

BRIDGING THE GAP: INTEGRATING INFORMAL AND FORMAL SAFETY TRAINING IN INDIA'S CONSTRUCTION INDUSTRY

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The construction industry in India, employing 51 million workers and contributing 9% to the GDP, faces significant safety challenges, particularly for unskilled labourers who often lack formal health and safety training. This research explores the informal training practices prevalent in the sector, shaped by cultural, economic, and practical realities. Despite the existence of formal safety programmes, many workers depend on informal, peer-led learning acquired through on-the-job experiences. While this method allows for immediate knowledge transfer and fosters communication and camaraderie, it lacks structure, leading to inconsistent safety standards. Based on 10 semi-structured interviews with labourers and supervisors, the study found that safety knowledge is often passed down by experienced workers, some of whom lack formal training themselves. Informal practices help some workers gain clarity, yet others feel uncomfortable raising concerns, highlighting a key risk. Additionally, many projects neglect safety due to the prioritisation of meeting deadlines. The study calls for integrating structured training with existing informal practices to develop a more robust safety culture, reduce workplace accidents, and promote healthier working environments in India's construction sector.

Keywords: informal training; safety culture; unskilled labourers; India

INTRODUCTION

India's construction industry is one of the largest employers in the country, with over 51 million workers and a 9% contribution to national GDP (Rani, 2021). Despite its economic significance, the sector continues to struggle with critical health and safety (H&S) issues, particularly among its vast unskilled labour force (Gupta, 2021). Globally, formal H&S training remains limited in accessibility and effectiveness, while informal, experience-based training passed from peer to peer dominates on-site learning (Aboagye-Nimo *et al.*, 2015). This informal model is often rooted in cultural norms, economic constraints, and practical site realities (*ibid*). However, as these informal practices are not recorded, there is the possibility of a lack consistency, structure, and alignment with modern H&S standards. Through ten semi-structured interviews with unskilled labourers and supervisors, this study will critically explore the lived experiences and perceptions in relation to H&S training on Indian construction sites. The research's geographic context is Mumbai. This paper argues

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that instead of disregarding informal methods, H&S policies and practices should embrace and integrate them into structured frameworks. By bridging the gap between formal programmes and informal learning, India's construction industry can adopt proactive measures which will lead to a more inclusive and sustainable safety culture, thereby enhancing wellbeing and reducing occupational hazards for its most vulnerable workers.

LITERATURE REVIEW

This literature review critically examines three interconnected themes: the challenges of health and safety (H&S) in the Indian construction sector, the role and limitations of informal training, and emerging discourse on integrating informal and formal H&S training. This structure allows for a comprehensive understanding of the contextual, theoretical, and practical dynamics shaping current practices.

It is imperative that some terminologies are clarified to help offer a better understanding of the research context. In the Indian construction sector, unskilled labourers typically refer to individuals engaged in physically intensive, non-specialised tasks such as carrying materials, site cleaning, or digging, often without formal education or vocational certification (Panneer *et al.*, 2019). While they are formally classified as "unskilled," many of these workers acquire knowledge through informal, peer-led experiences on site. This distinction is essential because, although they lack accredited training, they may still develop job-specific competence informally. This form of informally acquired competence/skill is crucial to building a positive safety culture on site (Aboagye-Nimo and Raidén, 2019). Understanding the position of unskilled labourers in relation to both formal and informal training approaches is key to exploring how H&S knowledge is transmitted and applied in real site conditions. The relevant literature themes are discussed next.

H&S Challenges in the Construction Sector

The construction industry is one of the most hazardous sectors globally, with a high rate of workplace accidents. Studies indicate that inadequate training significantly contributes to accidents (Fang and Wu, 2020). Unskilled workers in particular face elevated risks due to their limited exposure to structured H&S education.

The construction sector is globally recognised as one of the most hazardous industries, with high rates of accidents, injuries, and fatalities. In India, these challenges are compounded by a rapidly expanding workforce, a large proportion of which is unskilled and migratory. Workers often operate in dynamic environments with poor infrastructure, inadequate supervision, and limited access to personal protective equipment (PPE) (Boakye *et al.*, 2022). This creates an environment where H&S protocols are either weakly enforced or altogether absent.

The informal nature of employment further exacerbates the issue, as many workers are not covered by formal contracts or H&S regulations. Site-specific challenges, such as time pressures, harsh weather conditions, and multilingual workforces, also contribute to safety lapses. Moreover, regulatory frameworks such as the Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, while well-intentioned, are inconsistently implemented (Sharma and Mohanpuria, 1996).

Cultural norms play a role as well, where risk-taking behaviour and fatalistic attitudes towards accidents are normalised (Teye-Kwadjo, 2019). Combined, these factors make it difficult to build a unified safety culture. Addressing H&S challenges in this

sector requires not only improved formal training and enforcement, but also recognition of informal practices that shape worker behaviour and decision-making on site (Aboagye-Nimo and Raidén, 2019).

The Role of Informal Training

Informal training, often peer-driven and experience-based, is a common means of transferring safety knowledge in construction (Hofmann and Stetzer, 2016). While this method helps create a strong sense of teamwork, it is inconsistent and varies widely depending on the knowledge of more experienced workers.

Informal training plays a critical yet often under-recognised role in the construction industry, particularly in low- and middle-income countries like India (Panneer *et al.*, 2019). It refers to unstructured, experience-based knowledge transfer that occurs outside formal educational settings, typically on-site, peer-led, and learned through observation, imitation, and practice (Aboagye-Nimo and Raidén, 2019). In contexts where formal H&S training is scarce or inaccessible, informal methods become the default mode of learning for unskilled workers.

Informal training has been widely known to facilitate quick adaptation to tasks and also improves camaraderie among workers (see Acheampong *et al.*, 2024). It often aligns more closely with the practical realities of the construction site, enabling immediate application. However, its informal nature also leads to inconsistent H&S practices and knowledge gaps, as workers may learn from peers who themselves lack formal training or up-to-date knowledge of H&S protocols.

While informal training can enhance teamwork and shared responsibility, it often fails to instil a deeper understanding of risk, legislation, or long-term safety implications (Lingard and Holmes, 2001). As such, reliance on informal methods without integration with formal training can perpetuate unsafe practices (*ibid*). Bridging these systems could help enhance safety outcomes by combining contextual relevance with structured guidance.

Bridging Informal and Formal Training Approaches

There is growing recognition in the literature that a rigid divide between informal and formal H&S training can limit overall effectiveness, especially in complex, high-risk sectors like construction. Researchers (Billett, 2002; Eraut, 2004) argue for a more integrated model that leverages the strengths of both approaches. They further argue that informal training is valued for its immediacy, contextual relevance, and accessibility, particularly for unskilled and low-literacy workers. In contrast, formal training offers standardised knowledge, regulatory compliance, and a platform for structured learning. However, without integration, formal training often fails to resonate with site realities, while informal training lacks the rigour needed to prevent unsafe practices.

In India's construction sector, where informal learning dominates, bridging the gap requires aligning formal programmes with workers' everyday experiences. Studies (such as Panneer *et al.*, 2020) advocate for hybrid models that include hands-on demonstrations, storytelling, mentorship, and visual aids. The above methods mirror informal learning but are embedded within formal frameworks. This also creates teams that are resilient and adaptable during uncertainty. The blended strategies can develop deeper engagement, better retention, and a more inclusive safety culture. By recognising and validating the role of informal learning while providing structure and

reinforcement through formal means, the industry can promote more consistent and effective H&S practices across the workforce.

Adaptability and implications on H&S practices

Working teams and their adaptability are crucial to the safety of workers and their surroundings (Aboagye-Nimo and Raidén, 2019). There are three types of team competencies required for success: knowledge (cognition), attitude (feelings), and skills (behaviours) (Salas *et al.*, 2008). The above traits will inform the empirical phase of this study to help in give the research project a better understanding of how workers stay safe and more importantly, how H&S knowledge is passed on informally. Considering that construction work environments are dynamic work; it is imperative that workers possess the quality of adaptability for success in H&S and a successful project overall.

Considering the high-workload and time-pressured situations, adaptability becomes the key trait that can help workers create and maintain a positive safety culture (Burke *et al.*, 2006). Successful adaptation requires anticipation and recognition, all of which require several factors both internal to the individual and external (Malakis *et al.*, 2010). Due to the informal nature of the training and H&S practices (due to organisational structures, financial constraints etc.), workers must be able to anticipate risks in a dynamic setting to appropriately manage them.

The Heuristic Framework of team adaptation by Stagl *et al.* (2006) offers a lens to explore the individual aspects of team practices by acknowledging the plethora of factors that lead to overall success i.e., developing and maintaining a positive safety culture. Figure 1 shows that individuals, teams and job characteristics shape the emergent cognitive and affective states of the projects. Since a lot of training offered to individuals is done on the site by their respective teams and is also, determined by job characteristics, this model fits the research context sufficiently. In this instance, the team situational awareness and mental models will be beyond the scope of the study although some aspects may be coincidentally revealed in the empirical phase of the work. The adaptation as a process is iterative thereby feeding into each other and thus workers learning from each situation or encounter (see Figure 1).

Using Figure 1 as a tool for exploring the Indian construction sector, it is evident that several factors play a role in shaping an individual's personality, in this case knowledge, traits, attitudes and cognitive ability. The knowledge that the workers mainly acquire in this context is informal. However, their attitude towards learning and their cognitive abilities will play a key role in in the shaping of their overall H&S knowledge. Furthermore, as the team learns and adapts, there is a cyclical loop that feeds back to start the cycle again. In a formal setting, the lessons learnt would have been documented or recorded but, in this situation, most practices are presumed to be done informally and thus losing the opportunity to explicitly capture the learning and training. While the unit of analysis for this research is for the individual (thus not the team), findings will explore how the individuals perceive their personal training and knowledge in the context of individual and team adaptability as well as overall H&S.

After the critical consideration of the conceptual components of informal training and its impact on site practices as well as the overall adaptability of individuals and teams, the next section presents the methodological approach adopted for the empirical phase of the research.

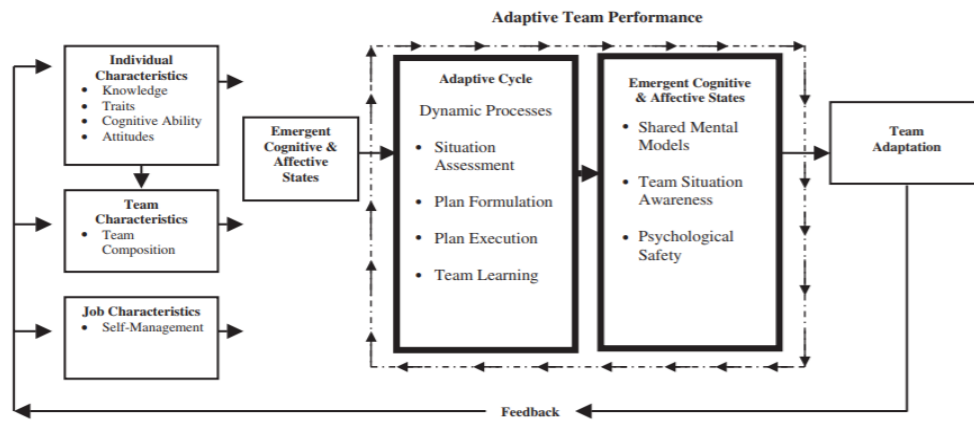


Figure 1: Heuristic Framework of Team Adaptation (Stagl et al., 2006)

METHOD

This study adopted a qualitative research design to explore how unskilled construction workers in India acquire and perceive H&S training, with particular attention to informal practices. A qualitative approach was appropriate given the need to understand worker's lived experiences, beliefs, and behaviours within the context of their socio-cultural and economic environments.

Data collection was undertaken through semi-structured interviews conducted with ten participants, comprising eight unskilled labourers and two site supervisors, across various construction sites in Mumbai, India. Participants were selected using purposive sampling to ensure representation of individuals with practical, on-site experience and differing levels of exposure to both formal and informal H&S training. The interviews were conducted in Hindi and later translated into English for analysis. An independent native speaker reviewed the transcriptions, and interview notes to ensure the meaning of the responses were not lost through the translation process. Each interview lasted between 30 to 45 minutes and followed a flexible guide that allowed participants to elaborate on their training experiences, perceptions of safety, and sources of knowledge.

The unit of analysis for this study was the individual worker, not the team or the broader construction site. This focus was critical for capturing the nuanced and personal experiences of unskilled labourers whose H&S learning often occurs informally through peer interaction, observation, and trial-and-error. By centring on individuals, the study aimed to uncover the personal coping strategies and informal learning mechanisms that may be overlooked in site-level or policy-driven H&S assessments.

Thematic analysis was employed to interpret the qualitative data. Transcripts were coded using NVivo using an inductive approach to identify recurring patterns and themes related to training practices, risk perception, and communication dynamics. Codes were refined through iterative readings, and themes were developed based on frequency, significance, and relevance to the research objectives.

Informed consent was obtained from all participants, and anonymity was ensured by using pseudonyms (see Table 1). Participants were briefed about the purpose of the study, and interviews were conducted in locations and at times convenient to them. Cultural sensitivity and respect for local norms were maintained throughout the research process.

FINDINGS AND DISCUSSION

There was a wide range of participants, and the general roles and Table 1 covers pseudonyms and roles of the participants who were interviewed.

Table 1: Overview of the interviewees

Name	Pseudonym	Role in industry	Years of experience	Formal training
Labourer 1	L1	General Labour	9	No
Labourer 2	L2	General Labour	15	Yes
Labourer 3	L3	Demolition	10	No
Labourer 4	L4	General Labour	8	Yes
Labourer 5	L5	Interior Design	8	No
Labourer 6	L6	Joiner	12	Yes
Labourer 7	L7	Grounds Work	14	No
Labourer 8	L8	Masonry	6	No
Site Supervisor 1	SS1	Supervisory	20	Yes
Site Supervisor 2	SS2	Supervisory	16	Yes

Prevalence of Informal Training

Interviews reveal that most workers acquire H&S knowledge through direct observation and peer instruction. Experienced workers take on a mentorship role, but their knowledge is not always based on formal guidelines, leading to gaps in H&S protocols. When interviewees were asked about their training and backgrounds in their roles, some of them were quotes as follows:

"I have never been formally health and safety trained, and the only safety instructions[training] I get are informal." L1

L1 had 9 years of industry experience but all the instructions he had received were informal. In his general labourer role, he had never any formal training. However, he clarified that he had received informal instructions. In a related context, L3 added that supervisors remind them of H&S practices but indicated it was not effective as it was often unstructured thereby making the ad-hoc nature reduce its effectiveness. He was quoted as follows:

"Although supervisors occasionally remind us about basic safety practices, the information is rarely structured." L3

L2 had had formal training but he believed he required some form of refresher training considering the dynamic nature of the industry and, site practices. He stated: *"The initial training was good. Unfortunately, frequently I am of the belief that due to a very changing interior environment constantly, additional training would be helpful."* Although he values the training he had received, he believes additional training is very important. Knowing he needs periodic training considering changing site and project conditions indicates his appreciation for the training process. Panneer *et al.* (2019) extensively documented the prevalence of informal training practices in India and offered insights on how this can be improved and how other emerging economies could learn from such approaches.

One observation from the data showed that formal training often came with provision of appropriate PPE as some training practices are centred on the appropriate use of the equipment. L2 stated that due to financial/resource constraints, there are instances where there is PPE shortage. He stated: *"Sometimes there is a shortage of equipment at work, and that places us in higher danger of being injured."*

When probed further, he stated that having a formal training gave him the ability to identify the right PPE and appropriate way to use it.

Strengths and Weaknesses of Informal Learning

Workers expressed appreciation for informal learning due to its immediacy and relatability. However, supervisors highlighted concerns about its inconsistency and the potential reinforcement of unsafe practices.

One supervisor SS1 recalled his own practices: *"While I remember the key points from my initial training, I often find myself wishing for refresher courses or more in-depth sessions."*

With some responses, it was evident that some workers without formal training often blurred the lines when it came to the use of PPE. L7 casually stated that PPE use is sometimes dependent of availability and not necessarily based on the task at hand.

"We use PPE only when it is available." L7

In an ideal situation, he should refrain from undertaking a specific task if it required PPE that was not available. Although it can be argued that financial constraints have led to such decisions, it is important to acknowledge that if he knew the implications of certain hazards, he would not consider using PPE only when available as stated. The lack of proper use and unavailability of PPE has been highlighted by previous studies (Boakye *et al.*, 2022) and this finding confirms how widespread an issue this is.

With informal H&S learning and training comes lack of formal communication channels. L4 who had received formal H&S training stated that he was not always comfortable raising some concerns. He believed it created more potential problems than solutions. He stated that he was hesitant to raise such issues due to potential issues that would be dragged up.

"I always hesitate to bring up the safety issues because maybe they will create some conflict." L4

L3 shared a similar concern: *"I am hesitant more often than I would like to speak up and initiate conflict or offense."*

For others who had managed to raise concerns on some occasions such as L6, he believed there was not always a positive response to the issues.

"The management does not always act on our concerns promptly." L6

While there were several negative views on how informal H&S practices play out on sites, there were some good aspects about it. L8 believed the situation of informal training created a space for him to continuously ask about matters he was not sure of. He stated that it helped him continuously ask questions:

"I like the informal sharing of knowledge on site because it gives me a chance to ask and clarify some things that I am unsure about." L8

This informal opportunity allows for experienced workers to teach less experienced workers without having to formalise their arrangements. This approach is crucial to having workers learn continuously. Workers expressing greater reliance on peer-led instruction and on-the-job demonstrations, which they found more relatable and practical. The value of this practice was also identified by Aboagye-Nimo *et al.* (2015).

Potential for Integration

Supervisors and workers acknowledged the benefits of combining formal and informal training. They suggested that structured H&S workshops could be incorporated into daily site activities, using experienced workers as facilitators to ensure relevance and engagement. SS1 stated that he felt fortunate that he received formal training. He stated: *"I consider myself fortunate to learn from my experienced co-workers."*

From the above, it is evident that SS1 greatly values the knowledge acquired from peers (often informal); a practice encouraged by Aboagye-Nimo *et al.* (2015) in promoting the use of tacit knowledge in accident prevention on site. Before SS1 became gained his supervisory role, he believed he learnt a lot from experienced workers. He appreciated the formal training he received, and the subsequent informal training acquired from his colleagues.

SS2 added that he believed combining the two regularly was the most effective approach especially in the situation where culture and resource scarcity were very influential in shaping project H&S. He stated that:

"The most effective way to change our working conditions would be to set up a regular schedule of safety meetings and training sessions." SS2

L2 who had a very extensive experience in the industry and had also received formal training pointed out some of the issues with the refresher training practices. He believed that they were generic and were not context specific enough.

"While we have health and safety training every year compulsorily, the content is usually very general and superficial in nature." L2

He had previously indicated how additional training was a necessity. By adding the above, he clarifies that the training must be effective and must also consider the working conditions. Without tailoring methods to workers' socio-cultural contexts and integrating informal practices, formal training alone is unlikely to create the robust safety culture required on construction sites (Billett, 2002). L5, who had had no formal training, explained that he had learnt of risks and hazards through observation of more experienced workers.

"I am somewhat aware of major risks, like falls or tool-related injuries, my understanding is thus acquired through observation and experience than education." L5

He indicated that he was somewhat aware of the major risks, thus indicating a limited level of confidence in his learning approach. Understandably, confidence comes with years of experience and continuous practice thereby leading to continuous improvement. In an alternate response, L8 stated that he was comfortable using informal means to communicate his concerns unlike L4 and L3 who felt intimidated to do so. He stated that:

"I feel somewhat at ease raising my concerns if I find unsafe practices, especially if others are doing it, too." L8

L2 added that productivity often took precedence over good practices. He stated that resources for formal training resources were limited and, other project pressures are often prioritised over H&S. He was quoted as follows: *"Resources for good training are at a minimum and often considerations of productivity override safety."*

With his years of experience, he had noticed that project completion was often the priority. SS2 added that safety cultures get disrupted when workers move across

projects especially when they have different training backgrounds e.g., no formal training versus formal training. He stated that:

"I see my colleagues switch to different projects very often, disrupting our continuity in training." SS2

Using Stagl *et al.* (2006) Heuristic Framework of Team Adaptation, teams that have workers with different attitudes and differing goals will reduce the team's adaptability thereby reducing overall team and project H&S.

While situations force some teams to adopt informal practices and training, it is important to note that there are some limitations. This confirms revelations presented in the literature review (Panneer *et al.*, 2019).

CONCLUSION AND RECOMMENDATIONS

In this paper, the often-overlooked role of informal training practices within the Indian construction sector was explored, with a focus on how these mechanisms sustain knowledge transmission and skill development among labourers. Despite the sector's heavy reliance on informal labour, there is a distinct lack of formal training pathways, making informal systems like on-the-job learning, imitation, and peer-to-peer guidance vital for workforce productivity and H&S.

The findings of the study suggest that these informal practices are not merely coping mechanisms but rather culturally embedded, dynamic systems that respond flexibly to the industry's needs. However, their unstructured nature also raises concerns about consistency, quality assurance, and the long-term professional development of workers. The research highlights the urgent need for policy interventions that recognise, support, and potentially formalise aspects of this informal learning, without erasing the organic knowledge-sharing networks that have evolved over time.

This research contributes to the broader conversation on construction labour, skills, and education in the Global South, advocating for a more nuanced understanding of how training unfolds in practice and the need to bridge the gap between formal frameworks and the lived realities of construction workers.

REFERENCES

- Aboagye-Nimo, E and Raidén, A (2019) Challenging Standardisation by Embracing Ambiguities of Site Safety: The Case of Micro Construction Firms, *In: Gorse, C and Neilson, C J (Eds) Proceedings of the 35th Annual ARCOM Conference, 2-4 September 2019, Leeds, UK, Association of Researchers in Construction Management*, 546-555.
- Aboagye-Nimo, E, Raidén, A, King, A and Tietze, S (2015) Using tacit knowledge in training and accident prevention, *Proceedings of the Institution of Civil Engineers-Management, Procurement and Law*, **168**(5), 232-240.
- Acheampong, A, Adjei, E K, Adade-Boateng, A, Acheamfour, V K, Afful, A E and Boateng, E (2024) Impact of construction workers informal safety communication (CWISC) on safety performance on construction sites, *Engineering, Construction and Architectural Management* [Ahead of Print].
- Billett, S (2002) Critiquing workplace learning discourses: Participation and continuity at work, *Studies in the Education of Adults*, **34**(1), 56-67.

- Boakye, M K, Adanu, S K, Coffie, G H, Adzivor, E. K and Ayimah, J C (2022) Building construction artisans' level of access to Personal Protective Equipment (PPE) and the perceived barriers and motivating factors of adherence to its use, *Journal of Environmental and Public Health*, **2022**(1), 4870731.
- Burke, C S, Stagl, K C, Salas, E, Pierce, L and Kendall, D (2006) Understanding team adaptation: A conceptual analysis and model, *Journal of Applied Psychology*, **91**(6), 1189-1207.
- Eraut, M (2004) Informal learning in the workplace, *Studies in Continuing Education*, **26**(2), 247-273.
- Fang, D and Wu, H (2020) Economic analysis of safety and health investment returns in construction, *Journal of Construction Engineering and Management*, **146**(2), 04019096.
- González, V and Martínez, A (2021) Innovative technologies for enhancing safety in construction, *Automation in Construction*, **125**, 103540.
- Rani, M J (2021) Indian construction industry progress since 1995, *In: Construction Industry Advance and Change: Progress in Eight Asian Economies Since 1995*, Bingley: Emerald Publishing Limited, 43-62.
- Gupta, R K (2021) A study on occupational health hazards among construction workers in India, *International Journal of Enterprise Network Management*, **12**(4), 325-339.
- Hofmann, E and Stetzer, A (2016) A cultural approach to safety in construction: Leading the change, *Journal of Safety Research*, **60**, 23-30.
- Hofmann, E and Stetzer, A (2016) A cultural approach to safety in construction: Leading the change, *Journal of Safety Research*, **60**, 23-30.
- Lingard, H and Holmes, N (2001) Understandings of occupational health and safety risk control in small business construction firms: Barriers to implementing technological controls, *Construction Management and Economics*, **19**(2), 217-226.
- Malakis, S, Kontogiannis, T and Kirwan, B (2010) Managing emergencies and abnormal situations in air traffic control (part 1), *Applied Ergonomics*, **41**(4), 620-627.
- Panneer, S, Acharya, S.S and Sivakami, N (2019) *Health, Safety and Well-Being of Workers in the Informal Sector in India*, Singapore: Springer Nature.
- Salas, E, Cooke, N J and Rosen, M A (2008) On teams, teamwork and team performance: Discoveries and developments, *Human Factors*, **50**(3), 540-547.
- Sharma, S D and Mohanpuria, K L (1996) *the Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Ordinance, 1996*, The Gazette Notification of Ordinance No 3.
- Stagl, K.C, Burke, S, Salas, E and Pierce, L (2006) Team adaptation: Realising team synergy, *In: C S Burke, L G Pierce and E Salas (Eds) Understanding Adaptability: A Prerequisite for Effective Performance Within Complex Environments*, London: Elsevier, 117-141.
- Teye-Kwadjo, E, 2019 Risky driving behaviour in urban Ghana: The contributions of fatalistic beliefs, risk perception and risk-taking attitude, *International Journal of Health Promotion and Education*, **57**(5), 256-273.