative analysis for research question 3, and quantitative analysis for research question 4.

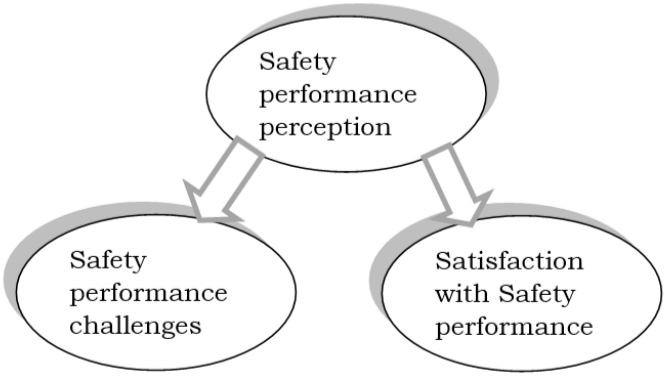

Figure 1: Conceptual Framework for Safety Performance Perception

2. Methods

The study aimed to investigate the perception of construction project site practitioners in Ghana regarding safety management performance and its corresponding satisfaction levels and challenges. The Ministry of Works, Housing, and Water Resources (MWHWR) in Ghana categorizes construction enterprises into four groups: D (building), K (civil engineering), E (electrical works), and G (plumbing works) (Ayarkwa et al., 2012), each with four financial sub-classes ranging from Class 4 (>75,000 USD) to Class 1 (>500,000 USD), determining their labor, plant, and project scope (Asare-Yeboah, 2016).

A mixed-methods strategy was used, integrating quantitative and qualitative data (Dawadi and Giri, 2021; Burke and Christensen, 2014) to improve knowledge validity, depth, consistency, and accuracy, ultimately aiming to help the construction industry. This study used a triangulation design with simultaneous phases (Ponce and Rico, 2015) and a multilevel mixed-design method (Tashakkori et al., 2021). A cross-sectional design was used to collect data (Allen, 2017). Project/site managers, engineers, supervisors/safety officers, artisans, and unskilled personnel were among the participants in the building project. Key informants were chosen using purposeful sampling, whereas questionnaire respondents were chosen using convenience sampling (Emmel, 2013; Etikan et al., 2016). Targeted active, large, and medium-sized projects whose employees and leadership were presumed to be familiar with H&S procedures and delivery were used (Simpson and Sam, 2020).

The research instruments were verbally approved by a committee of academics from Akenten-Appiah Menka University's construction management department, which included prominent senior lecturers selected by the head of department (HoD). A pilot study was conducted to assess the items' relevance, and any required adjustments were implemented. Participants' consents were obtained after informing them that the study was being conducted for academic purposes, assuring them of privacy and confidentiality, and stressing that their participation was voluntary and that they could withdraw at any time without paying any penalty (Fisher and Anushko, 2008, as stated in Rana, 2021). These statements

of informed consent were clearly spelled out in the preambles of the questionnaires and interview guides for respondents.

Data were gathered using questionnaires, semi-structured interviews, and audio recordings (Rutakumwa et al., 2019). To measure practitioners' perception about safety performance, questionnaires contained demographic questions as well as seven-point Likert scale (1=strongly disagree to 7=strongly agree) items about safety performance. Safety performance items were adapted from Yu et al. (2021) and DeArmond et al. (2011). Satisfaction with safety performance was also measured with a 7-point Likert scale (1=very dissatisfied to 7=very satisfied) with items about satisfaction level with safety performance. Items were adapted from Kim et al. (2019) and DeArmond et al. (2011). To guarantee reliability, necessary adjustments were performed, and scale consistency was evaluated using Cronbach's alpha (Pallant, 2011). A total of 650 self-administered surveys were delivered, with an 80% response rate, with 38 more responses obtained via Google Forms, making 558 respondents from construction sites in Ghana's five regions.

SPSS version 26 software helped to analyze 534 valid questionnaires to provide descriptive and inferential statistics on practitioners' opinions regarding health and safety performance, satisfaction, and challenges. Research questions one and two were answered using a mixed methods approach, while qualitative was used to answer research question three and quantitative, research question four. The Kruskal-Wallis H test was applied to find the statistical differences in opinion among practitioners concerning safety performance and safety performance satisfaction.

To gather qualitative data, semi-structured face-to-face and phone interviews were conducted using an interview guide (Adams, 2018). The interview guide includes a preamble outlining the purpose of the study and a request for voluntary participation (informed consent), participants biodata, perceptions of safety performance, level of satisfaction, and perceived challenges. This was done to strengthen the questionnaire data (Simpson and Sam, 2020). Participants were chosen using maximum variation and expert sampling methods (Etikan and Bala, 2017) from the Greater Accra, Ashanti, Western, Northern, and Central regions of Ghana. The interview data were thoroughly transcribed and analyzed thematically (Ju and Rowlinson, 2014). Participants were questioned further to clarify their replies, member checks ensured data integrity, and data triangulation improved confirmability and explanation (Gunawan, 2015).

3. Results

3.1 Reliability analysis

Cronbach's alpha scores for safety performance (0.782-0.827) and safety performance satisfaction (0.777-0.834) items are within a tight range, indicating moderate to high internal consistency.

3.2 Demographic information of respondents

The sample is predominantly male (89.7%) and young, with the majority of common age groups comprising 26-33 years (38.2%) and 18-25 years (26.4%). The bulk of those surveyed (35.8%) held a bachelor's degree, followed by Inter/Senior High/WASSCE (31.1%) and HND (12.5%). Supervisors (35.8%) and artisans (29.0%) continue to be the most prevalent job categories, while managers and unskilled personnel are smaller (7.1% and 6.4%, respectively). In terms of tenure, the majority (52.4%) have been with the company for one to five years, with a few remaining for longer. Finally, the workforce is young and educated and predominantly occupies management or technical positions with short tenures (Table 1).

Table 1: Demographic characteristics of respondents			
Category	Frequency	Valid Percent	Cumulative Percent
Gender			
Male	479	89.7	89.7
Female	55	10.3	100.0
Age Bracket			
< 18 years	1	0.2	0.2
18-25 years	141	26.4	26.6
26-33 years	204	38.2	64.8
34-41 years	140	26.2	91.0
42-49 years	39	7.3	98.3
50-57 years	8	1.5	99.8
> 57 years	1	0.2	100.0
Qualification			
No Education	1	0.2	0.2
Primary	2	0.4	0.6
Junior High / MLSC	16	3.0	3.6
Inter/Senior High/WASSCE	166	31.1	34.6
Advance/CTC	47	8.8	43.4
NEBOSH	3	0.6	44.0
HND	67	12.5	56.6
Bachelor	191	35.8	92.3
Masters	41	7.7	100.0
Work Schedule			
Managers	38	7.1	7.1
Engineers	116	21.7	28.8
Supervisors	191	35.8	64.6
Artisans	155	29.0	93.6
Unskilled Personnel	34	6.4	100.0
Years with Current Company			
< 1 year	137	25.7	25.7
1-5 years	280	52.4	78.1
6-10 years	79	14.8	92.9
11-15 years	25	4.7	97.6
16-20 years	6	1.1	98.7
21-25 years	5	0.9	99.6
> 30 years	2	0.4	100.0

3.3 Participants and projects characteristics

A total of 36 participants were questioned. Gender distribution: 34 (94.44%) participants were men, with fewer women. Age-wise, the majority, 17 (47.22%), were 30 to 39 years old, followed by 9 (25%), 20 to 29, and 8 (22.22%), 40 to 49. In terms of credentials, 19 participants (52.78%) possessed a bachelor's degree, 5 (13.89%) held a master's degree, and 12 (33.33%) held lower-level qualifications such as diplomas, construction technician certificates, and National Vocational Training Institute certification. Three (8.33%) of the participants are craftsmen, while five (13.89%) work as project managers, operational directors, laborers, site foremen, or site supervisors, each accounting for 2.78%. Two (5.56%) are engineers. Of the safety-related positions, 20 (76.92%) are safety officers, four (15.39%) are safety managers, and the rest are safety assistants or coordinators. 20 (55.56%) interviews were performed over the phone, with the remainder taking place in person at sites or site offices at various times of day. The phone interviews were often performed in the evenings to accommodate the participants' daily schedules. 52.78% of participants are local contractors, 25% are multinationals, and the rest are international enterprises. Residences, offices, hospitals, stadiums, factories, data centers, lecture halls, ports, multifunctional structures, and condominiums were among the projects at various phases of development, ranging from substructure to superstructure. Greater Accra contains Ghana's most active building sites, followed by the Ashanti, Central, Northern, and Western regions.

3.4 Perception about safety performance at their construction sites

3.4.1 Quantitative results

With mean scores above 5 for every variable—fewer safety incidents (5.55), fewer injuries (5.67), fewer equipment failures (5.26), low economic losses (5.31), improved compliance behavior (5.80), and improved participatory behavior (5.83)—the data shows that respondents have an overall positive opinion of safety performance at their construction sites. Standard deviations show different degrees of spread, ranging from 1.172 to 1.844. Kurtosis values near 0 suggest a rather normal distribution, and the data is slightly biased to the right. The estimations' high accuracy is indicated by the comparatively small Bootstrap Confidence Intervals (BCa 95% CI) (Table 2).

Table 2: Respondents perception about safety performance at their construction sites

Variable	N	Mean	Std. Deviation	Skewness	Kurtosis	Bootstrap Mean	Bootstrap Std. Error	BCa 95% CI Lower	BCa 95% CI Upper
Fewer Safety Incidents	534	5.55	1.666	-1.455	1.413	5.55	0.072	5.39	5.71
Reduction in Injuries	534	5.67	1.603	-1.586	1.955	5.67	0.069	5.52	5.82
Decrease in Equipment Failures	534	5.26	1.819	-1.023	-0.052	5.26	0.079	5.12	5.42
Low Economic Losses	534	5.31	1.844	-1.093	0.174	5.31	0.080	5.14	5.47
Improved	534	5.80	1.193	-1.150	1.412	5.80	0.052	5.69	5.89

Compliance Behavior									
Improved Participative Behavior	534	5.83	1.172	-1.231	1.443	5.83	0.051	5.73	5.93

3.4.2 Qualitative findings

Table 3 shows the findings of a thematic analysis of construction project site safety performance and comments, which demonstrate a largely positive safety culture. The sites showed a great dedication to safety, with 94.9% of respondents mentioning daily housekeeping. Regular inspections were also carried out, with 39.4% of respondents reporting daily, monthly, or weekly inspections. Furthermore, 83.3% of respondents reported investigating mishaps and accidents, demonstrating a proactive attitude to safety.

SM 3 indicated that

> Housekeeping includes making sure that they don't litter the environment and they don't leave the tools, electrical wires, and any hazards that may cause trips and falls, either to themselves working there or to other workers passing by and visitors to the site.

S.O. 17 also said that *"*the pre-start inspection is done by the safety officer himself…late in the evening or early morning before the PSI… to inform the safety officer about the issues to be discussed during the pre-start information period."

S.M. 3, a safety manager, added that

> We also inspect the site equipment and tools and tag them as safe to use or unsafe so that workers do not go using unsafe equipment, which may pose a higher risk of injury. … We inspect our machinery, like the excavators, backhoes, and cranes, to ensure that those that need certification have appropriate certifications to operate.

Monitoring and supervision were highlighted as critical components of safety performance. 51.4% of respondents reported daily monitoring and supervision, while 35.1% stated a combination of worker and safety monitoring. This shows that building sites actively monitor safety standards to avoid accidents.

S.O. 13 said, *"*I monitor the workers and how they go about their jobs.*"*

SSS also stated that "I was doing my rounds and checks. I told the supervisor I was not happy with the way he was working, so I released him to go home again."

SO 12 said that, "Workers do report incidents, but it is not very often.*"*

SO 13 intimated that "… and then we also encourage workers to report hazards, near misses, and incidents when they occur."

HSSC reported that, "We also do incident and accident investigation."

Considering the strict safety procedures in place, accidents and incidents did occur. 14.1% of respondents reported no incidents, while 16.9% reported minor injuries. More serious accidents were also documented, including 4.2% lost-time injuries, 2.8% deaths, and 12.7% medical cases. However, 4.2% of respondents claimed favorable safety results, such as completing 500,000 man-hours without lost-time injuries.

For example, E2 reported that *"*so far there has been no accident at the site—no fatalities or injuries. I am satisfied with the H&S practices and satisfied with safety behavior."

For example, SM1 reported as follows: "We have had 5 lost-time injuries. Only one was very serious—no death. All of them are fit now, and they are all back at work."

SO 20 also indicated that *"*… this is a big project, so by the close of the week we record about two, three, four, or five first aid cases, and they get treated."

SO6 intimated that *"*management is committed to safety at this site. All my leaders wear the PPEs. I have so far recorded just one injury; it's a minor injury, and the victim was sent to the hospital for treatment…."

SM4 intimated that

> We have reached 500,000 man-hours without any lost-time incidents. In an incident here, somebody will get hurt and cannot continue with his work for the day. But we have other incidents where a person gets a cut, and first aiders are able to handle it, and he goes back to work again. Those ones we have. So, the kind of accident we don't want to happen on this site is a person getting injured and being unable to continue work on that day. The last audit that we did, we scored 87%. That was an external audit conducted by auditors from South Africa. It was a very detailed work.

SO 8 said,

> For almost 2 years we have not had any lost-time injuries… But what I think shows clearly is the workers risk perception now. I think, to me, that is the positive side we have been able to build, due to the programs and the kind of people I have. They are very helpful.

SO 9 said that "since then there has been an improvement in the safety trainings, PPE compliance, and a few of them."

Overall, respondents expressed favorable opinions, with 9.9% expressing enhanced safety awareness and 4.2% highlighting information exchange and worker participation. However, 1.4% of respondents admitted flaws in their safety standards. To increase safety performance even further, construction sites should prioritize frequent inspections, monitoring, and supervision, as well as worker participation and information exchange.

For example, SO7 reported that

> Since I came here, I see safety is improving because there were some practices that, when I came, I realized were about the workers but have now stopped. Especially housekeeping was a big challenge, and now it is changing little by little.

SO16 also said, *"*Workers are allowed to bring their opinion on board, especially during the general safety meetings. We give room for every company—two people from each company to talk." This suggests that a safety-oriented culture is being fostered on site.

Notwithstanding the favorable findings, the data show that there is still potential for growth. Only two respondents (2.2%) indicated consistent adherence to safety standards, highlighting areas that require attention.

SO5 bemoaned that

> Our safety practices at the site have not fully changed management safety behavior. Management thinks that, oh, it is the workers doing the work… So, sometimes they become a little bit hesitant to comply with safety, especially when it comes to the PPEs, the basic ones, which are the helmets, the reflectors, boots, and others.*"*

Furthermore, the research emphasizes the need for continuous efforts to decrease lost-time injuries, deaths, and medical cases. By addressing these issues, construction project sites can enhance their safety performance and lower the dangers connected with construction operations.

SO5 continued that**,** "So, if the safe practices go up, it means our environment is safe. So now the focus is, we are trying to eliminate the near misses…"

Table 3: Construction Project Sites Safety Performance Data				
Theme	Sub Themes	Codes	Frequency	%
Housekeeping	Housekeeping	Daily housekeeping	37	94.9
	Undisclosed		4	5.1
Total			*41*	*100*
Inspection	Periodic Inspection	Daily inspection / Monthly and weekly inspections / Regular inspections, Daily material and tools inspection	13	39.40
	Inspection of Tools and Equipment	Inspection of tools and equipment	12	36.36
	Pre-start Inspection	Pre-start inspection	5	15.15
	Undisclosed	Undisclosed	3	9.09
Total			*33*	*100*
Monitoring and Supervision	Daily and General Monitoring	Daily Monitoring and supervision / Monitoring and supervision	19	*51.35*
	Combined Monitoring	Monitoring of safety behavior / Monitoring of workers / Safety monitoring	13	*35.14*
	Attendance Tracker	Attendance tracker	2	*5.41*
	Undisclosed	Undisclosed	1	*2.70*
	Monitoring of Risk Assessment	Monitoring of risk assessment document by consultant's representative	1	*2.70*
	Supervision	Supervises the workers	1	*2.70*
Total			*37*	*100*
Investigation	Incidents/accident Investigation	Investigate incidents/accidents and report on them	30	83.33
		Undisclosed	5	13.89
		Investigates incidents	1	2.78
Total			*36*	*100*
Reporting	Encouragement to Report Incidents	Encouraging workers to report incidents	14	38.89
	Reporting of Near Misses/Injuries	Report near misses, injuries, and ill health	9	25.0
	Frequency of Reporting	Workers report incidents but not very often	5	13.89

	General Reporting of Incidents	Workers report incidents	3	8.33
	Undisclosed	Undisclosed	4	11.11
	Specific Reporting	Workers report on PPEs, unsafe conditions, and incidents	1	2.78
Total			*36*	*100*
Accident/Incident Situations	No Accidents	No Accident at My Site	10	*14.1*
	Minor Injuries	No Injury	12	16.9
	Lost Time Injuries	5 Lost Time Injuries, Finger Injury- Medically Treated	3	4.23
	Fatalities	Two Deaths	2	2.82
	Medical Cases	Fall from Height, Car Accident	6	12.67
	Other Injuries	Scorpion Sting, Foot Injury, Charging Phone Accident, Payloader Accident, Lost Finger	6	12.67
Safety Performance Matrix	Positive Safety Outcomes	Reached 500,000-man Hours Without Lost Time Injuries. Reached 265,968 Man-Hours Without Lost Time Injury	3	4.23
	Improvement in Performance	Safety Performance Improved	11	*15.49*
	Training and Awareness	Workers Have Acquired Knowledge	4	5.63
Overall Sentiment	Increased Safety Awareness	Improvement in Safety Performance	7	9.86
	Knowledge Sharing	Information Sharing Improved Safety Compliance	3	4.23
	Worker Engagement	More Workers Influenced by Safety Practices	3	4.23
	Acknowledgment of Limitations	We Have Not Done Much	1	1.41
Total			***71***	***100***

3.5 Satisfaction level with safety performance

3.5.1. Quantitative results

With mean ratings ranging from 4.89 (Satisfaction with Absenteeism/Lost Time) to 5.68 (Satisfaction with Participation Behavior), respondents' satisfaction levels with safety performance at their

construction sites were largely good. The standard deviations showed different degrees of dispersion, ranging from 1.265 (Satisfaction with Compliance Behavior) to 1.796 (Satisfaction with Absenteeism/Lost Time). Kurtosis values showed a fairly normal distribution; however, the data was somewhat biased to the right. High accuracy in the estimations was shown by the comparatively narrow Bootstrap Confidence Intervals (BCa 95% CI), such as Satisfaction with Participation Behavior (5.57-5.79) (Table 4).

Table 4: Respondent's satisfaction level with safety performance at their construction sites

Variable	N	Mean	Std. Deviation	Skewness	Kurtosis	Bootstrap Mean	Bootstrap Std. Error	BCa 95% CI Lower	BCa 95% CI Upper
Satisfaction with Personal Injuries/Hazards	533	5.27	1.778	-1.189	0.431	5.27	0.077	5.11	5.42
Satisfaction with Material Damage	533	5.10	1.744	-0.922	-0.061	5.10	0.076	4.94	5.24
Satisfaction with Employee Motivation	533	5.35	1.582	-1.070	0.488	5.35	0.069	5.22	5.48
Satisfaction with Absenteeism/Lost Time	533	4.89	1.796	-0.819	-0.347	4.89	0.078	4.73	5.04
Satisfaction with Compliance Behavior	533	5.52	1.265	-1.003	1.065	5.52	0.055	5.42	5.63
Satisfaction with Participation Behavior	533	5.68	1.286	-1.332	2.139	5.68	0.056	5.57	5.79

3.5.2 Qualitative findings

General contentment with construction safety performance is rather good (Table 5). Out of 41 codes, 31 reported "satisfaction," with 11 saying "Very Satisfied" and 8 saying "Satisfied." This suggests that the majority of respondents are satisfied with the existing level of construction safety performance. Despite widespread contentment, there is definitely opportunity for growth. Despite their satisfaction, 10 participants stated that there is "more room for improvement.". This means that, while present construction safety performance is adequate, there are still areas that require attention and enhancement. SO 6 indicated as follows: "Very satisfied due to the level of understanding of safety by management and workers.".

SO 12 said, "so far for this project I am very satisfied with safety because the workers, leaders, and management try as much as possible to comply with safety procedures, especially if the client is insisting on safety at the site."

SO9 said, … "I am not satisfied with management. I am not satisfied with the level of communication and interaction…"

HSSC said, safety management practice... "we still have more room for improvement. Safety behavior and leadership behavior, more room for improvement, and safety performance more room for improvement."

A laborer reported,

> I am happy with how safety is managed here. They have trained us in a way that even if you are not in the company, you can use the experiences (processes and policies) gained from them in the other companies…. You can offer advice if you are the leader in your new place of work to ensure improvement.

On the flip side, a small percentage of respondents were dissatisfied with construction safety performance. Four out of 41 codes voiced displeasure, with one stating "Not totally satisfied," two saying "Not satisfied," and one saying "Not satisfied at all." This suggests that there are still some important difficulties that must be solved.

For instance, SO 20 indicated that

> … I rated it 90%, but we are still not satisfied. Because still the focus is zero harm as our priority, and we want to get to the point where we will not record any minor first aid cases, no fatality, no disability, and stuff like that…

The study indicates that despite good construction safety performance, there's room for improvement due to potential complacency and high contentment levels, necessitating regular monitoring, addressing outstanding issues, and fostering a proactive safety culture.

Table 5: Participant's satisfaction level with safety performance at their sites

Response	Rating (1-10)	Frequency
Very Satisfied	9 -10	11
Satisfied	8	8
Satisfied but more room for improvement	7	10
Somehow Satisfied	6	2
Not totally satisfied	5	5
Not satisfied	4	2
Not satisfied at all	3	1
Undisclosed	-	2
		41

3.6 Safety performance challenges

The findings of the investigation show that the construction sites face several issues that affect safety performance (Table 6). PPE management is the most major problem, accounting for 30.50% of total frequencies. This issue contains sub-themes such as PPE supply delays, insufficient or non-availability, bad PPE quality, irregular PPE supply, PPE problems, and non-compliance with PPE usage. The

increased frequency of PPE management difficulties emphasizes the importance of proper PPE management to maintain worker safety.

Another great challenge is communication barriers, which account for 20.32% of overall frequencies. This subject is divided into sub-themes such as language hurdles, communication problems, a lack of free flow of information, difficulty with instruction, and communication-language concerns. The high frequency of communication obstacles highlights the necessity of effective communication among employees, management, and contractors in preventing accidents and ensuring safety.

Leadership and commitment problems make up 16.93% of the overall frequencies. This subject is divided into sub-themes such as low management commitment to safety, a lack of complete management support, leadership intervention in safety, leadership bad conduct toward safety, and management disrespect for safety. The frequency of leadership and commitment problems emphasizes the need for better leadership commitment to safety in order to foster a safety-first culture.

The data also finds that compliance and safety culture issues constitute 8.86% of overall frequencies. This subject contains sub-themes like non-compliance with safety protocols, non-compliance with PPE usage, compliance and participation issues, and a bad safety culture among local workers and contractors. The regularity of compliance and safety culture difficulties highlights the importance of ongoing training, audits, and enforcement of safety rules in order to foster a safety-first culture.

Operational challenges account for 6.77% of overall frequencies, with codes including friction between production and safety. Welfare concerns make up 5.08% of overall frequencies, including sub-themes such as overcrowding, bedbugs, mosquitoes, and water issues. Lastly, regulatory and administrative challenges represent 8.45% of total frequencies, with sub-themes including a lack of national laws, a lack of a safety bill, insufficient safety officers, and difficulty obtaining workman's compensation benefits.

The investigation reveals safety issues in the construction sector, requiring a comprehensive strategy including effective PPE management, clear communication, leadership commitment, frequent training, audits, and improved working conditions.

Table 6: Safety performance challenges at the construction sites

Theme	Codes	No / Percentage	
PPE Management	Delay in PPE supply	8	13.56%
	Insufficient/Non-availability of PPEs	4	6.78%
	Low quality of PPEs	1	1.69%
	Irregular supply of PPEs	1	1.69%
	PPEs challenges	2	3.39%
	Non-compliance of PPEs usage	2	3.39%
	Total	*18*	*30.50%*
Communication Barriers	Language barrier	7	11.86%
	Communication challenges	2	3.39%
	Lack of free flow of information	1	1.69%
	Instruction's difficulty	1	1.69%
	Communication-language issues	1	1.69%
	Total	*12*	*20.32%*

Leadership and Commitment	Low management commitment to safety	5	8.47%
	Lack of management full support	2	3.39%
	Leadership interference in safety	1	1.69%
	Leadership poor behavior towards safety	1	1.69%
	Disregard for safety in management	1	1.69%
	Total	*10*	*16.93%*
Compliance and Safety Culture	Non-compliance of safety protocols	2	2.39%
	Non-compliance of PPEs usage	2	2.39%
	Compliance and participation challenges	2	2.39%
	Poor safety culture of local workers and contractors	1	1.69%
	Total	7	8.86%
Operational Challenges	Friction between production and safety	3	5.08%
	Conflict between production and safety	1	1.69%
	Total	4	6.77%
Welfare Issues	Welfare issues (e.g., overcrowding, bedbugs, mosquitoes, water issues)	3	5.08%
	Total	3	5.08%
Regulatory and Administrative Challenges	Lack of national laws	1	1.69%
	Absence of safety bill	1	1.69%
	Insufficient safety officers	1	1.69%
	Difficulty in workman's compensation benefits	1	1.69%
	Difficulty in receiving workman's compensation payment	1	1.69%
	Total	5	8.45%
	Grand Total	**59**	**100%**

3.7 Perceptual differences in safety performance and satisfaction among the practitioners

3.7.1 Safety performance

In Table 7, the Kruskal-Wallis test demonstrates significant variations in judgments on safety performance among construction practitioners (managers, engineers, supervisors, craftsmen, and laborers) regarding fewer safety incidents, reduction in injuries, and low economic losses ($p < 0.05$). There are no significant differences in terms of decreased equipment failures, improved compliance behavior, or improved participatory behavior. This implies that construction professionals from all occupational categories have comparable opinions about these safety performance factors.

Table 7: Kruskal Wallis H Test for respondents' perception about safety performance

Variable	Kruskal-Wallis H	df	Asymp. Sig.	Result

Fewer Safety Incidents	20.082	4	0.000	Significant
Reduction in Injuries	11.416	4	0.022	Significant
Decrease in Equipment Failures	2.957	4	0.565	Not Significant
Low Economic Losses	32.066	4	0.000	Significant
Improved Compliance Behavior	7.083	4	0.132	Not Significant
Improved Participative Behavior	5.409	4	0.248	Not Significant

3.7.2 Satisfaction

The Kruskal-Wallis test (Table 8) found significant variations in satisfaction with safety performance within construction practitioners for personal injuries/hazards, absenteeism/lost time, and compliance behavior ($p < 0.05$), demonstrating different perspectives across occupations. Yet, there were no significant disparities in material damage, employee motivation, and participation behavior, indicating that attitudes in these areas are more consistent. These findings highlight the need to consider several views when evaluating safety performance.

Table 8: Kruskal Wallis H test for respondents' perception about satisfaction with safety performance

Variable	Kruskal-Wallis H	df	Asymp. Sig.	Result
Satisfaction with Personal Injuries/Hazards	22.325	4	0.000	Significant
Satisfaction with Material Damage	4.141	4	0.387	Not Significant
Satisfaction with Employee Motivation	8.895	4	0.064	Not Significant
Satisfaction with Absenteeism/Lost Time	28.700	4	0.000	Significant
Satisfaction with Compliance Behavior	9.669	4	0.046	Significant
Satisfaction with Participation Behavior	2.637	4	0.620	Not Significant

4. Discussion

The study's findings on safety performance in the construction sector are similar to previous research. Both quantitative and qualitative data suggest that construction site respondents had a good perception of safety performance, which supports Otitolaiye et al.'s (2021) definition of safety performance as attempts to reduce accidents and injuries. The study's emphasis on monitoring and supervision as essential elements of safety performance is consistent with Pourmazaherian and Musonda (2022), who accented the necessity of safety-oriented staff selection procedures. The findings further confirm Christian et al. (2009)'s difference between safety compliance and safety participation, with respondents engaging in both compulsory behaviors (e.g., wearing PPE) and voluntary actions (e.g., encouraging coworkers to engage in safety activities). In line with Qayoom (2019), who highlights the significance of safety manager conduct, decentralizing decision-making, and promoting employee safety-conscious

behavior, the study recommends giving priority to regular inspections, monitoring, and supervision alongside worker participation and information exchange. Nonetheless, the findings also underscore the intricacy of safety performance, which is impacted by a number of organizational and environmental elements, including worker characteristics, site management, management strategies, resources, and the organizational environment (Durdyev et al., 2017). This accentuates the necessity for a multifaceted approach to safety performance that includes leadership, safety planning, performance evaluation, risk assessment, inspections, safety culture development, and the application of safety regulations (Khalid et al., 2021). Even so, the study's highlighted areas for improvement, such as lost-time injuries, deaths, and medical cases, underscore the need for continued efforts to decrease risks and enhance safety performance. This conclusion is consistent with previous research, which highlights the necessity of ongoing improvement in safety performance (Durdyev et al., 2017). Furthermore, the literature supports the conclusion that training and awareness programs play an important role in developing a safety-oriented culture (Abbasianjahromi and Golafshani, 2021). The idea of safety orientation, as established by Pourmazaherian and Musonda (2022), may also be applicable to the outcomes of this study. A worker with a strong safety orientation would wear needed safety equipment, obey established safety standards, and prevent on-the-job accidents, all of which contribute to the study's good safety culture and high agreement levels. Part of the findings in Table 3 suggest that greater training and awareness lead to workers gaining knowledge, which results in improved safety performance. This validates Ofori et al.'s (2023) finding that safety training is the most significant element impacting safety performance, moderated by safety knowledge and culture. Productive safety training not only provides personnel with the essential skills but also additionally reinforces safety regulations, resulting in improved safety results.

The findings also show that respondents are very satisfied with the safety performance on their construction sites, with both quantitative and qualitative findings reflecting a strong safety culture. Despite this, both studies identify areas for improvement, such as absenteeism/lost time and material damage. Furthermore, these findings stress the necessity of proactive measures like training and awareness programs, stakeholder involvement, and constant monitoring, highlighting the need for ongoing efforts to maintain and improve safety performance. The study's findings are consistent with Simpson and Sam (2020), who observed that 88% of respondents were satisfied with H&S standards. Both studies emphasize the need for continuous efforts to maintain and improve safety performance, including identifying areas for improvement and adopting proactive measures such as training and awareness programs as prescribed by previous literature (Abbasianjahromi and Golafshani, 2021; Durdyev et al., 2017).

The findings on the issues influencing safety performance on Ghanaian construction sites are consistent with previous research. The problems noted by Kukoyi and Adebowale (2021), such as insufficient training, ineffective communication, and inadequate legislation, are in line with the issues that have been identified, including PPE management, communication barriers, leadership and commitment issues, and compliance and safety culture issues. The results also corroborate Samanta and Gochhayat's (2022) observation that psychological issues, including fatigue and stress, pose a threat to construction safety performance. Additionally, the findings show support for many of the safety obstacles highlighted by Botchway et al. (2024), notably in the areas of PPE management, communication, leadership, and compliance. However, the findings indicate deficiencies in policy, legislation, and worker welfare that go beyond Botchway's initial ten hurdles, emphasizing the importance of a more comprehensive strategy

to improve safety performance in Ghana's construction sector. Segbenya and Yeboah (2022) identified comparable difficulties, such as low labor literacy, management's lack of commitment, and employees' refusal to report occurrences. Furthermore, Boadu et al. (2021) revealed barriers to OHS adoption in Ghana, such as a lack of experienced people, financial limits, and a lack of a defined compliance and enforcement framework, which are consistent with the investigation's results on regulatory and administrative problems. The findings, however, do not clearly address the problem of high material prices, which Segbenya and Yeboah (2022) describe as a threat to Ghana's H&S standards. Nonetheless, the study emphasizes the necessity for good PPE management and thorough safety training, which is consistent with the literature's recommendations for enhancing construction safety performance in Ghana.

The Kruskal-Wallis test (Tables 7 and 8) found significant differences in construction practitioners' assessments of incidents, injuries, economic losses, absenteeism, and compliance behavior ($p < 0.05$). Nevertheless, no distinctions were discovered concerning equipment failures, improved compliance behavior, or improved participatory behavior (safety performance) and material damage, employee motivation, and participation behavior (satisfaction). These findings underscore the need to take into account a variety of occupational viewpoints when evaluating safety performance. This is consistent with Bayram et al.'s (2016) findings, which relate safety performance to higher employee satisfaction and lower accident costs. Bayram (2019) argues that safety training increases satisfaction through increased participation, whereas Bayram (2018) states that management's commitment to OHS enhances both satisfaction and safety performance. Furthermore, Dziuba et al. (2020) demonstrate the value of safety performance in enhancing employee satisfaction, and Onubi et al. (2023) emphasize its importance for owner satisfaction. Although Simpson and Sam (2020) found no significant difference in safety satisfaction between junior and management staff, this study identifies more nuanced differences, particularly in terms of injuries and compliance behavior, pointing to a desire for more studies with larger samples and more expansive geographical coverage to better understand safety performance and satisfaction.

Implications

Policy implications. In order to improve construction safety in Ghana, the study stresses the urgent need for authorities to develop and implement comprehensive strategies that include enhancing laws and regulations, funding educational and awareness campaigns, and addressing psychological issues like stress and fatigue among workers. Moreover, policymakers should prioritize fostering a safety-oriented culture and encourage collaboration among stakeholders, and governments should support research into improvements in construction safety, such as the development of innovative technologies and improved personal protective equipment (PPE). Regular safety audits and incident reporting ought to be essential for monitoring performance and tackling infractions, and a strong construction safety bill is needed to fill in the gaps in PPE usage, worker protection, and site safety standards with stringent enforcement and clear penalties for noncompliance.

Practical implications. Implementing best practices should be a top priority for Ghanaian construction companies in order to improve safety performance. This entails putting in place effective PPE management procedures, offering comprehensive safety instruction, and encouraging a culture of safety via employee participation and leadership dedication. Addressing welfare issues like overcrowding and

inadequate sanitation can enhance worker well-being and safety behavior, leading to a safer work environment and reduced hazards. To find opportunities for improvement, construction companies can also encourage stakeholder participation, carry out routine inspections, and regularly assess safety performance. Implementing the recommendations presented in this study will help construction organizations improve safety performance, minimize risks, and improve safety culture, eventually assuring construction workers' well-being and fostering a safer construction sector. The findings suggest that policymakers and practitioners should establish customized occupational H&S interventions and policies that take into consideration different workplace roles and viewpoints in order to improve safety performance and employee satisfaction.

5. Conclusion

By investigating the perceptions of Ghanaian construction practitioners at the stated locations, this study aimed to address the knowledge gap in safety performance, satisfaction, and challenges in construction site safety management. The study is based on information gathered from 36 interviews and 534 valid questionnaires. Based on the findings, the study concludes that construction site practitioners generally have a positive view of safety performance, with a strong emphasis on reducing accidents and injuries. Respondents are satisfied with safety performance, reflecting a strong safety culture in the studied sites. Key factors for success include monitoring, management, and worker participation. A holistic approach is necessary, addressing organizational and environmental variables through leadership, planning, risk assessment, and safety culture development. While a strong safety culture is observed, issues such as material damage and absenteeism need to be addressed. Proactive measures like training, stakeholder involvement, and ongoing monitoring are essential for continuous improvement. The study also highlights challenges on Ghanaian construction sites, such as PPE management, communication barriers, leadership issues, and compliance, supporting previous findings on low labor literacy, management commitment, and regulatory problems. However, it does not address the issue of high material prices, a concern raised in earlier research. The Kruskal-Wallis test emphasizes the need to take into account a variety of occupational viewpoints to improve safety performance and employee satisfaction with safety performance.

Limitations and Future Studies

One of the study's many drawbacks is its dependence on self-reported data, which might introduce biases and compromise the validity of the results. To validate findings, future studies should think about employing objective metrics or data triangulation. Only five of Ghana's sixteen regions were included in the survey, which may not accurately reflect the whole nation. Future research should strive for more thorough geographic coverage in order to guarantee wider applicability. Because only Ghanaian construction sites were included in the sample, it might not be fully representative of the nation's varied construction sector. More locations from various businesses and geographical areas should be included in future studies. To give a more comprehensive knowledge of the study issue, the quantitative technique might benefit from the inclusion of other variables such as corporate culture, leadership styles, and technology. The emphasis on safety performance, satisfaction, and challenges may have overshadowed other important areas of construction site management, such as quality, productivity, and environmental sustainability. Future research should investigate these topics as well. Finally, the results may not be

applicable to different situations or sectors. To determine its broader application, future research should duplicate the study in diverse circumstances, such as other nations or industries.

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