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THE ROLE OF CONTRACTING ENTERPRISES IN HEALTH AND SAFETY PERFORMANCE IN THE GHANAIAN CONSTRUCTION INDUSTRY

Benjamin Boahene AKOMAH[1*], Prasanna Venkatesan RAMANI[2], Abel NIMO-BOAKYE[3]

[1] *Cape Coast Technical University (CCTU), Cape Coast, Ghana*
[2] *Vellore Institute of Technology (VIT), Vellore, India*
[3] *Sunyani Technical University (STU), Sunyani, Ghana*

**Corresponding author's e-mail: benjamin.akomah@cctu.edu.gh*

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Abstract. The health and safety of construction industry employees are often compromised by the contracting companies that employ them. This paper uses multivariate analysis to identify and classify the contracting enterprise-related factors that influence health and safety performance in the Ghanaian construction industry. The study commenced with observation of the industry's practices and literature review. This resulted in the identification of 23 factors that were modified and developed into a questionnaire to suit the study's purpose. A total of 635 participants were obtained through a simple random sampling method from an all-inclusive population of professionals. The questionnaires were administered to subjects both in hardcopy and electronic formats. In the case of the electronic form, Google Forms were used. Providing a safe working environment, adequate welfare facilities, safe plants and systems of work, and developing a comprehensive occupational safety and health policy, plan, and implementation are key to improving health and safety. The findings of the study suggest that robust contracting enterprise welfare responsibilities (CWR), management and leadership commitments (MLC), and clearly defined safety performance roles (SPR) are the primary drivers that directly enhance health and safety outcomes in construction environments. Based on the paper's conclusions, it is recommended that companies adopt standardised health and safety best practices for accident reporting and demonstrate a measurable commitment to safety review activities to foster employee confidence. Furthermore, contracting enterprises (CEs) should provide adequate welfare facilities to enhance employee satisfaction and prioritise the development of occupational safety and health (OSH) policies and plans as a strategic business objective.

Keywords: *contractors–subcontractors–suppliers, health and safety responsibilities, management leadership commitment, safety performance, welfare.*

INTRODUCTION

The construction industry is crucial to the global economy. Its growth and sustenance depend on small, medium, and large contracting enterprises (contractors, subcontractors, suppliers, and other allied professionals) with diverse specialisations that engage in commercial activities for business gains (Hitchcock, 2023). The industry has contributed enormously to the economic drive of many countries (Anyango, 2023). It focuses on the creation of buildings and spaces that connect communities, and also on repairs, remodelling, reconstruction, and maintenance of structures (Construction Industry Training Board (CITB), 2024; Akomah & Ramani, 2024; Hussain et al., 2022). The industry's performance is driven by skilled experts and unskilled labour (CITB, 2024). About 6 % of the global gross domestic product (GDP) is accounted for by the construction industry. Its contribution is close to 5 % of the GDP in developed countries and over 8 % in developing countries (Ramani & Akomah, 2025; Suwal et al., 2019).

The Ghanaian construction industry is regarded as one of the thriving and significant industries in the country (Pim-Wusu et al., 2023; Blay Jnr et al., 2023). It includes civil engineering contractors, building contractors, and mechanical, electrical, and plumbing contracting firms (Akomah & Ramani, 2023). After years of reconstruction, the industry has become essential to the Ghanaian economy. According to Osei (2013), the construction sector's GDP between 1993 and 2011 was 9.1 %, representing 25.35 % of the total GDP of 35.9 % for all industries. At the end of 2013, the industry's contribution to GDP was 14.34 % (Ghana Statistical Service (GSS), 2019). It contributed GHS 12.49 billion and GHS 12.8 billion in 2019 and 2020 to the nation's gross domestic product (Yeboah, 2021). In 2021, Fitch Solutions estimated the market to be worth USD 9 billion. Its market size increased to USD 11.3 billion by the end of 2022. At the end of March 2021, the industry's growth was 14.2 %. Projections show that the construction industry between 2024 and 2027 will see its annual average growth rate increase above 5 % (GlobalData, 2024). The development of Ghana's construction industry in 2021 ranked seventh among Sub-Saharan Africa's construction industries. It ranked sixth in the sub-region in terms of attractiveness (Akomah & Ramani, 2024; Yeboah, 2021). It contributes substantially to the economy (Osei, 2013; Akomah et al., 2020a).

Despite the beautiful picture painted by the industry, it is plagued with poor occupational safety and health performance (OSHP), ill health, injuries, and accidents (Ndekugri et al., 2023) arising out of the failure of contracting enterprises (CEs) and other stakeholders to take leadership positions in health and safety. Poor health and safety on site are a sign of laxity on the part of CEs and management. Though existing fragmented laws require employers to put some measures in place, these laws are often flouted by CEs and sometimes fail to take their rightful place as corporate organisations to protect their employees. Procurement packages consistently fail to spell out the health and safety responsibilities of CEs, and in addition to this, health and safety is not included as an evaluation criterion in construction projects (Akomah et al., 2025). Risk identification, assessment, and mitigation reporting are not often highlighted; safety records and accident reporting are neglected responsibilities, accounting for the poor health and safety records in the industry. Most projects come with no health and safety performance assessment, safety reviews, assessment of new risks, or auditing. On most projects, the views of employees are not factored into health and safety decision-making, and there are no safety committees to monitor and report on health and safety. Many now regard the industry as dangerous because of its poor health and safety issues (Ndekugri et al., 2023; Akomah et al., 2020b). Health and safety ineptness is now considered normal behaviour, but considering what the industry brings to the nation's GDP (Khalid et al., 2021; Love & Matthews, 2020; Yap et al., 2020), allowing such slackness to continue would be catastrophic (Mohandes et al., 2022; Tetzlaff et al., 2021). Because lives are at stake, occupational safety and health (OSH) should not be trivialised in project delivery (Friend et al., 2023). In response to the poor health and safety records characterising the Ghanaian construction industry, this study aims to identify, classify, and assess the contracting enterprise factors that influence OSH using multivariate analytical tools.

1. LITERATURE REVIEW

Construction health and safety is an undervalued area that attracts the attention of CEs (Adegboyega et al., 2021) and other stakeholders. In 2016, the GSS recorded an accident rate of 65. This figure was higher than the national indicator of 43 (GSS, 2016). In the same year, a severity rate of 418 was accounted for by the construction industry (Osei-Asibey et al., 2021; GSS, 2016). Osei-Asibey et al. (2021) postulated that there is a dichotomy between the number of accidents reported and the reality of the health and safety architecture in the industry. They indicated that accidents and health and safety records of the industry are hard to come by, and in most cases, the few available are inconsistent. Any attempt to leave safety issues at their current levels would significantly impact the sector in the future, as employees would seek alternatives due to perceived dangers and experiences (Boadu et al., 2021), which could lead to high employee turnover (Frimpong et al., 2021). Those interested in pursuing careers would also concentrate on other areas (Akomah et al., 2020b). All stakeholders must be committed to pursuing excellence in OSH in the industry (Eyiah et al., 2019).

When all stakeholders contribute their share, OSH will be better managed (Bridoux & Stoelhorst, 2022). Despite the need for a link among stakeholders to manage OSH as theorised by the stakeholder theory, Managers of Contracting Enterprises (MCEs) have an enormous responsibility to manage health and safety (Fang et al., 2020); their ability to avoid or limit accidents and their related events that have a consequential effect is critical to OSH success (Gao et al., 2023; Oyeyipo & Osuizugbo, 2023). CEs, as employers of construction employees, must seek ways to improve the well-being of their employees by curtailing all forms of on-site danger.

Interestingly, most CEs do not even know what the law requires of them. Part XV of Ghana's Labour Act 2003 (Act 651), Sections 118, 119, and 120, specifically discuss occupational safety and related issues. The Factories, Offices, and Shops Act 1970 also has prominent issues for promoting OSH but has been disregarded by many CEs for years. The provisions in the two laws are inadequate, given the diversity of construction operations. A significant strength of the two aforementioned legislative instruments is that they mandate employers (CEs) to ensure the occupational safety and health of their employees. This legal obligation necessitates the implementation of pragmatic measures to achieve positive safety outcomes. CEs must recognise that their businesses' success is linked to workers' well-being and performance. Consequently, CEs must adopt optimal strategies, irrespective of legal requirements, to safeguard their employees and ensure the long-term viability of their enterprises.

However, OSH on most projects in the country is badly managed; the law is completely disregarded. Sometimes, there are no structures for managing OSH concerns (Boakye et al., 2023). Most firms lack safety policies or officers (Boadu et al., 2023). A larger proportion of the CEs lack the organisational ethos of OSH. It is not surprising that accidents occur on construction sites (Osei-Asibey et al., 2021). The scarcity of industry accident data from regulatory agencies further hinders strategic planning and policy implementation. This lack of data prevents the adoption of a collaborative stakeholder approach necessary to improve safety (Rafindadi et al., 2023). Deepak & Mahesh (2024) and Kurtz & Tucker (2023) indicated that a comprehensive OSH policy and plan are panaceas to improving health and safety. Friend et al. (2023) and Boakye et al. (2023) highlighted the provision of safety standards, manuals, leaflets, instructions, information, and refresher training modules. Bayramova et al. (2023), Cheung & Zhu (2023), and Shabani et al. (2023) identified safety induction and behaviour-based programmes as critical factors that enhance safety.

However, the recognition of the role of safety committees on projects, the involvement of employees in safety decision-making, and auditory, visual, drug, and alcohol testing of employees before and during employment are also useful additions when looking at the setup of the Ghanaian industry. Additionally, monitoring and evaluation of the OSH practices of subcontractors and suppliers by the main contractor, accident reporting, and the involvement of top management, and the encouragement of safety citizenship behaviour. The context-specific nature and practices of the Ghanaian construction industry make them imperative. A list of the construct items for contracting companies that could influence OSH is given in Table 1, with their sources. These factors emphasise the crucial roles that CEs can play and the measures they can implement to limit employees' exposure to hazards in the industry.

Table 1. Contracting Enterprise Factors

Contracting enterprise-related factor	Supporting literature
Develop a comprehensive OSH policy and plan, and implement it to create a unique safety culture as an organisational brand.	Deepak & Mahesh, 2023; Deepak & Mahesh, 2024; Kurtz & Tucker, 2023
Make budgetary allocations for health and safety and strictly enforce them.	Kurtz & Tucker, 2023
Establish a health and safety committee and appoint a safety officer.	Researchers' observation
Undertake risk identification and assessment, job hazard and accident analysis, and propose mitigation measures.	Yousri et al., 2023; Verma et al., 2023

Provide safety standards, manuals, and leaflets, instructions, information, and refresher training modules on health and safety for management and employees.	Friend et al., 2023; Boakye et al., 2023
Involve employees in health and safety decision-making.	Researchers' observation
Provide workers with a safe working environment, adequate welfare facilities, safe plants and systems of work.	Liu *et al.*, 2023; Osei-Asibey et al., 2023
Provide warning signs on site and relevant personal protective equipment (PPE) and enforce their use.	Gomez-de-Gabriel et al., 2023; Chung et al., 2023
Create a safety register and keep accurate records of all accidents.	Friend et al., 2023; Chen & Jin, 2023; Researchers' observation
Establish an efficient accident reporting system and involve top management in OSH reviews.	Researchers' observation
Empower employees to own their health and safety.	Yılmaz, 2023; Boadu et al., 2020
Undertake auditory, visual, drug, and alcohol testing before and during an employee's employment.	Researchers' observation
Organise induction programmes and behaviour-based programmes for employees to correct bad safety behaviours and avoid high labour turnover.	Bayramova et al., 2023; Cheung & Zhu, 2023; Shabani et al., 2023
Include health and safety in the project performance evaluation.	Akomah & Ramani, 2023; Boakye et al., 2023; Onubi et al., 2023; Researchers' observation
Undertake health and safety monitoring, auditing, review, and assessment of new risks.	Akomah & Ramani, 2023; Pirzadeh et al., 2023; Researchers' observation
Perform a health and safety performance assessment.	Researchers' observation
Monitor and evaluate the health and safety practices of subcontractors and suppliers.	Researchers' observation
Establish safety recognition, incentives, and award schemes, and keep safety performance records.	Cheung & Zhu, 2023; Yiu, 2023; Wang et al., 2023
Appoint employees' safety leaders and encourage safety citizenship behaviour.	Researchers' observation
Make state-of-the-art first-aid and welfare facilities available for employees' use.	Long & Cooke, 2023; Park et al., 2023; Irfan et al., 2024
Provide a planned maintenance schedule for all equipment and undertake a life cycle risk assessment.	Ren et al., 2023; Zhang et al., 2023
Provide safe transportation, handling, and storage equipment for all substances, materials, and articles.	Datta et al., 2023; Yue et al., 2023
Ensure strict compliance with safety laws and regulations, and ensure effective supervision of health and safety practices.	Lee et al., 2023; Famakin et al., 2023; Ramadan et al., 2023

PPE – personal protective clothing; OSH – occupational safety and health

2. METHODS

A deductive research approach was adopted for the study. The chosen methodology involved using a quantitative research method, which led to the adoption of a cross-sectional design. The quantitative method lends itself to the use of instruments and statistical packages (Creswell & Creswell, 2017). The paper depended extensively on the existing body of knowledge (Boote & Beile, 2005), which led to the provision of information for interrogation (Creswell & Creswell, 2017; Creswell & Clark, 2017). An examination of the extant literature provided a broader understanding of the research problem and served to contextualise the current study within the wider field (Creswell, 2014; Berg, 2001) to advance collective knowledge on what CEs can do to influence OSH in the Ghanaian construction industry (Boote & Beile, 2005). A preliminary observation of the practices in the industry was undertaken to identify the beneficial factors that could help improve health and safety. After this, a literature review was also conducted to identify additional factors. The factors were screened, modified, and generated into a questionnaire.

A total of 23 health and safety factors were developed into a questionnaire. The survey questionnaire came in two distinct segments: the respondents' personal information section and the factors that influence occupational safety and health performance (OSHP) section. The first section sought to collect biodata on subjects regarding their profession and years of experience. The second section included CEs' factors that could help improve health and safety in the construction industry. These factors were designed on a 5-point scale, from 1 (very low influence) to 5 (very strong influence). Subjects were asked to share their opinion on the extent of influence such factors could have on health and safety. Information for the study was solicited from professionals who have in-depth understanding of the sector and what CEs can do to improve health and safety. A total of 635 professionals participated in the survey. This included 152 quantity surveyors, 76 lecturers, 63 architects, 202 engineers, and 142 contractors. Using a simple random sampling technique, these participants were drawn from an all-inclusive population of 7925 comprising 240 lecturers with construction and related backgrounds; 566 architects, 439 quantity surveyors, 3966 engineers, and 2714 contractors who were in good standing with their professional bodies and associations at the time of the study. The categories of professionals above were considered core to the construction industry. The study's sample size was influenced by the recommendation of Gay et al. (2012). They advised that beyond 5000, a sample size of 400 should be considered acceptable. This informed the selection of 635 as the sample size. The additional 235 above the 400 prescribed by Gay et al. (2012) was provided to accommodate the non-responses and other pitfalls that often come with survey studies and also assist in the development of a robust CFA model. According to Bagozzi (2012), building a robust model requires a sample size of at least 200.

The a priori assumption that the 23 indicator variables may be associated with contracting companies led to the use of exploratory factor analysis (EFA). This was intended to assess the explanatory factors' consistency, unidimensionality, and reliability (Watkins, 2018; Kline, 2016). In order to test the relationship between the observed variables and the underlying construct, a Confirmatory Factor Analysis (CFA) was conducted. The indices presented in Table 2 were used to assess the robustness of the hypothesised model. SPSS version 26.0 was utilised in the multivariate correlational analysis, while AMOS version 22.0 was used for the Confirmatory Factor Analysis (CFA).

Table 2. Indices for Robust Assessment

Fit index	Cutoff value	Comment	Source
χ^2			
df	0≥	Acceptable	
CFI	0.90≥ acceptable 0.95≥ good fit	Good fit	
PCFI	Less than 0.80	Good fit	Kline, 2016; Pattabhiraman, 2024; Hu & Bentler, 1999; Schumacker & Lomax, 2004; Byrne, 2010; Joreskog & Sorbom, 1988
RMSEA	Less than 0.08	Acceptable	
RMSEA 95 % CI	0.00–0.08 [good fit]	Acceptable	
NFI	Greater than 0.90 [good fit]	Good fit	
IFI	Greater than 0.90 [good fit]	Good fit	
PNFI	Less than 0.80	Good fit	
RMR	Less than 0.05 [good fit]	Good fit	
GFI	Greater than 0.90 [good fit]	Good fit	

χ^2 – Pearson chi-squared; *df* – degrees of freedom; CFI – comparative fit index; PCFI – parsimony comparative fit index; RMSEA – root mean square error of approximation; CI – confidence interval; NFI – normed fit index; IFI – incremental fit index; PNFI – parsimony normed fit index; RMR – root mean square residual; GFI – goodness-of-fit index

3. RESULTS

3.1. Respondents' biodata

The total number of valid responses was 454. Out of these, 134 were quantity surveyors, 125 were engineers, 84 were contractors, 62 were lecturers, and 49 were architects. The analysed data revealed that 68 respondents had 2–5 years of work experience, while 126 had 6–10 years of work experience. There were also 103 with 11–15 years of experience, 101 with 16–20 years, and 56 with 21 years or more experience.

3.2. Exploratory factor analysis

The twenty-three items measuring the contracting enterprises' construct were examined using maximum likelihood with varimax rotation, and all were found to be consistent based on the Kaiser–Meyer–Olkin (KMO) and Bartlett's test of sphericity. The obtained Kaiser–Meyer–Olkin (KMO) value was 0.940, whereas the Bartlett's test of sphericity recorded was $p < 0.000$. These figures were better than the estimated KMO cutoff value of 0.70 and Bartlett's test of sphericity of $p < 0.05$ recommended by Hair et al. (2010). The outcome indicated that factor analysis could be conducted with the data.

A factor loading of 0.5 was used to assess the variables. The figure was greater than the 0.4 suggested by Field (2005) and Hair et al. (1998). After the factor reduction exercise, some items exceeded the 0.5 threshold for their respective components. Six factors had factor loadings below 0.5, signalling they were unrepresentative of their construct.

Component one loaded six items, and all had thresholds above 0.5. These items were labelled Contracting Enterprise Welfare Responsibilities (CWR). For the second component, seven items recorded thresholds greater than 0.5 and were classified as Management and Leadership Commitments (MLC). The third and last component loaded four items whose thresholds exceeded 0.5. These four factors were classified as Safety Performance Roles (SPR). Table 3 presents the EFA results. The establishment of an efficient accident reporting system and the involvement of top management in OSH reviews, the provision of budgetary allocations for health and safety and strict enforcement were found to be highly associated with the construct according to their factor loadings.

Table 3. Contractor, Subcontractor, Supplier-Related Factors (CSSRF)

Contractor, subcontractor, and supplier-related factor (CSSRF)	**Component**		
	1	2	3
Make budgetary allocations for health and safety and strictly enforce them.	0.763		
Develop a comprehensive OSH policy and plan, and implement it to create a unique safety culture as an organisational brand.	0.656		
Establish a health and safety committee and appoint a safety officer.	0.590		
Involve employees in health and safety decision-making.	0.582		
Provide safety standards, manuals and leaflets, instructions, information, and refresher training modules on health and safety for management and employees.	0.579		
Undertake risk identification and assessment, job hazard and accident analysis, and propose mitigation measures.	0.531		
Establish safety recognition, incentives, and award schemes and keep safety performance records.		0.698	
Provide safe transportation, handling, and storage equipment for all substances, materials, and articles.		0.653	
Ensure strict compliance with safety laws and regulations, and ensure effective supervision of health and safety practices.		0.607	
Organise induction programmes and behaviour-based programmes for employees to correct bad safety behaviours and avoid high labour turnover.		0.546	
Provide workers with safe working environment, adequate welfare facilities, safe plants and systems of work.		0.533	
Appoint employees' safety leaders and encourage safety citizenship behaviour.		0.511	
Undertake auditory, visual, drug, and alcohol testing before and during an employee's employment.		0.506	
Establish an efficient accident reporting system and involve top management in OSH reviews.			0.800
Create a safety register and keep accurate records of all accidents.			0.577
Perform a health and safety performance assessment.			0.533
Empower employees to own their health and safety.			0.505

Note: CSSRF – contractor, subcontractor, supplier-related factors; OSH – occupational safety and health

The corrected item-total correlation for the items of the three components was extracted using a suggested cutoff value of 0.30. The first component, CWR, exhibited a Cronbach's α of 0.866, while the second component, MLC, showed a value of 0.874. Lastly, the third component, SPR, displayed a value of 0.833. According to Nanually and Bernstein (1994), the internal reliability is deemed acceptable. Table 4 presents information on contractor, subcontractor, and supplier-related factors' unidimensionality and reliability.

Table 4. Unidimensionality and Internal Consistency of Contractor-, Subcontractor-, and Supplier-Related Factors

Contractor, subcontractor, and supplier factor	**Cronbach's α**
Contracting enterprise welfare responsibilities (CWR)	0.866
Management and leadership commitment (MLC)	0.874
Safety performance roles (SPR)	0.833

Note: CWR – contracting enterprise welfare responsibilities; MLC – management and leadership commitments; SPR – safety performance roles

3.3. Model assessment

The results of the exploratory factor analysis indicated that the construct under investigation was unidimensional and exhibited good reliability. Therefore, confirmatory factor analysis was deemed necessary to further validate the findings. The goodness-of-fit for contractor, subcontractor, and supplier-related factors (CSSRF) was assessed using a three-statistics strategy (Hu & Bentler, 1999). The sample data for the model yielded a χ^2 of 3.466 with 101 degrees of freedom (df) and a probability of $p = 0.000$, indicating a good fit. The deviation of the sample data from the hypothesised model was statistically significant. The estimated CFI value was 0.935, the NFI value was 0.911, the PNFI value obtained was 0.767, the RMR was 0.018, and the GFI was 0.915. The figures of CFI and NFI were greater than the 0.90 cutoff points, PNFI was lower than the cutoff point of 0.800, RMR was less than 0.05, and GFI was greater than 0.90, indicating the model was acceptable (Kline, 2016; Hu & Bentler, 1999; Byrne, 2010). The fit indices for the CSSRF model indicate that the proposed model effectively represents the observed sample data. Table 5 represents the robust fit indices for adaptability and integration.

Table 5. Robust Fit Indices

Fit index	**Cutoff value**	**Estimate**	**Comment**
χ^2		3.466	
Df	0≥	101	Acceptable
CFI	0.90≥ acceptable 0.95≥ good fit	0.935	Good fit
PCFI	Less than 0.80	0.787	Good fit
RMSEA	Less than 0.08	0.074	Acceptable
RMSEA 95 % CI	0.00–0.08 [good fit]	0.065–0.082	Acceptable
NFI	Greater than 0.90 [good fit]	0.911	Good fit
IFI	Greater than 0.90 [good fit]	0.935	Good fit
PNFI	Less than 0.80	0.767	Good fit
RMR	Less than 0.05 [good fit]	0.018	Good fit
GFI	Greater than 0.90 [good fit]	0.915	Good fit

Note: χ^2 – Pearson chi-squared; *df* – degrees of freedom; CFI – comparative fit index; PCFI – parsimony comparative fit index; RMSEA – root mean square error of approximation; CI – confidence interval; NFI – normed fit index; IFI – incremental fit index; PNFI – parsimony normed fit index; RMR – root mean square residual; GFI – goodness-of-fit index

The CSSRF features for the unidimensional model are presented in Figure 1 and Table 6. Sixteen (16) out of twenty-three (23) indicator variables were obtained and used for the final CFA analysis (Byrne, 2010; Joreskog & Sorbom, 1988). From the 454 cases analysed for this construct, sixteen (16) indicator variables consisting of three (3) components were realised as CWR (CWR1, CWR2, CWR3, CWR4, CWR5, and CWR6), MLC (MLC1, MLC2, MLC3, MLC4, MLC5, and ML7), and SPR (SPR1, SPR2, SPR3, and SPR4). Table 6 captures the final conceptual model indicator variables for contractor, subcontractor, and supplier factors that influence OSHP, while Figure 1 represents its CFA model.

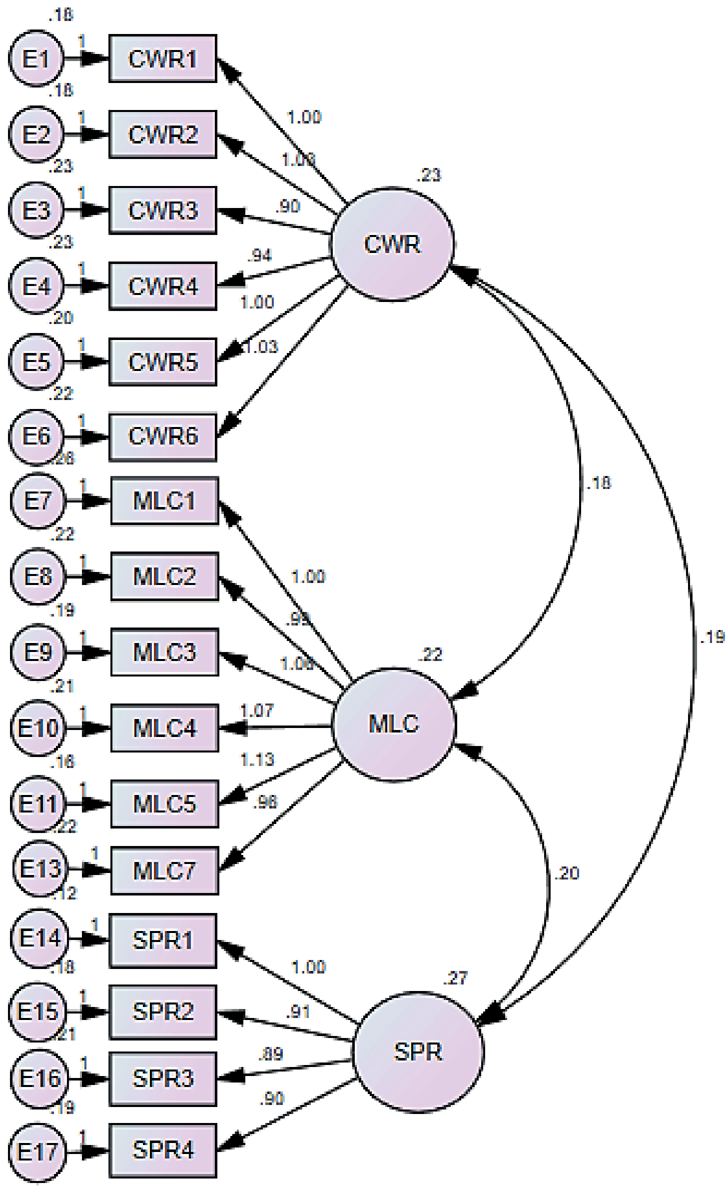

Figure 1. CFA model for contractor, subcontractor, and supplier-related factors. CWR – contracting enterprise welfare responsibilities; MLC – management and leadership commitments; SPR – safety performance roles.

Table 6. Final Conceptual Model Indicator Variables

Latent component	Measurement variable	Label
Contracting enterprise welfare responsibilities (CWR)	Make budgetary allocations for health and safety and strictly enforce them.	CWR1
	Develop a comprehensive OSH policy and plan, and implement it to create a unique safety culture as an organisational brand.	CWR2
	Establish a health and safety committee and appoint a safety officer.	CWR3
	Involve employees in health and safety decision-making.	CWR4
	Provide safety standards, manuals, leaflets, instructions, information, and refresher training modules on health and safety for management and employees.	CWR5
	Undertake risk identification and assessment, job hazard and accident analysis, and propose mitigation measures.	CWR6
Management and leadership commitments (MLC)	Establish safety recognition, incentives and award schemes, and keep safety performance records.	MLC1
	Provide safe transportation, handling, and storage equipment for all substances, materials, and articles.	MLC2
	Ensure strict compliance with safety laws and regulations, and ensure effective supervision of health and safety practices.	MLC3
	Organise induction programmes and behaviour-based programmes for employees to correct bad safety behaviours and avoid high labour turnover.	MLC4
	Provide workers with a safe working environment, adequate welfare facilities, safe plants and systems of work.	MLC5
	Undertake auditory, visual, drug, and alcohol testing before and during an employee's employment.	MLC7
Safety performance roles (SPR)	Establish an efficient accident reporting system and involve top management in OSH reviews.	SPR1
	Create a safety register and keep accurate records of all accidents.	SPR2
	Perform a health and safety performance assessment.	SPR3
	Empower employees to own their health and safety.	SPR4

Note: CWR – contracting enterprise welfare responsibilities; MLC – management and leadership commitments; SPR – safety performance roles; OSH – occupational safety and health

The correlation values, standard errors, and test of statistics of the final sixteen-indicator model are presented in Table 7. The correlation values were less than 1.00, while the p-values were less than the significant value of 0.05. The estimated figures were deemed reasonable. The parameter with the highest standardised coefficient was the indicator with variable SPR1. Its parameter coefficient was 0.828. This was followed by MLC5 (0.796), CWR2 (0.762), CWR1 (0.748), MLC3 (0.746), MLC4 (0.738), SPR2 (0.738), CWR5 (0.734), SPR4 (0.729), CWR6 (0.726), SPR3 (0.704), and MLC2 (0.701). These parameter estimates had high correlation values close to 1.00, suggesting a linear association between the indicator variables and the unobserved variables CWR, MLC, and SPR (Pattabhiraman, 2024). In addition, the R^2 values obtained according to Pattabhiraman (2024) could be considered moderate, signifying that the factors explained more of the variance in the indicator variables. The results suggest that the indicator variables significantly predict the unobserved components; measured variables are significantly associated with CWR, MLC, and SPR.

Table 7. Factor Loading and P-Value

Hypothesised relationship (path)	Unstandardised coefficient (λ)	Standardised coefficient (λ)	*P*	R^2	Significant at 5 % level
CWR1 ← CWR	1.000	0.748	0.000	0.559	Yes
CWR2 ← CWR	1.034	0.762	0.000	0.581	Yes
CWR3 ← CWR	0.900	0.671	0.000	0.450	Yes
CWR4 ← CWR	0.935	0.684	0.000	0.468	Yes
CWR5 ← CWR	1.005	0.734	0.000	0.539	Yes
CWR6 ← CWR	1.033	0.726	0.000	0.528	Yes
MLC1 ← MLC	1.000	0.678	0.000	0.459	Yes
MLC2 ← MLC	0.994	0.701	0.000	0.492	Yes
MLC3 ← MLC	1.055	0.746	0.000	0.556	Yes
MLC4 ← MLC	1.072	0.738	0.000	0.544	Yes
MLC5 ← MLC	1.127	0.796	0.000	0.633	Yes
MLC7 ← MLC	0.963	0.689	0.000	0.475	Yes
SPR1 ← SPR	1.000	0.828	0.000	0.685	Yes
SPR2 ← SPR	0.909	0.738	0.000	0.544	Yes
SPR3 ← SPR	0.890	0.704	0.000	0.496	Yes
SPR4 ← SPR	0.905	0.729	0.000	0.531	Yes

Significant at $p < 0.05$

Note: CWR – contracting enterprise welfare responsibilities; MLC – management and leadership commitments; SPR – safety performance roles

4. DISCUSSION

The segment discusses the contracting enterprise factors. All twenty-three factors were analysed using exploratory and confirmatory factor analysis. The twenty-three variables after the EFA were grouped into three components, namely, CWR, MLC, and SPR, making the model a three-factor model. The test for uni-dimensionality, reliability, and internal consistency using Cronbach's α indicated that the explanatory variables were good measures of their respective latent constructs. CWR obtained a Cronbach α of 0.866, while MLC and SPR recorded 0.874 and 0.833, respectively. The model fit analysis revealed that the postulated CFA model is a good fit based on Table 5.

4.1. Contracting enterprise welfare responsibilities (CWR)

The factor loadings and p-values illustrated in Table 7 indicated that CWR2 explained 0.581 or 58.1 % of the variance in the CWR construct and recorded the highest standardised coefficient (0.762). It was the most influential explanatory variable among the six. CWR obtained a β of 0.23, as indicated in Figure 1, and its variables were statistically significant at a 5 % level. The four influential CWR factors identified were: CWR2, CWR1, CWR5, and CWR6.

Each of these variables explained more than 50 % of the variability in CWR. Safety policies and plans are imperative. They demonstrate the contractor's intention for safety (Buniya et al., 2021) and sense of direction about safety. Having them is not enough; they must be implemented and enforced. The paper underpins Eyiah et al. (2019) findings on budgetary allocations for OSH. Lack of funds by contracting enterprises affects safety performance. According to Su et al. (2021), the extent of safety supervision can be linked to the safety standards used, and at the moment, Milligan et al. (2021) indicated that Ghana lacks safety standards for sector practice. This affects contractors' safety performance. Safety manuals or leaflets are important educational materials (Ferreira et al., 2022). Contractors can use leaflets to create safety awareness (He et al., 2022). The sufficiency of information given to employees is vital for accident prevention. However, the quality of training is a key barrier to safety improvement (Umeokafor et al., 2022). This study reinforces the finding of Umeokafor et al. (2022). Risks can be dealt with through effective identification, assessment (Wong et al., 2020), and classification. Unfortunately, many firms lack the capacity to undertake this all-important exercise. The contracting enterprise welfare responsibilities are key to effective safety management and performance. This was revealed by Abba et al. (2019). Osei-Asibey et al. (2021) agreed that they have welfare responsibilities as employers, but very few are committed to these responsibilities. It can be inferred from the results that good OSH policies, plans, and their implementation are crucial to safety performance because of their positive impacts. Safety improves when firms deliberately make budgetary provisions and monitor how these allocations are used. In most cases, firms have no real cost assigned to safety, which explains why accidents usually occur. Failing to plan and spend on safety is disastrous because the cost implications of an accident or any unforeseen event are costly.

4.2. Management and leadership commitments (MLC)

The findings revealed that MLC5 had the highest standardised coefficient, implying that it has a major influence on management commitment (MC). The factor explained 0.633 or 63.3 % of the variance in MLC. The p-values of MLC variables in Table 7 revealed that they were all significant at a 5 % level. According to Figure 1, the β of MLC was 0.22. The factors labelled MLC5, MLC3, MLC4, and MLC2 were deemed key to impacting OSHP and defining MC. MLC5 is key. The finding confirms the study of Maura et al. (2023). A secure workplace environment increases workers' positive involvement. Unsafe environments reduce productivity because workers become overly careful about their safety (Akhmadalieva et al., 2023). An unsafe environment creates excessive emotional and mental stress for the worker. Workers' commitment is positively correlated with the working environment because a safe working environment attracts a positive response (Yasin et al., 2023a). The provision of adequate welfare facilities is not a favour but an obligation. This reinforces the work of Irfan et al. (2024), firms that want worker satisfaction and success rate concentrate on providing good welfare facilities to employees. Wang et al. (2023) encouraged firms to provide safe systems for production. Compliance with safety standards must be mandatory (Friend et al., 2023). Most contractors have no structured safety systems and policies to enforce compliance (Hagan et al., 2021). Safety gaps on site are usually attributable to the experience of the supervisor. This is consistent with the conclusions of Zhang et al. (2023). However, the paper contradicts the findings of Ofori et al. (2023). They found no relationship between performance and safety performance. Good induction programmes are necessary for a positive safety culture (Okorie & Musonda, 2020). This is consistent with this study. Workers who receive good induction understand their safety responsibilities. It reinforces an organisation's safety position (Mesuwini et al., 2023). Fan et al. (2023) opined that behaviour-based programmes, when well-targeted, reduce and prevent accidents. It should be personalised by firms and organised to educate workers (Duan et al., 2023). Firms with poor safety performance are likely to have high labour turnover. Safe transportation, handling, and storage equipment influence project results (Khahro et al., 2023). Organisational safety culture and environment improve when leaders commit to safety (Timbang et al., 2023). Safety leadership posture influences employees' safety behaviour (Yasin et al., 2023b). A good managerial safety leadership and proactiveness create a positive safety climate (Azinga et al., 2023). A deduction from the results indicates that having a good plan without ensuring compliance does not yield the desired results. Once there are systems and regulations in place, supervisors have a responsibility to supervise and monitor to ensure there are no intentional infractions. To avoid unnecessary exposure of employees to danger, a safe work environment, a safe system of work, and adequate welfare facilities are paramount.

4.3. Safety performance roles (SPR)

The results revealed that four factors define the SPR of contracting enterprises. These are SPR1, SPR2, SPR4, and SPR3, in that order. SPR1 was the most influential SPR variable. This factor registered a standardised coefficient of 0.828 and explained 0.685 or 68.5 % of the variance in this latent construct. The p-values of SPR revealed that all the explanatory variables were statistically significant at a 5 % level. From the CFA model labelled Figure 1, the β of SPR was 0.27. SPR1 was identified as the most significant factor. This is in synch with Wang et al. (2024), who indicated that safety reporting systems are good for identifying performance-shaping factors. Reporting provides information on the four Ws (who, when, where, and why) of accidents and incidents (Yang & Demichela, 2023).

Regular safety reviews and participation by the leadership of firms should be seen as an important practice by management because it reveals the true state of safety adherence. Creating a safety register and recording all accidents accurately is a proactive safety management attempt (Brandt et al., 2023). Poor record-keeping leadership exacerbates the construction industry's poor accident record. The safety performance of a firm can only be revealed by the records (Mavroulidis et al., 2022). This buttresses the earlier assertion made by Yang & Demichela (2023) on the 4 Ws. The role of employees in OSHP cannot be underestimated. They have the role of risk identification and must be empowered to be proactive about safety (Schinke et al., 2022). More often than not, employees' voices on safety are silenced by management (Shankar et al., 2022), preventing them from contributing their quota to enhance safety. Leadership must empower employees and assure them of their commitment to take their suggestions on board; this way, workers perceive themselves as essential participants within the comprehensive safety management framework. Empowerment improves employees' decision-making. According to Homann et al. (2022), employees' contribution is dependent on the level of confidence they have in their leaders. Safety performance assessment is key because it is a tracking structure for identifying risks and establishing conformance or otherwise. Bhagwat & Delhi (2023) proposed the utilisation of comprehensive safety performance models that incorporate proactive safety measures. Onubi et al. (2023) indicated that the attitude of contracting enterprises regarding safety is transmitted to their employees. Abbasianjahromi & Aghakarimi (2023) posited that management commitment and leadership in safety positively affect safety performance. Firms must see safety as a business obligation and lead the way. The findings point to the importance of accident reporting, OSH reviews, and the use of accident registers. Reporting systems aid in the identification of the most common accidents and their means of occurrence. Constantly reviewing OSH plans and policies is a dynamic approach to taking charge of safety issues in an organisation because decision-making is based on real-time data from reports and on-site registers.

CONCLUSIONS

Based on the EFA results, the paper concludes that establishing an efficient accident reporting system and the involvement of top management in OSH reviews, making budgetary allocations for health and safety, strictly enforcing them are the two major contracting enterprise-related factors. However, SPR1, MLC5, and CWR2 were considered the significant explanatory variables based on the inference from the developed CFA model. The three thematic areas that need critical attention in OSH performance efforts are the contracting enterprise welfare responsibilities, management and leadership commitments, and safety performance roles.

The practical implication of the study is that it identifies enhanced performance in health and safety to be hinged on the larger organisation, its management, and leadership. Contracting enterprises must adopt a comprehensive OSH best practice framework for accident reporting to keep track of accidents and incidents to inform future decision-making. Accident costs are not only expensive but also additional costs that can be avoided through best industrial practices (Lee et al., 2022). In order to avoid sending negative signals to employees, management members must demonstrate a genuine interest in safety review activities.

The provision of adequate welfare facilities should be considered a significant management responsibility because it contributes to employee happiness and overall organisational success.

Furthermore, the development of OSH policies and plans for businesses should be a priority for CEs to establish themselves among the best industry players. These documents, when developed, must be implemented and enforced through regular training, awareness creation, and sensitisation. It must form the basic blueprint for all induction programmes. Firms that do not organise induction ceremonies for new employees must include them in their business practice because it is the best entry point to sell an organisation's brand. If this is well implemented, it will influence the safety climate and culture of organisations.

To ensure the uniformity of standard safety practices, it is recommended that the government develop a comprehensive OSH regulatory framework specifically for the construction industry. While this would serve as the national standard, individual enterprises should be encouraged to internalise these regulations into their own internal safety protocols. Furthermore, robust enforcement mechanisms must be institutionalised to ensure strict compliance and guarantee consistency in safety management across the sector. Such a framework should incorporate clear sanctions for violations and be supported by technical guidance and expert-led training programs to facilitate effective implementation by practitioners.

LIMITATIONS OF THE STUDY

This study is subject to several limitations. Geographically, the findings are based wholly on the OSH perspective of the Ghanaian construction industry. Therefore, caution should be exercised when generalising these results to other regional or cultural contexts. Methodologically, the sampling approach did not account for the specific proportions of various professional groups, which may introduce sampling bias. Furthermore, the application of exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) involves a degree of subjectivity, particularly regarding the researchers' judgment in component extraction. Finally, the CFA results may be sensitive to the sample size, as large samples can disproportionately influence model fit indices.

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