

A Review of the State of the Art on Health and Safety Management in Ghana

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Abstract

The construction industry plays an important role in contributing to the economy and development worldwide. The state of affairs concerning health and safety in the construction industry needs attention. In most countries, the industry is the second largest contributor to Gross Domestic Product (GDP) after agriculture. However, despite the importance of the construction industry for the national economy, the activities in the industry sadly pose serious health and safety risks to workers and users of construction facilities. The study therefore aims to examine the health and safety management practices relating to construction operatives. A comprehensive review was conducted using Scopus, Web of science, Litmaps and Research Rabbit databases to examine the health and safety management practices of construction operatives in the last two decades. Content analysis was conducted using the 17 documents retrieved from the database search. The study identified behaviour and attitude of workers towards safety, communication, training and safety programmes as the main findings. The study provides practical knowledge to construction stakeholders in minimising health and safety risk to construction operatives to ensure sustainability. It will also help the scientific community to know what still needs to be done to further advance knowledge on health and safety management practices.

Keywords: Health, Safety, Construction industry, Construction operatives, Health and Safety Practice

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Introduction

The construction industry is known to be a significant employer (Agyekum et al., 2022). The industry contributes largely to the global market. The Bureau of Labour Statistics (2017) noted that in the United States of America (USA), construction workers account for about 4.3% of the labour force, while on the average the United Kingdom (UK) employ about 10% into the construction industry. Despite its major contributions to GDP globally, the industry is prone to accidents due to its multiple activities. Accident records in this industry is the highest compared to other industries. (International Labour Organisation, 2018). The sector is estimated to account for over 100,000 fatalities annually (International Labour Organisation, 2015). It also accounts for all work-related fatalities between 30 and 40% (Luo et al., 2022; Sunindijo and Zou, 2012). The industry therefore performs poorly in terms of health and safety as a result of these fatalities (Agyekum et al., 2021). Developing countries even have worse Health and Safety records (Manu et al., 2018). Unfortunately, these accidents are mostly unreported (International Labour Organisation, 2017). Construction workers therefore are at a constant risk of work related ill-health. Some of these adverse health risks include musculoskeletal injuries (related to hand-arm movements sometimes affecting the back, knee and hip problems due to lifting and carrying), respiratory diseases such as asthma, skin infections and other associated injuries. The adverse effects of these problems include work absenteeism, schedule delays, increased medical expenses as well as loss of income and productivity and sometimes, early retirement (Yu et al., 2021; Umer et al., 2017a). One of the most vulnerable workers in the industry is the operative who works mostly in dangerous positions (King, 1990). Ignorance to health and safety practices is one of the biggest challenges for construction operatives. Majority of construction operatives do not know about the significance of health and safety practices in their day to day life on site and their rights to health and safety. This causes them not to take health and safety issues seriously (Oni et al., 2019). Majority of them (i.e., construction workers), particularly, the unskilled labourers have little or no knowledge about safety. This may be due to the nature of construction work which may require the services of these labourers for brief periods of time (Oni et al., 2019). Some are employed for just a day and this might be challenging for employees (to possess the necessary knowledge about health and safety). Owing to the persistently high number of adverse health risks, (e.g., accidents and fatalities), health and safety has remained an utmost issue of concern within the construction industry (Ajayi et al., 2021).

Health is the process of safeguarding the minds as well as the bodies of people from illness resulting from mishandling materials, procedures and processes involved in the workplace. Safety involves the process of preventing bodily harm to people (Meenakshi, 2019). In order to improve the health and safety of the workforce, it is imperative that health and safety management practices are implemented. Health and safety management is vital in the construction industry in enhancing the industry's future. The objective of health and



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safety management is to carry out tasks in a safe manner while concentrating on reducing accidents (Oni *et al.*, 2022; Zhou *et al.*, 2012). This includes a variety of programmes designed to monitor and reduce occupational risks within the industry while implementing protective and mitigating actions (Oni *et al.*, 2022). Numerous studies have been conducted on construction safety regulations, procedures, and enforcement. However, the main areas of focus have been worker attitudes and behaviour, work environment conditions, causes of accident and the availability of health and safety training (Adebayo and Emoh, 2019; Zhou *et al.*, 2014; Ajayi *et al.*, 2021; Umeokafor *et al.*, 2014; Abubakar and Tsanyawa, 2021). This paper presents a review of pertinent literatures to highlight the various health and safety management practices for operatives on site. The study aims to provide a systematic review of research conducted over a period of ten years (2013-2023) on the health and safety management practices for construction operatives in the construction industry. The main goals of the review are (i) to look into health and safety management practices for operatives in the construction industry, (ii) to look at publication trends and (iii) suggest future directions for further research. The conclusions from the review can provide insights into what has been done and what still needs to be done to further advance knowledge on health and safety management practices. This study will help the scientific community to know what still needs to be done to further advance knowledge in health and safety.

Literature Review

Occupational health and safety is the study of potential risk to the safety of operatives that arise in or from the workplace and are anticipated, acknowledged, assessed and controlled (Adebayo and Emoh, 2019). Predominantly, occupational health and safety is of utmost importance for all industries, including the construction industry. However, the major concern for most people has been the accidents, injuries and fatalities workers are exposed to, which is quite prevalent in this industry. Notwithstanding, some measures have been put in place to combat these recurring incidents but they are not enough. The construction industry is tagged as one of the most accident-prone industries due to the number of accidents and fatalities being recorded. This is particularly true in developing countries. The table below (Table 1) shows statistics of accidents and fatalities in some countries.

Table 1: Construction accidents and fatalities in some countries

Country	Description of the status of construction safety
United State of America	The construction sector accounted for over 800 worker related and 5,333 fatal occupational injuries in 2019 (Bureau of Labour Statistics, 2020)
United Kingdom	An average of 143 deaths and 1.4 million related ill-health per year between 2015/2016 – 2017/2019 (Health and Safety Executive 2020)



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China	There were 1,752 deaths in the industry within the first half of 2018 (Ministry of Emergency Management of the People's Republic of China, 2019)
Qatar	Between 2012 and 2014, over 500 construction site deaths in Qatar were reported to be of Indian descent (Gibson, 2014b)
Nigeria	236 construction workers of different trades reported high level of accidents and fatalities (Okoye, 2018)
Australia	The construction industry in Australia had the highest work-related illness rate (59 per 1000 employed persons) in 2017-2018 (Australian Bureau of Statistics, 2018)

Source: Adapted from Zhou *et al.* (2012)

The componential aspects of the construction industry are dynamic, transient, and intricately interrelated, in contrast to other industrial work environments (Borys, 2012, Albert *et al.*, 2014, Arslan *et al.*, 2019). At different phases of the construction process, the size and type of facilities, plant, machinery, and equipment change (Edwards *et al.*, 2003). Due to weather conditions and the proximity of fast-moving traffic, site layout is unique and unpredictable for horizontal construction projects; however, working at heights and/or with subterranean utilities for both horizontal and vertical construction projects changes the working environment into different risk and hazard exposure levels (Guo *et al.*, 2015, Sadeghpour and Andayesh, 2015).

On construction sites, there has been a noticeable increase in unsafe practices. It is not uncommon for project sites to disregard the necessary health and safety protocols and neglecting to take preventive measures such as wearing safety gear. According to Awwad *et al.* (2016), poor assistance from safety managers, lack of a suitable monitoring system, and a low level of safety knowledge, all adversely affect the implementation of health and safety procedures. Workers' knowledge and comprehension of health and safety at work enhances safety of workers on construction sites (Shamsuddin *et al.*, 2015). The relationship between individuals and organisations involved in construction projects is also project-based and short-lived due to the high turnover and regular work team rotation of the work force (Swallow and Zulu, 2019).

Construction operatives sometimes referred to as trade workers are constantly being exposed to various degrees of hazards and fatalities due to the nature of the work they do and their level of involvement. Some are, however, exposed to more health and safety challenges than others due to the fact that the content of risk of each worker's assignment differs from trade to trade. Construction operatives work in teams or group which consist of skilled, semi-skilled and labourers with different degrees of job experience and awareness of health and safety matters. Some operatives are more exposed to accidents than others. In 2015, Choi reported that in the USA, the trade groups who were highly prone to site hazards and accidents in the construction industry were carpenters, labourers, operators and steel/iron workers. It was reported that operatives whose tasks involved lifting, such as the masons and their labourers



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were exposed to injuries like musculoskeletal disorders/injuries. The vulnerability of these operatives to hazards, injury and accidents reflect their level of involvement in delivering construction works. It has been reported that the main causes of accidents are as a result of poor management practices (i.e. inadequate supervision), inadequate safety management systems, pressure to meet production targets, communication issues (i.e. between shifts, personnel and management), excessive working hours, which results in mental fatigue, inadequate reporting systems, complacency, violations/ non-compliance behaviour, improper maintenance of tools and equipment, updates to equipment without the knowledge of the operator among others.

Safety management, according to Kirwan (1998), is concerned with real procedures, responsibilities, and duties related to staying safe. Typically, it is implemented using various safety management techniques as well as the organization's safety management system (Agyekum *et al.*, 2018). Safety management procedures of construction industries vary from nation to nation because of the cultural variations in both developed and developing countries (Ali *et al.*, 2009; Ismail *et al.*, 2012). According to Choudhry *et al.* (2008), a business must adopt safety procedures that satisfy the changing demands of the construction sector if it wants to stay competitive. Implementing good health and safety management practices reduces the number of injuries to operatives and personnel in the workplace through control and prevention of workplace hazards. It reduces production interruptions, material and equipment damage, the risk of major accidents, cost of insurance as well as the cost of absenteeism. It also minimises legal cost of accident litigation, fines, expenditures on emergency supplies, accident investigation time and the loss of expertise and experiences (Choudry *et al.*, 2008). In order to fully benefit from safety and health, construction and client organisations must use excellent safety management procedures such as health and safety training induction programmes for new workers, implement health and safety plans, effective communication on site with government and client support.

This review makes it clear that health and safety precautions are required in the workplace to protect workers' health and safety well-being in order to: preserve and enhance work quality and productivity. This may further minimise labour turnover and absenteeism, reduce indiscipline and accidents, boost employee morale and motivation, lower operational costs and spoilage, and protect workers' physical and mental health. But in order for this to happen, a strong system and programme for managing health and safety issues needs to be implemented. These safety plans include having a written safety policy, allocating and organising responsibilities for these issues, educating staff, making sure there are first aid facilities, as well as providing the necessary procedures and documentation (Eze *et al.*, 2020). In the past, workplace safety concerns have received greater attention than health issues, but as work environments began to change, health issues also become an area of concern. In recent years, there has been a growing recognition of the connection between well-being and the workplace (Aditya *et al.*, 2018). Workplace well-being is defined as the



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characteristics of the workplace that promotes healthy behaviour, improve health outcomes and strengthen workplace culture (Radzi et al., 2023). Laine and Rinne (2015) defined well-being as an employee's holistic mood and emotions related to their job which includes physical, mental, and social aspects of health. Well-being involves every aspect of working life, including the quality and the safety of the environment as well as how workers feel about their jobs (International Labour Organisation, 2022). A poor workplace well-being leads to project failures and decreased productivity. Approximately 73% of construction workers do not have adequate support from well-being issues based on a survey (Radzi et al., 2023). This assertion links to health and safety management practices where workers do not have adequate support from their superiors and which leads to low productivity. Workplace well-being issues on construction sites, which adversely affect productivity, include bullying and harassment, work pressure, emotional and physical demands (Rouhanizadeh and Kermanshachi, 2021). They found that the effective ways that can enhance workplace well-being issues and reduce their negative effects include having the support of supervisors and communication among co-workers. Poor working conditions such as dirt, natural lighting, ventilation and noise as well as the organisational structure may affect maintaining excellent workplace well-being in construction work compared to white-collar jobs (Eaves *et al.*, 2016). Some well-being issues such as stress and anxiety account for more absenteeism than accidents, flu and other diseases.

Past studies indicate that physical, psychological and social well-being are the primary factors for a good workplace well-being. Some physical factors affecting workplace well-being include healthy food, comfort at the rest area, workload and transportation facilities for construction workers. Psychological factors include general safety and health monitoring, worker facilities, project progress, insurance for construction workers, workers' welfare, salary package, working hours, working environment, timeline of salary payment and planning of the project. Social factors include communication between workers, worker work monitoring, collaboration between top management and workers, project leadership and relationship between top management and workers. These three factors positively affect workplace well-being. The well-being of workers cannot be simply solved by training and giving them more resources to care for themselves but by creating a supportive workplace atmosphere where stress and emotional exhaustion caused by role uncertainty and ambiguity is minimised. By comparison, construction workers are more at risk (i.e., a shorter life expectancy) and with poorer health and well-being outcomes (Du Plessis *et al.*, 2013; Chung *et al.*, 2019; HSE, 2019).

Research Methodology

A literature review study is not merely a report on the references. Instead, this type of study synthesizes the results from individual studies to produce a coherent and integrated argument about one research subject. A systematic review uses clear, detailed methods to



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find, select, evaluate and combine a set of research studies on a well-defined topic. Unlike the narrative review, systematic review makes the findings less vulnerable to the biases of a single researcher (Robson *et al.*, 2007). It provides a clear-cut and reproducible research framework (Martinic *et al.*, 2019). The systematic review method has been used extensively in the medical field, but in recent years, it has gained widespread interest in other disciplines, including construction management (Mok *et al.*, 2015). This study adopted the systematic review as a methodological approach to review the existing health and safety management practices to discover useful findings and identify knowledge gaps for future research. The search is aimed at compiling the right publications related to health and safety management practices for construction operatives. A preliminary search was conducted where journals which had the highest number of papers were targeted for a secondary search which was used to select literature based on publication types and criteria. The papers were coded and analysed to have an overview of health and safety management practices for construction operatives. The search was limited to articles relating to the construction industry. The process is shown in the figure below.

Table 2: Search results in the four databases

Database	Scopus	Litmaps	Research rabbit	Web of Science
No. of Papers	3	16	4	2

Scopus and Web of science

A total of seven (7) peer reviewed journal articles published between the years 2013-2023 were retrieved from the keywords on health and safety management practices for construction operatives were selected and analysed. The desktop search was conducted using four databases including Scopus, Litmaps, Research rabbit and Web of Science. The comprehensive desktop search was undertaken using the title/abstract/keyword field of the database. Scopus is one of the most influential and widely used research databases (Hasan *et al.*, 2021; Markus, 2011). The keyword/title entered in the search field was ‘health AND safety AND management AND practices AND for AND construction operatives’. The search was limited to include results only related to construction. The strategy to restrict the search to construction provided meaningful and relevant results. Eight documents were retrieved from the database in relation to the keywords which were entered. The types of documents received were six articles, one review paper and one conference paper from Scopus. Three peer reviewed articles were retrieved from Web of Science out of which two were used after screening. Duplicates were unavoidable among the papers due to adopting overlapping databases and applications. The duplicates were removed and a total of three papers remained.

Litmaps and Research Rabbit

Another tool which researchers can use to gain insights in their field and to identify gaps



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in knowledge is the Litmap mapping tool, which means 'Literature map.' It is a visual tool that shows the relationships between different concepts in literature (Sulisworo, 2023). It is an application tool that can be used to track the growth of research ideas. The keywords entered into the search were health and safety management practices for construction operatives. Five articles were retrieved out of which one key paper was used as the seed article. From the seed article, 21 articles were retrieved and screened to suit the research topic and the years which were being used for the study. Out of the 21 articles, 16 were used for the study. Litmaps assists in focusing the researchers' paper search by using keywords, citations, or both. It also notifies users when new articles related to the map are released. The ability to visualise literature maps with important articles from desired study in a variety of visualisation modalities is made possible by Litmaps (Amanpreet *et al.*, 2022). Since the size of the node is inversely correlated with the log of the citation count, papers with higher citation counts have larger circles. Researchers can see the connections between various research topics by using the Map Mixer (Amanpreet *et al.*, 2022). Research rabbit is another cutting edge online tool for "citation based literature mapping". It is similar to Litmaps where a seed paper is used to draw out papers which are pertinent to the topic. The same keywords were used in search of articles relating to health and safety management practices for construction operatives. Eight articles were retrieved out of which four were used for the review after screening. Keywords, abstract and title of the papers selected were used to select the literature. The keywords entered into litmaps were HEALTH AND SAFETY MANAGEMENT PRACTICES FOR CONSTRUCTION OPERATIVES. Five journal articles were retrieved. The articles were screened and 4 articles were within the year range which is 2013-2023. These articles were in line with the keywords. From the five articles, one paper was used as the seed article (Ajayi *et al.*, 2022) out of which 21 peer reviewed articles were retrieved. These were also screened, out of which 12 articles were in line with the keywords and the year range. A total of 16 publications were retrieved from Litmaps.

Results

Citations

In selecting the literature, the following information was looked at: year of publication, country where the study is being conducted and publications with the highest impacts.

Year profile of publications

An examination of yearly publications might help researchers determine how much interest there is in a particular field. From the papers selected, the earliest ones concerning health and safety management practices were written in 2014 by Sherratt (2014) and Shin *et al.*, (2014). Sherratt's article was published in Construction management and Economics Journal. The study focused on using zero as policy and a target to bring change to health and safety management on UK construction sites. Shin *et al.* (2014) in his study set out to create a system dynamics (SD) model of workers' mental processes in order to examine feedback mechanisms and the ensuing dynamics pertaining to workers' safe behaviours and attitudes.



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From the year 2013 to 2020, the number of significant papers published annually was fewer than ten. Generally, the number of relevant papers has been increasing gradually since 2021 making the overall trend on health and safety management practices surge. In total, eight papers have been published between 2021 -2023 giving an indication of the growing awareness and attention being paid to health and safety management practices.

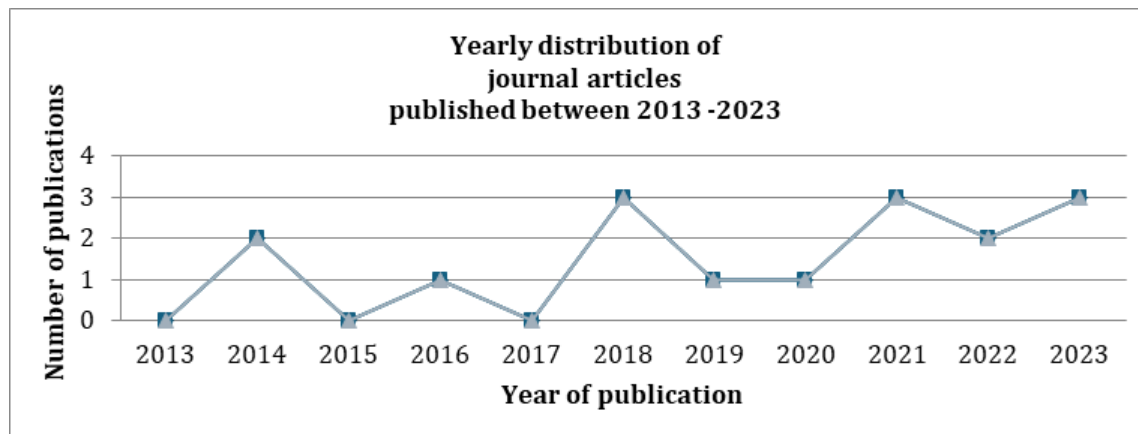


Figure 1 Year profile of publications

Publications by Country

This study focus was based on the areas where the research took place. The continents represented were Europe, Asia, North America, Australia and Africa. From observation, many of the studies involving the construction industry were from the United Kingdom (Sherrat, 2014;Oswald et al.,2020, Ajayi et al., 2022; Oswald et al.,2018; Bayramova, 2023; Sherrat and Raiden, 2023). In general, nine countries were covered in the papers selected. Almost 40% of the studies were conducted in the United Kingdom (U.K), followed by the United States of America which was about 20%. Other recognised countries include China, Saudi Arabia, Nigeria and Australia. Asia is rising in the area of health and safety management practices. Publications from Africa were few.

Publications with the highest impact

Practitioners and researchers can learn about important knowledge sources in the field by studying information on the most quoted publications on health and safety management practices. The citation analysis was conducted on seventeen documents to find the most frequently cited works in the field of health and safety management practices. Table 3 presents the top five (5) documents with the highest impact in health and safety management practices in the construction industry showing the presence of early development and broad expansion within the field of research. Shin et al (2014) aimed to develop a system dynamics (SD) based model of construction of construction workers' mental processes that can help analyse the feedback mechanisms and the resultant dynamics regarding workers safety attitudes and safe behaviours. The developed mode was applied to examine the effectiveness of three safety improvement policies which were incentives for safe behaviours, increased



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levels of communication and immersion in accidents. Guo *et al.*(2018) had the second highest citation impact. The others are Schwatka and Rosecrance (2016), Choi and Lee (2018) and Basahel (2021).From the diagram, the bigger node indicates a higher citation and the smaller node shows a lower citation. Shin *et al.* (2014) had the highest citations (348), which was followed by Guo *et al.* (2018) with 145 citations. Schwatka *et al.* (2016) had been cited 110 times whilst Basahel (2021) had 60 citations.

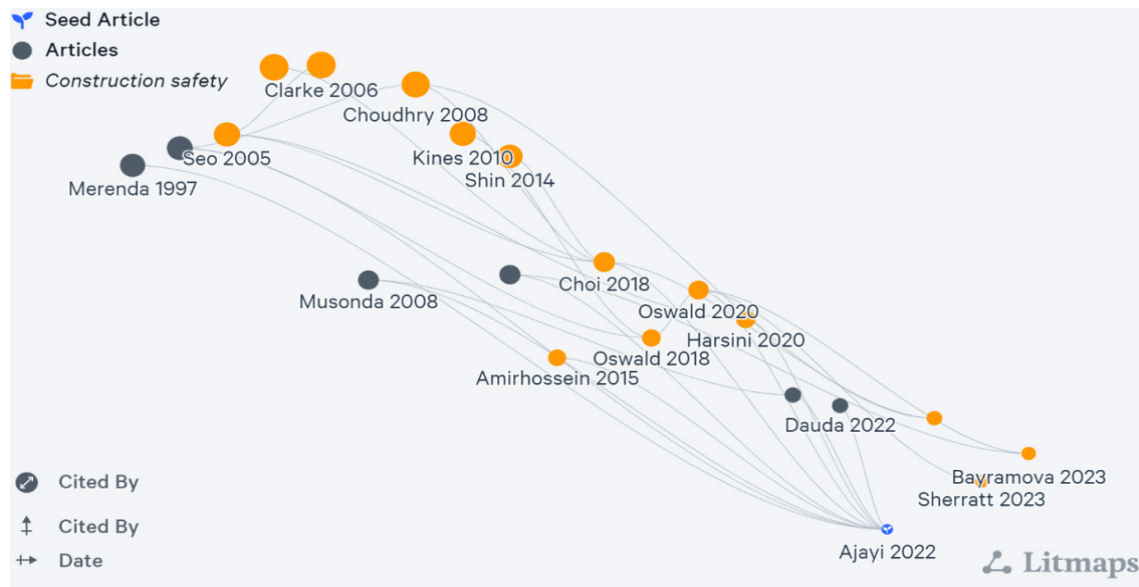


Figure 2 : Publications with highest impact

Table 3: Publications with the highest impact

Author	Year	Title	Journal	Citations
Shin et al	2014	A system dynamics approach for modelling construction workers' safety attitudes and behaviours	Journal of Accident Analysis and Prevention	348
Guo et al	2018	A system dynamics view of a behaviour-based safety program in the construction industry	Safety science	145
Schwatka and Rosecrance	2016	Safety climate and safety behaviours in the construction industry: The importance of co-workers commitment to safety	IOS Press	110
Choi and Lee	2018	An empirically based model of the socio cognitive process of construction workers' safety behaviour	Journal of Construction Engineering and Management	81



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Basahel	2021	Safety leadership, safety attitudes, safety knowledge and motivation towards safety-related behaviours in electrical substation construction projects	International Journal of Environment	60
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Research Topics

The subjects on health and safety management are broad and varied. In screening the 17 publications, twelve topics emerged. Some of these topics looked at the impact of the workers’ characteristics which were safety attitude, safety behaviour and safety cognition. Others were focused on the organisation which included safety programmes, compensation culture, safety climate, safety wears, and site safety practice, health and safety plan and safety leadership. Other topics were safety perception and cost safety. Among the research topics, safety behaviour and attitude were the topics which were frequently studied.

Discussion

Health and safety management research trends

Topics relating to health and safety management are changing with the times. Researchers focused on the characteristics of site workers such as their cognitive behaviour, unsafe behaviour, perception, attitude, safety wear use, cost safety, compensation culture and safety programmes. System dynamics was also used to explore the workers’ attitude and behaviour towards safety. Currently, the trend of health and safety management research is much more diversified. Twelve topics were focused from 2013-2023. This shows how research is using diverse means to address health and safety management issues to improve health and safety management in the industry.

Behaviour and attitude of workers

Much of the studies was focused on workers’ behaviour and attitude towards safety (Ajayi *et al.*, 2022; Ajayi *et al.*, 2021; Choi and Lee, 2018; Shin *et al.*, 2014, Guo *et al.*, 2018; Xu *et al.*, 2021; Schwatka and Rosecrance, 2016; Basahel,2021). Ajayi *et al.*(2021). In addressing the behavioural safety concerns on Qatari Mega projects, it was observed that human factors like unsafe behaviours are the major contributors of accidents and fatalities in Qatari projects. They found that the major factors which contributed to unsafe behaviours included lack of safety knowledge, improper safety gear usage, making production a priority over safety and poor safety disposition due to workplace conditions. They employed six strategies for entrenched safety behaviour. These included a proactive approach towards safety monitoring by the management, effective communication and feedback, provision of adequate equipment, safety education and training, safety enforcement and appraisal and safety policy efficiency. Liu et al. (2023) defined antecedents as the factors which influence the cognition of construction workers. He established four levels of a comprehensive model of the antecedents of construction workers’ safety cognition which were social factors



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(e.g. country, industry, and family), organisational factors (safety climate, leadership and culture), work situational factors (site condition, task characteristics) and individual factors (psychological and physiological factors, work skills). Choi and Lee (2017) developed in their studies, a model which was used to carry experiments in examining how the socio-cognitive process interacts with safety management interventions (i.e. strictness and frequency of management feedback and project identification). The outcome of the study revealed three interventions, all of which contributed to decreasing the incident rate. These interventions included promoting workers' project identification which would be an effective strategy in the modest risk site condition, combining other interventions after achieving the medium strictness of management feedback in the high risk site condition and other interventions which would not be effective without very strict management feedback in the low-risk site condition. Good behaviour and attitude enhances good safety practice for any organisation.

Communication

Communication is another theme that emerged from the review. Communication has the likely solution to confront problems by professionals and practioners (Naiman *et al.*, 2022). Channels of communication need to be improved because ineffective communication between managers and workers hinders productivity and efficiency at work (Abubakar and Tsanyawa, 2021; Adebayo and Emoh, 2019). This is as a result of realising only a little difference in their rate of safe behaviour despite the increased communication between the workers. Communication is a social factor in well-being which when incorporated into the health and safety management practices will enhance the efficiency of the workers.

Training

Training is a potential solution in tackling the problem of safety by professionals and practioners. Some studies (Naiman *et al.*, 2022; Abubakar and Tsanyawa, 2021; Adebayo and Emoh) have found that there is a low level of engagement in safety training programmes. Workers have difficulty in adapting to safety practices such as the use of safety wears, safety knowledge, which hinders efficiency and productivity at work. It is important that site and safety managers provide adequate training for operatives in the industry. Operatives can be trained on safety knowledge, accident prevention programmes, the right use and importance of Personal Protective Equipment (PPE) and compliance to safety rules and regulations on site.

System Dynamics

Most of the methods used in the studies relied on survey design and interviews (Adebayo and Emoh, 2019; Naiman *et al.*, 2022; Ajayi *et al.*, 2021; Xu *et al.*, 2023). These methods could not provide more contexts about the unsafe behaviours of the workers but one method which stood out was the system dynamics model which researchers used to predict the behaviour of the workers. Researchers were able to know situations (e.g. work pressure and safety experience) on site which have significant effect on the attitude of the workers.



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Safety management programmes

Organisations can also target programmes where their policy could be on zero target (Sherrat, 2014) in their health and safety management. This can motivate workers to be committed and work safely. This will encourage management to improve on the site safety practices. Organisations can also have programmes which will enhance the safety of workers. A 'new view' perspective of site safety practice which makes a useful contribution to the understanding of construction site safety. Safety on site is basically linked to the work conditions on site, which is usually physically demanding and requires working safely, avoiding accidents and working safely. The new view perspective of site safety recognises site workers' as a solution to safety and not a problem. If workers are seen as the solution, they will see themselves as part of the stakeholders of the organisation and they will be involved in ensuring high productivity and performance in the organisation.

Conclusion and Further Research

Though there have been improvements over the years, accidents, fatalities and injuries continue to affect the construction industry. In answering this, the number of peer-reviewed articles published and a range of research topics have been increasing to help the industry improve upon its health and safety management practices. Diverse topics, however, and the number of papers helped researchers and practitioners to have an overview of the field. A comprehensive literature review evaluated 17 peer-reviewed papers published in various journals which have high reputation in the field of health and safety management in the construction industry. Analyses of these articles were carried out from year profile of publications, publications by country and publications with the highest impact. The review identified twelve topics, which included safety cognition, safety attitude, safety perception, safety behaviour, safety programmes, health and safety plan, safety wears, safety climate, compensation culture, cost safety, safety leadership and site safety practice. Discussion arising from the results included behaviour and attitude of workers, training, communication and system dynamics. Researchers can further look into improved remuneration and well-being of workers. Remuneration is more likely to have a great impact on how the workers will follow safety measures and other necessary measures that may increase productivity. The study provides practical knowledge on how to minimise health and safety risks in construction to ensure sustainability. The study will also help the scientific community to know what still needs to be done to further advance knowledge on health and safety management practices.

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