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GHANAIAN CONSTRUCTION WORKERS' HEALTH AND SAFETY KNOWLEDGE AND COMPLIANCE

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ABSTRACT

Purpose: This study seeks to assess the knowledge level of local construction workers regarding health and safety measures on construction sites.
Design/Methodology/Approach: A quantitative research approach was employed, using interval Likert-type scales to measure data. A purposive sampling technique was employed for the study. One hundred and fifty questionnaires were distributed, with 122 returned and deemed valid for analysis. Descriptive statistics, relative importance index, Pearson Correlation, and structural equation modelling were utilised for the study. Data analysis was conducted using Amos 28 through structural equation modelling.
Findings: The results indicate that the level of knowledge in construction health and safety practices directly and indirectly affects project performance and productivity. Higher levels of knowledge were associated with higher compliance with construction health and safety practices, leading to increased project performance and productivity. Compliance with health and safety measures directly influenced project performance and productivity. Additionally, the level of knowledge had a positive indirect effect on project performance and productivity.
Research Limitations: Primarily, the sample was confined to construction workers within specific regions of Ghana, which may limit the applicability of the results to other geographic areas or contexts. Additionally, using self-reported data through questionnaires could introduce bias, as participants may respond in ways they perceive as socially desirable rather than reflecting true behaviours and knowledge levels.
Practical Implication: Construction firms and authorities should prioritise safety training and tight safety regulations. Knowledge and compliance boost project performance and efficiency, making them a compelling financial case for investment. Companies could integrate advanced training modules and ongoing learning opportunities to maintain safety knowledge and compliance leading to more efficient and safer construction methods.
Social Implications: The study shows substantial social consequences for construction worker health and safety. It emphasises the need for improved education, regulation, and compliance to reduce workplace injuries and fatalities.
Originality/value: It contributes to understanding the relationship between project performance and productivity in a complex construction environment.
Keywords: *Compliance. construction workers. health and safety. knowledge. productivity.*

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INTRODUCTION

Unsafe working environments have a direct impact on the welfare of staff. Workplace risks, along with labour injuries and illnesses, can decrease employee satisfaction, motivation, and firm efficiency, ultimately affecting the marketplace of a company (Pouliakas, & Theodossiou, 2013). To remain competitive, companies must mitigate workplace threats and allocate resources to prevent them. It is widely acknowledged that human behaviour within complex work processes plays a crucial role in ensuring a safe working environment. As Provan et al. (2020) emphasised, safety enforcement is integral, requiring employees to adhere to safety protocols and carry out their work safely. Several accident and occurrence reports in high-risk industries have highlighted the significance of safety enforcement, revealing a lack of adherence to laws, rules, and procedures as a critical contributing factor in many cases (Hopkins, 2011).

To guarantee the safety of construction workers, they must possess knowledge of Health and Safety (H&S) information. Researchers have hypothesised that there is a positive correlation between awareness of H&S knowledge and the safety of construction workers (Kawuwa et al., 2018; Okuye et al., 2017; Adebiyi et al., 2019; Arifuddin et al., 2019). Okoye et al. (2016) have endorsed this statement, asserting that the availability of H&S information helps minimise incidents and harm on construction sites. Thus, construction workers must be equipped with adequate knowledge of H&S data. The prevalence of injuries and hazards on construction sites poses significant challenges to workers. There is an urgent need for an in-depth inquiry into the extent of expertise and enforcement of H&S information by construction staff (Hopkins, 2011). Udo et al. (2012) have revealed that neglecting H&S data on sites significantly affects employees' productivity and efficiency. Non-conformance with H&S details significantly contribute to construction site safety and health conditions. Knowledge of H&S data and strict enforcement are sufficient to increase employee protection (Kawuwa et al., 2018).

Recently, there has been a growing focus on occupational safety management issues and integrating knowledge management through organisational learning competency (Nesheim & Gressgrd, 2014; Deepak & Mahesh, 2019). Controlling knowledge is necessary for establishing effective occupational safety management systems (MD & Mahesh, 2023). Many businesses understand that knowledge is critical for improving safety performance (Duryan et al., 2020). Several studies have explored the use of knowledge management systems to enhance safety management in various industries, such as manufacturing, maritime, and healthcare (MD, & Mahesh, 2023). However, the construction sector has received less attention in this regard due to the lack of practical implementations and the fragmented work processes within the industry (Jarvis et al., 2014; Teperi et al., 2019; Kolagar & Hosseini, 2019). The job's complexity, diverse locations, and high turnover of construction workers contribute to these challenges (Boadu et al., 2020).

Although it is crucial to reduce safety risks at work and spend resources sensibly, there is still little study on safety management in the construction sector, especially, when it comes to actual implementations and adjustment to its peculiar, dispersed work procedures. Furthermore, even if certain aspects of safety management performance have been identified, a thorough model designed especially for the difficulties faced by the construction industry is conspicuously

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lacking. Inadequate enforcement of health and safety laws also frequently leads to non-compliance. Moreover, little is known about how organisational and cultural aspects affect safety performance, especially how these aspects affect compliance and safety procedures on construction sites. By measuring the knowledge and degree of compliance of local construction workers with health and safety regulations and investigating the effect on project performance, this study seeks to close these gaps.

The study is structured into six main sections. Section one is the introduction, which sets the background of the study. Section two synthesises the literature on health and safety knowledge and compliance with construction sites in Ghana. Section three outlines the research approach adopted. In section four, the data are analysed and discussed, and study implications for policy research and practice are stated in section five. Section six contains the conclusion of the study.

HEALTH AND SAFETY ON CONSTRUCTION SITES IN GHANA

Ghana's construction industry is a critical component of the nation's economy, though was among the contracting sub-sectors based on the year-on-year quarterly growth rates in the 3rd quarter of 2023 Ghana Statistical Service (GSS) report, recorded -8.3% in 2023 (GSS, 2023). The prevalence of occupational health and safety (OHS) injuries and accidents poses a substantial risk to the anticipated industrial growth (Khani et al., 2018).

The Ghanaian Occupational Health and Safety (OHS) has a rich history that extends beyond the enactment of the Factories, Offices, and Shops Act of 1970. The foundation of OHS regulations in the country encompasses various sectors and specific concerns, as outlined by Annan et al. (2015). Key legislative frameworks include the Mining and Minerals Regulations of 1970 (LI 665), which set standards for safety in the mining sector, and the Workman's Compensation Law of 1987, which provides mechanisms for compensating workers who sustain work-related injuries or illnesses. In the health sector, the Ghana Health Services Act of 1999 (Act 526) incorporates provisions for the safety and well-being of health service employees. The Labour Act of Ghana, 2003 (Act 651) offers a comprehensive approach to worker health and safety across all sectors. Radiation hazards are specifically addressed by the Radiation Protection Instrument of 1993 (LI 1559), an amendment to the Ghana Atomic Energy Act of 1963 (Act 204). Environmental and personal safety from hazardous substances is governed by the EPA Act of 1994 (Act 490), and have components such as the Pesticide Control and Management Act of 1996 (Act 528). Moreover, road safety, a crucial aspect of public and occupational safety, is managed under the commission of the National Road Safety Act of 1999 (Act 567). These regulations collectively underscore Ghana's commitment to safeguarding workers and the public, ensuring a comprehensive approach to occupational health and safety (Annan et al., 2015).

Health and Safety Knowledge and Compliance

Compliance with safety refers to activities based on achieving minimum safety requirements such as observing safety protocols, wearing personal protective equipment, and safely performing work (Mustaffa, 2021) Participation in safety refers to actions that promote the priorities and objectives of the company in this field (Vinodkumar & Bhasi, 2010), such as assisting co-workers, supporting workplace safety services, engaging in voluntary safety

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activities, demonstrating measures, and making efforts to improve workplace safety (Neal et al., 2000). Compliance can be described as the regulator mostly caring about better results than prosecution consequences, and enforcing actions intended to conform with legal requirements (Williams et al., 2018). Compliance with H&S legislation will improve efficiency in industries by reducing accidents, according to Agwu (2012). Compliance with safety is a key component of occupational safety conduct (Clarke, 2006). It relates to the core behaviours that workers should undertake to preserve safety in the workplace, including compliance with standard work procedures and regulations (Casey et al., 2017).

Such regulations and procedures specifying safe or permitted methods of performing a particular task or job can be deliberately or accidentally violated (Fogarty & Shaw, 2010). Violations of the former type are deliberate actions that occur when employees are aware of the rules/regulations but choose not to comply with them, while violations occur because of a lack of awareness or interpretation of the rules/regulations (Dahl, 2013). Safety compliance includes behaviours considered part of the employee's job position. In contrast, safety engagement consists of a more incredible voluntary aspect, including behaviours outside the formal role of the employee, i.e., organisational citizenship behaviours (Clarke, 2006).

An in-depth analysis is required to examine the extent of construction workers' awareness and conformance to safety information due to the ongoing occurrence of construction site mishaps (Adeboyi et al., 2019). The high frequency of site accidents can be attributed to poor compliance with health and safety measures (Ume Okafor et al., 2014). The failure to rigorously enforce health and safety (H&S) protocols results in non-compliance with established regulations. Okafor et al. (2014) identified that a significant factor contributing to the poor state of H&S on construction sites is the lack of adherence to these regulations. Additionally, Williams et al. (2018) highlighted various factors exacerbating non-compliance with H&S standards, including bribery and corruption, fear of legal repercussions, the pursuit of higher profit margins, insufficient support, employee and workplace issues, management dedication, human rights concerns, perceptions of industry stakeholders, erroneous beliefs, business credibility, and the tendering process Most employees refuse the use of safety products, with much disregard given to them due to lack of knowledge, implementation of safety legislation, difficulties created by wearing personal protective equipment and weak safety culture.

Health and Safety Performance

The effective administration of safety, efficiency, quality, health, and the environment is equally critical to the sustainability of the construction industry, similar to marketing and finance (Venkataraman, 2008; Hasan & Jha, 2013). Consequently, safety performance is an equivalent metric to time, quality, and cost in assessing the success of a given project. Time, cost, and quality should be prioritised as performance metrics during the execution phase of construction projects. In addition to advocating for human value (Jitwasinkul & Hadikusumo 2011), customers ought to extend their concern to site safety. Customers ought to prioritise site safety over the value of human beings in addition to time, cost, and quality as success metrics for construction project execution (Jitwasinkul & Hadikusumo, 2011). The financial performance of a company and the overall cost of construction can be significantly impacted and increased by as much as 15% when proper safety measures are not implemented

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(Hallowell, 2011). This extends beyond mere health concerns. Additional variables that substantially impact the safety efficacy of speciality contractors were identified by Ye et al. (2020).

These factors encompass a range of initiatives, such as implementing drug testing for personnel and facilitating employee training with the support of contractor associations, among others. In their study, Fang et al. (2004) identified variables that exhibit a robust correlation with the performance of on-site safety administration on Chinese construction sites. The prioritisation process considered five significant factors: those associated with the foreman, the workers, the staff, the manager, and safety training. The status of safety management in the Chinese construction industry was evaluated by Tam et al. (2004). The researchers discovered that inadequate safety knowledge among senior executives, insufficient training, project managers' lack of security awareness, reluctance to allocate security resources, and irresponsible operations are the primary determinants that impact safety performance. In addition, Aksorn and Hadikusumo (2008) as cited by Usukhbayar and Choi, (2020) analysed critical success factors influencing the performance of safety programmes in the Thai construction sector. They concluded that the most influential factor is management support.

In their model for evaluating the performance of construction project safety management, Li and Li (2009) identified the most influential factors: safety management organisation, security management measures, safety personnel, and equipment and material management. The critical success factors that influence the performance of safety programmes in Malaysian construction projects were delineated by Omran et al. (2010). Their research findings demonstrated that effective communication is a critical element, which should be accompanied by clear and practical objectives, a safety committee or officer, adequate resource allocation, and ongoing employee participation.

Following these studies, Jitwasinkul and Hadikusumo (2011) identified seven critical organisational factors influencing safety work behaviours in construction projects: communication, culture, commitment to management, leadership, organisational learning, empowerment, and reward system. The construction industry in Thailand served as a specific case study for this analysis. In their 2013 study, Hasan and Neeraj Jha collected data from 32 construction projects in India to assess the effectiveness of safety incentives and penalties. The delivery system, adequate labour training, exceptional attention to hazardous circumstances, the role of the safety committee and subcontractors, specialised work and safety equipment, and the appropriate type of incentive/penalty were all identified as determining factors in the pursuit of enhancing safety efficiency. Human capital is significantly degraded by occupational accidents, which has a detrimental impact on the productivity and competitiveness of nations (Fernández-Muñiz et al., 2009) as cited by Scholar, (2020). According to Fernández-Muñiz et al. (2009), safety management benefits economic-financial performance, safety, and competitiveness.

RESEARCH METHODS

A quantitative strategy was used in this study. Given this, the target audience for the study consists of experts working in the construction industry, including, Safety Managers, Managing

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Directors, Project Managers, Site Engineers, and Construction Managers with reasonable experience in the construction industry. Well-structured questionnaires were designed and distributed to professionals to gather data from the primary source, while secondary sources include an extensive review of the literature using journal articles and other published books. One hundred and fifty (150) sets of questionnaires were administered to construction professionals, including health and safety experts, who were selected using a purposive approach (Alvi, 2016), however, 122 were returned as completed and valid for the analysis, representing 81.33% response rate.

The questionnaire was developed based on literature examining the knowledge and compliance of local construction workers on health and safety measures on construction sites. The questionnaire assessed compliance, the effect on project performance, and the level of knowledge. Interval Likert scales are supported as a quantitative research methodology for data measurement (Netemeyer, Bearden, & Sharma, 2003). Descriptive statistics may be used for data analysis in quantitative research as well (Brown, 2011). In this study, descriptive statistics, relative importance index (RII), Pearson Correlation, and Amos 28 through structural equation modelling were employed to determine the level of knowledge and compliance of local construction workers on health and safety measures on construction sites. Conclusions and recommendations made at the end of this research were based on the research findings.

Data collection

A structured, close-ended questionnaire survey was disseminated among safety managers within construction firms located in Ghana's Greater Kumasi and Greater Accra regions. The questionnaire was meticulously developed based on extensive literature reviews and segmented into three distinct sections. Additionally, certain elements of the questionnaire were adapted from the work of Okoye (2017).

Section A captured demographic data, including respondents' years of experience in the Ghanaian Construction Industry (GCI), the number of projects they had been involved in, and the availability of site safety programs. Section B consisted of ten Likert-scale items assessing the level of knowledge in Health and Safety among local construction workers (coded as LK1 to LK10), where respondents indicated their agreement regarding the knowledge level of these workers in Ghana. (See Table 3). Section C included fourteen Likert-scale items evaluating the compliance with Health and Safety regulations by construction workers (coded as LC1 to LC14), requiring respondents to express their agreement with the stated compliance levels. (Table 4). Section D comprised ten Likert-scale items addressing the impact of knowledge on compliance and project performance and productivity (coded as EFHS1 to EFHS10), with respondents indicating their level of agreement on these effects. (See Table 4)

The data derived from these Likert-scale items were employed in the descriptive analysis of this study. The use of closed-ended questions in Sections B, C, and D was deliberate to minimize respondent bias, as suggested by Akintoye and Main (2007). Confidentiality was assured to the participants, ensuring that no personal identifiers would be disclosed in the research, thereby encouraging honest and sincere responses due to the anonymity guaranteed to them.

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RESULTS AND DISCUSSION

Respondents' profile

The demographic of the respondents pertains to the specific characteristics within a given population. In this study, Table 1 presents respondents construction experts who had secondary and post-secondary education. These respondents were construction professionals, including Safety Managers, Managing Directors, Project Managers, Site Engineers, and Construction Managers from small and medium-sized construction firms, all possessing extensive knowledge of safety on construction sites. Furthermore, the majority of the respondents, comprising 38%, had over six years of experience, indicating their ability to provide data for measuring the knowledge level of local construction workers regarding health and safety measures on construction sites.

Table 1 Background of Respondents

Demographic Variables	Frequency	Percentage
Job Position		
Safety Manager	2	1.7
Managing Director	4	3.3
Project Manager	17	14
Site Engineer	16	13.2
Construction Manager	27	22.3
Others	54	45.5
Educational Level		
Doctrate	7	5.8
Masters	58	47.9
First Degree	52	43
HND/Diploma	4	3.3
Years of Experience		
Less than 6 Years	17	14
6-10 Years	33	27.3
11-15 Years	23	19
16-20 Years	19	15.7
Over 20 Years	29	24
Years in Organisation		
Less than 6 Years	32	26.4
6-10 Years	46	38
11-15 Years	11	9.1
16-20 Years	12	9.9
Over 20 Years	16	16.6

Source: Field data, 2024.

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Table 2: Relative Importance index of level of knowledge about Health and Safety by local Construction Workers

S/N	Level of knowledge about Health and Safety by local Construction Workers	RII	Rank
LK2	Construction Safety laws and regulations	0.793	1st
LK3	Proper use of a ladder	0.793	1st
LK4	Proper Housekeeping	0.793	1st
LK1	Safety training and education	0.785	2nd
LK5	First aid and welfare facilities	0.748	3rd
LK6	Proper use of scaffoldings	0.711	4th
LK7	Construction health and safety plan	0.700	5th
LK8	Safety monitoring policy and safety records.	0.681	6th
LK9	The use of personal protective equipment (PPE)	0.667	7th
LK10	Safety communication	0.656	8th

Source: Field data, 2024.

Table 2 shows 10 important elements identified under the level of knowledge about health and safety by local Construction Workers. From the table, the elements range from construction safety laws and regulations to proper use of a ladder and proper housekeeping with RII, ranging between 0.793 and 0.748. construction Safety laws and regulations, proper use of ladders, proper housekeeping, and safety training and education are the highest ranked (RII of 0.793 and RII of 0.785, respectively). The finding is in agreement with Earnest and Branche (2016) argued that because of ladder safety concerns inspection and maintenance of ladders are carried out before being used on construction sites. This is followed by the appropriate use of scaffoldings, Construction health and safety plan, Safety monitoring policy and safety records and the use of personal protective equipment (PPE) with safety communications being the least ranked.

Table 3: Relative Importance index of level of compliance with Health and Safety by Construction Workers

S/N	Level of Compliance with Health and Safety by Construction Workers	RII	Rank
LC1	The working environment is always clean and free from any harmful objects.	0.841	1st
LC2	Safety records keeping	0.833	2nd
LC3	Before climbing ladders, ensure that they are properly secured in place.	0.826	3rd
LC4	Proper handling of Construction Equipment	0.726	4th
LC5	Health and safety plan availability before project commencement	0.726	4th
LC6	Mandatory use of on-site personal protective equipment (PPE)	0.722	5th

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LC7	Availability of on-site first aid and welfare services	0.696	6th
LC8	Strict monitoring of safety policy	0.689	7th
LC9	Ladders fixed and adequately protected before ascending them.	0.681	8th
LC10	Communication of safety issues to all concerned	0.656	9th
LC11	Observation of standing Safety rules and regulations on site	0.648	10th
LC12	Safety brief before the commencement of any day work on site	0.633	11th
LC13	Safety training and education	0.600	12th
LC14	Scaffoldings are inspected before mounting them	0.600	12th

Source: Field data, 2024.

Table 3 shows 14 elements of the relative importance index of construction workers' compliance with health and safety. These include maintaining a clean and hazard-free working environment, keeping comprehensive safety records, and ensuring ladders are securely fixed and stabilised before using them, two elements, which are "Safety training and education" and "Scaffoldings are inspected before mounting them" being the least ranked with RII of 0.600. The finding aligns with Mwangi (2016) who argued that ensuring effective implementation of occupational safety there is a need to provide a safe and hazard free working environment. This indicates that the compliance level of construction workers in Ghana is excellent, according to this study. Table 3 shows that construction workers strictly adhere to safety rules on construction sites. It further revealed how the working environments are always clean and free from all harmful objects. It again shows how safety records are kept. This shows how seriously construction management is not relenting in ensuring site safety improvement. This is an indication that knowledge of safety could translate into compliance. The higher the level of expertise, the higher and better the compliance of workers concerning safety. This attests to the fact that local workers' complying with H&S on construction sites could improve workers' safety to a large extent (Adebiyi *et al.,* 2020).

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Table 4: Effect of Health and Safety Knowledge and Compliance on Project Performance

S/N	Effect of Health and Safety Awareness and Adherence on Project Outcomes	RII	Rank
EFHS 2	Reduces claims and litigations	0.922	1st
EFHS 3	Improves the industry's reputation	0.893	2nd
EFHS 4	Improves project quality	0.889	3rd
EFHS 5	Improves environmental quality	0.878	4th
EFHS 6	Increases company's image	0.870	5th
EFHS 1	Reduces construction site accidents	0.837	6th
EFHS 7	Reduces project cost	0.837	6th
EFHS 8	Reduces construction project delay	0.837	6th
EFHS 9	Increases workers' confidence	0.837	6th
EFHS10	Increases productivity and efficiency	0.822	7th

Source: Field data, 2024.

Table 4 presents the RII of the effects of Health and Safety Knowledge and Compliance on Project Performance. The results show that all the RII of the various impacts are very high, with "Reduces claims and litigations" having a rank of RII of 0.922 and "Increases productivity and efficiency, reduces construction site accidents, reduces project cost, reduces construction project delay, and Increases workers' confidence all ranked an RII of 0.837 each. Knowledge and compliance with H&S on construction sites can go a long way in positively affecting project performance. This agrees with Demirkesen (2020) who confirmed that safety awareness enhanced safety performance on construction sites.

To determine the extent and significance of the relationship between health and safety knowledge, compliance, and project performance among construction workers, it is necessary to examine the following: the correlation between health and safety knowledge and compliance, the correlation between health and safety knowledge and project performance, and the correlation between health and safety compliance and project performance. To this end, four hypotheses were formulated for correlation analysis.

H1 – The extent of knowledge in construction health and safety has a substantial impact on project performance and productivity. H2 – The extent of knowledge in construction health and safety significantly influences compliance with construction health and safety regulations. H3 – Compliance with construction health and safety regulations significantly affects project performance and productivity. H4 – Compliance with construction health and safety regulations mediates the relationship between the level of knowledge and project performance and productivity. The results of the correlation analysis are presented in Tables 5 and 6.

Table 5 shows Pearson's correlation between relevant variables. The level of knowledge in construction health and safety is positively correlated with compliance with construction health and safety procedures ($r = 0.341$, $p<0.001$, two-tailed). The finding is supported by Mullen et al. (2017) who argued that employer safety obligations are positively associated with employee safety compliance. This result suggests that higher knowledge was associated with higher

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compliance. Level of knowledge has no significant correlation with project performance and productivity (r = 0.037, p>0.05, two-tailed). Compliance levels are positively correlated with project performance and productivity (r = 0.461, p<0.001, two-tailed). Thus, a higher level of compliance was associated with higher project performance and productivity.

Table 5: Pearson's bivariate correlations between the variables.

Variable	1	2	3	4	5	6
1. Level of knowledge	1	.341**	0.037	-0.045	0.029	-0.148
2. Level of compliance		1	.461**	0.007	0.02	-0.148
3. Performance and productivity			1	0.147	0.157	0.115
4. Education				1	-0.141	.251**
5. Company age					1	.490**
6. Having a health & safety department						1

**p<0.05; **p<0.001. Source: Field data, 2024.*

Table 6: The effects of level of knowledge on compliance level and project performance and productivity

Dependent variable	Path	Predictor	Direct effects					Indirect effects	
			B	β	SE (of B)	Critical ratio	p	B	β
Main effects									
Level of compliance	<---	Level of knowledge	0.408	0.341	0.103	3.972	***		
PPP	<---	Level of knowledge	-0.079	-0.136	0.049	-1.592	0.111	0.10***	0.17***
PPP	<---	Level of compliance	0.246	0.507	0.041	5.949	***		
Covariate effects									
Level of knowledge	<---	Education	0.506	0.032	1.544	0.328	0.743		
Level of knowledge	<---	Department*	-5.794	-0.226	2.833	-2.045	0.041		
Level of knowledge	<---	Age	3.003	0.145	2.245	1.338	0.181		

****p<0.001; *Department stands for "Having a health & safety department"; Chi-square = 11.07; p = 0.086; GFI (goodness of fit index) = 0.971; TLI (Tucker-Lewis Index) = 0.873; RMSEA (random mean square error of approximation) = 0.084; PPP – project performance and productivity, B – unstandardised effects or coefficients; β – standardised coefficients or effects. Source: Field data, 2024.*

Table 6 shows the direct and indirect effects of the level of knowledge in construction safety and health practices on project performance and productivity. Level of knowledge has a direct positive outcome on the level of compliance with construction safety practices (β = 0.341, critical ratio = 3.972, p<0.001), which affirms that a higher level of knowledge was associated with higher project performance and productivity (Liu et al., 2020). This result confirms the first hypothesis (H1). Level of knowledge has no effect on project performance and productivity, but level of compliance has a positive effect on project performance and productivity (β = 0.507, critical ratio = 5.949, p<0.001). This result suggests that a higher level of compliance was associated with higher performance and productivity. Hence, the second hypothesis (H2) was not supported but the third hypothesis (H3) was confirmed. Level of knowledge has a positive indirect effect on project performance and productivity (β = 0.17, p<0.001). Therefore, the level of compliance fully mediates the effect of the level of knowledge on project performance and productivity. Thus, the fourth hypothesis is supported by the data. Figure 2 is the resulting structural model.

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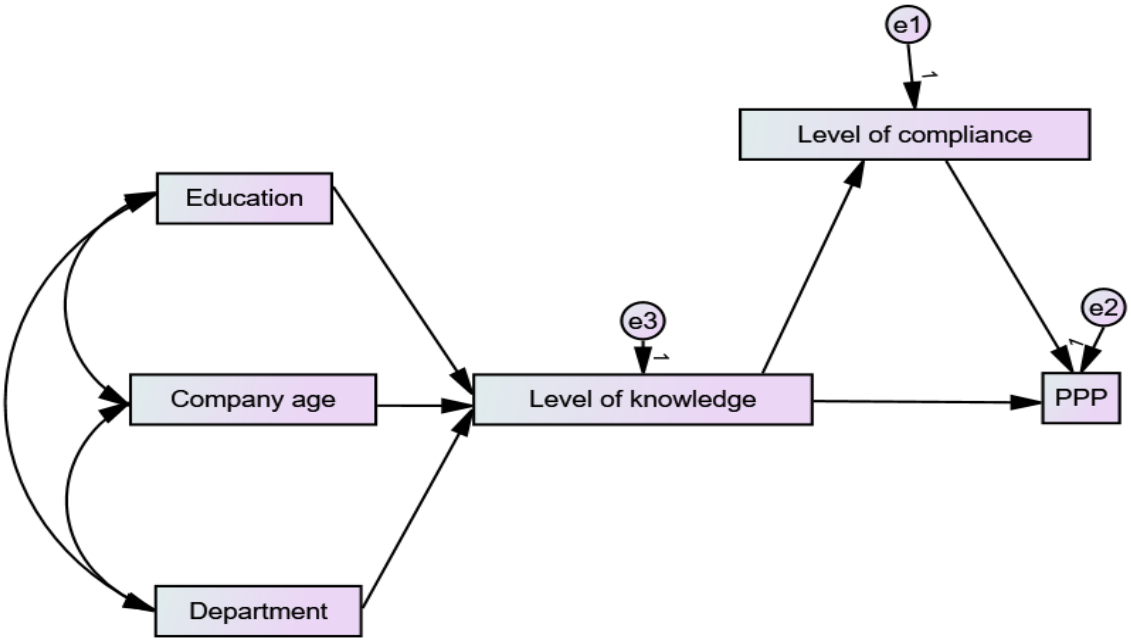
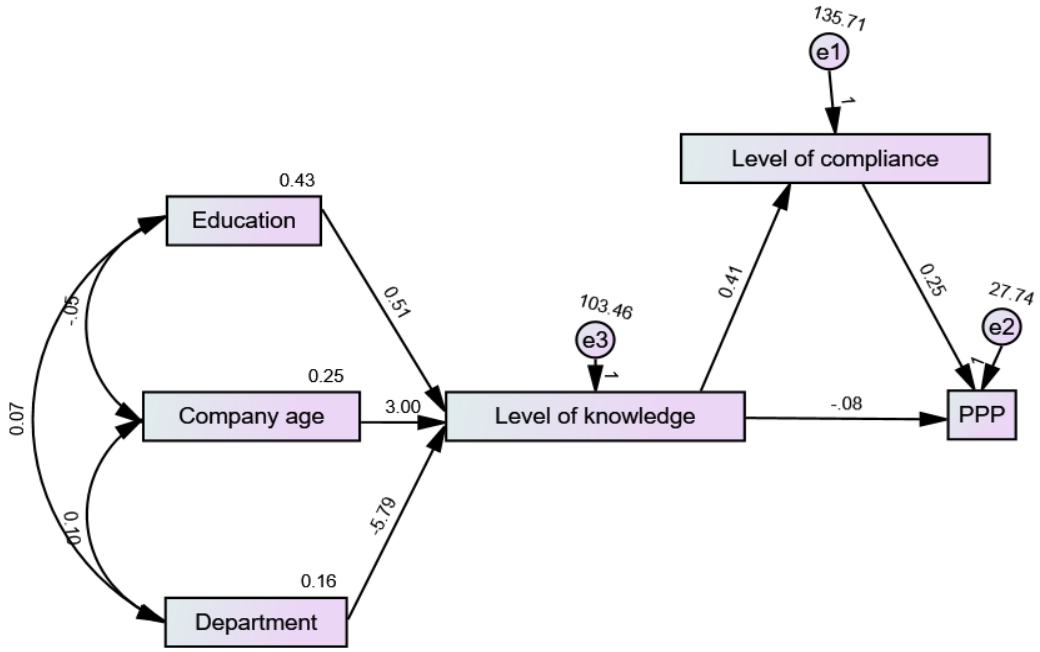


Note: Department stands for "Having a health & safety department"
Figure 1: A conceptual model of the effects of the level of knowledge on the level of compliance and project performance and productivity. Source: Field data, 2024.



Note: Department stands for "Having a health & safety department"
Figure 2: The effects of level of compliance on project performance and productivity. Source: Field data, 2024.

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Implication for Research and Practice

This case study examines the knowledge and compliance levels of Ghanaian construction workers with health and safety regulations. It highlights the need for strengthened policies and regulations, improved enforcement of existing laws, and investment in education and awareness initiatives to enhance workers' knowledge and compliance. The government should empower regulatory bodies and agencies to monitor and enforce compliance effectively, and collaboration between government entities, industry stakeholders, and workers' unions should be encouraged.

Future research should focus on identifying underlying factors contributing to low know-how and conformity levels among construction workers and exploring the impact of cultural, social, and economic factors on workers' attitudes and behaviours. Additionally, research should assess the effectiveness of various interventions and programs designed to enhance workers' knowledge and compliance with health and safety regulations.

Practical implications include prioritising workers' health and safety by providing adequate training, equipment, and resources, developing a safety culture within construction companies, and promoting knowledge dissemination through workshops, seminars, and training sessions. Collaborative efforts between academic institutions, industry associations, and government agencies can facilitate the provision of such training initiatives.

CONCLUSION

Constant health and safety issues on building sites have drawn a lot of attention because they have caused all kinds and levels of losses, including fatalities. While improper application of information can lead to disastrous outcomes, some argue that knowledge truly is power. This study examined construction workers' health, safety, and compliance knowledge and how they relate to project performance and productivity on Ghanaian construction sites.

According to the study, the construction workers knew a decent amount about health and safety. Additionally, we discovered a low degree of worker compliance with health and safety regulations. The findings also revealed that construction compliance and health and safety knowledge significantly impact project performance and productivity.

Similarly, the findings showed a strong positive correlation, though not statistically significant, between health and safety compliance and project performance and between health and safety knowledge. Although the study found positive correlations indicating that the awareness of health and safety issues and adherence were associated, this would not imply that knowledge of health and safety issues would inevitably guarantee adherence. Despite their considerable positive link with project performance, this study also concluded that safety and health awareness and conformity alone are insufficient to enhance project performance significantly. This assertion means that some elements of safety culture, knowledge, and compliance are necessary for the behavioural adjustments needed for safety performance. Equally important for better project performance, these additional crucial safety elements include an enforceable

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legislative framework, management commitment, and worker involvement. The environment in which the study took place is crucially important.

The results of this study would inform any state agency responsible for ensuring strict adherence to safety regulations on building sites. It has come to light that maximising safety performance on our construction sites would undoubtedly result from following health and safety regulations. The government should create a State Safety Commission in Ghana to enhance the health and safety standards in the construction industry. The commission's responsibilities would involve policy development, establishing safety regulations for all sectors, issuing and revoking safety compliance certificates, organising safety training sessions, seminars, and workshops, and promoting public awareness.

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