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IMPACT OF STRESS ON EMPLOYEE'S PERFORMANCE IN THE CONSTRUCTION INDUSTRY: SYSTEMATIC LITERATURE REVIEW AND BIBLIOMETRIC ANALYSIS

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Abstract

The daily high-pressure work situations in the construction industry stress workers out and adversely impacts productivity. Work-associated stress negates project success determinants that lead to poor industry performance in the construction industry. Therefore, this review aims to examine the impact of stress on employees' performance in the construction industry. A desk study involving a systematic literature review and bibliometric analysis was adopted for this study. Various search string was adopted during the article search. The following search was adopted for the study "TITLE-ABS-KEY (impact AND of AND level AND of AND stress AND among AND the AND construction AND workers)". After the search, a total number (60) of articles were subsequently considered for the study. Out of the 60 identified articles, only fifteen (15) passed the selection and screening phase, which is done to ensure quality and related articles were considered for the study. A literature assessment covered publications published between 2010 and 2023 on how stress affected worker performance in the construction sector, and a bibliometric analysis was deployed to find trends and patterns in the construction industry's stress study. The comprehensive review found that several factors, such as high job expectations, a lack of control over one's work, social support, and job satisfaction, contribute to stress in the construction business. Stress was discovered to have detrimental effects, including lower job satisfaction, higher absenteeism, and higher turnover rates. Additionally, it was discovered that stress had a detrimental impact on work quality and productivity, leading to higher expenses and longer project completion times. The results of this study highlight the need for interventions and strategies for stress management to enhance the performance and well-being of employees in the construction industry. In conclusion, employers may boost productivity, work quality, and general job happiness in the construction sector by putting employee well-being first and employing stress management techniques.

Keywords: Construction Industry, Employee, Impact, Performance, Stress

1.0 Introduction

The construction industry is regarded as one of the major industries globally owing to its contribution to the Gross Domestic Product (GDP), infrastructural development, and employment creation. Various studies have reiterated the importance of the construction industry globally (Bello *et al.*, 2023a; Aka *et al.*, 2022; Olanrewaju *et al.*, 2020; Rabia *et al.*, 2020) and, according to McKinsey Global Institute (2022), established the annual spending of the construction industry to be \$10 trillion which is expended on products and services. This vast amount contributed to about 13% of the global GDP. Previously, the World Economic Forum (2018) established that the construction industry contributed approximately 6% to the global GDP. Similarly, the GDP rate is projected to reach 14.7% by 2030, as suggested by (Global Construction Perspectives and Oxford Economics, 2015). Moreso, Ahmad *et al.* (2022) established that the construction industry is the largest employer of labour globally.

Despite the construction industry's significant impact on global economic development, the industry still faces some inherent challenges that hinder the industry employees' performance and productivity. These challenges include high-stress levels and poor mental health (Lu *et al.*, 2020; Park *et al.*, 2016, Mayerl *et al.*, 2016; Eskilsson *et al.*, 2017), fragmentation and rigidity (Bello *et al.*, 2023b; Olanrewaju *et al.*, 2020), and lack of technological inclination (Bello *et al.*, 2022).

Employees often face varying levels of stress due to the construction sector's lengthy and intense operation nature, which tends to hamper their performance. Workplace stress results from high demands, bad job management, and inadequate social and welfare work. These factors can result in poor physical and mental health, which lowers employee performance (Park *et al.*, 2016). These mental health issues commonly result from work stress, including irritability, anxiousness, aggressive behaviour, inattention, sleep difficulties, and memory loss (Mayerl *et al.*, 2016). According to the Health & Safety Executive (2017), 40% of all work-related illnesses are caused by employees' stress levels, which generally result in productivity losses. Organisations spend over \$300 billion annually on healthcare expenditures and lost productivity due to employee stress (EU-OSHA, 2015).

Leung *et al.* (2016) state that stress is the body's established response to external dangers. It refers to the sensations of mental or physical stress brought on by any experience or idea that causes someone to feel agitated, irritated, or anxious. According to Nixon *et al.* (2011) and Leung *et al.* (2016), this may be broadly categorised into two types: physical stress, which refers to physiological changes including breathing problems and sleep issues, and emotional stress, which frequently takes the form of sadness and a helpless feeling. The effects of stress can manifest physically and emotionally in construction employees (Liang *et al.*, 2018). Physical or emotional stress can be very harmful to construction workers since it can cause morbidity, significantly lower performance,

significantly higher safety risks, and damage interpersonal relationships (Langdon & Sawang, 2018; Jebelli, 2019).

Furthermore, Leung *et al.* (2016) contended that stress at work is a factor in absenteeism, low morale, high occupational hazards, greater turnover rates, diminished performance, and an increase in the cost of medical care for the business. According to research by Leung *et al.* (2016), construction workers in charge of creating project bids had high-stress levels in response to external demands such as time restraints, deadlines, and workload. According to Ukamaka *et al.* (2021), researchers have investigated several group-based approaches to give strategies for reducing employee stress in various contexts. These include a stress inoculation approach among athletes (Rose & Berger, 1996), a mindfulness intervention approach among older adults (Wetherell *et al.*, 2017), acceptance and commitment therapy among social workers (Brinkborg *et al.*, 2011), emotion-focused therapy among military veterans (Mikaeili *et al.*, 2017) and group Rational-Emotive Behaviour Therapy (group REBT) among parents, undergraduates, teachers, and nursing students (Ede *et al.*, 2020). Albert Ellis created the group REBT technique in 1955 as a research-based group intervention strategy for reducing stress in various groups by identifying and modifying people's thoughts, feelings, and beliefs that make them susceptible to stress (Onuigbo *et al.*, 2018).

Stress can significantly affect employee productivity, leading to absenteeism, reduced output, and higher turnover rates. Therefore, understanding how stress impacts employee performance in the construction industry is essential for improving worker performance, safety, and general health. The study employed a systematic literature review and bibliometric analysis technique to locate and evaluate essential papers presented at conferences and peer-reviewed journals. The study aimed to assess the relationship between work performance and stress in the construction industry and identify the primary stress sources.

2.0 Methodology

The study adopts a systematic literature review to achieve the set objective using the SCOPUS database. The SCOPUS data was adopted for the study due to its wide acceptance and quality in scientific research. Various search string was adopted to ensure the study captures and does not miss out on crucial articles. The search string includes; TITLE-ABS-KEY (effect AND of AND stress AND on AND construction AND workers AND performance AND ion AND the AND construction AND industry); TITLE-ABS-KEY (stress measurement among workers in the construction industry); TITLE-ABS-KEY (stress AND among AND the AND construction AND industry AND workers AND measuring AND stress AND level); TITLE-ABS-KEY (effect AND of AND stress AND on AND employee's AND performance AND in AND the AND construction industry); TITLE-ABS-KEY (impact AND of AND level AND of AND stress AND among AND the AND construction AND workers).

Among the search strings adopted, "TITLE-ABS-KEY (impact AND of AND level AND of AND stress AND among AND the AND construction AND workers)" gave the highest article number (60) and was subsequently considered for the study. Out of the 60 identified articles, only fifteen (15) passed the selection and screening phase, which is done to ensure quality and related articles were considered for the study. Figure 1 shows the diagrammatic illustration of the article selection process.

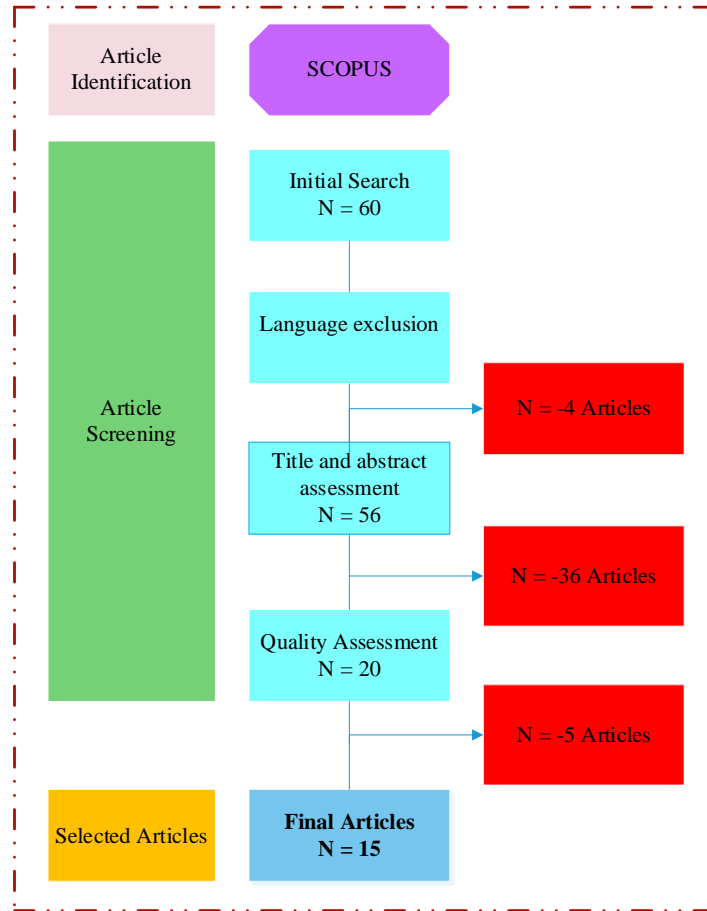


Figure 1. Article Selection Process

3.0 Stress Impact on the Construction Industry Employees' Performance

A study by (Leung *et al.*, 2012) surveyed 395 construction workers (CWs) to identify the impact of organisational stressors, two types of stress, and safety behaviours on injury incidents. Results showed that injury incidents were minimised by safety behaviours but escalated by a lack of goal setting, safety behaviours were maximised by emotional stress, and physical stress was predicted only by inappropriate safety equipment. Another study by (Obasa *et al.*, 2022) focuses on the impact of technologies on addressing stress-related problems among quantity surveyors. Primary data was collected and analysed using Percentiles, Mean Item Score, and Kruskal-Wallis. Results showed that Mobile phones, BIM, Smartwatches, Strap/band/patch, Wearable Sensors, and VR are the

most available technology for reducing stress levels. The study recommends that construction organisations make these tools available to quantity surveyors to ensure the stress level is well managed or prevented.

The impact of emotional intelligence (EI) on construction workers' stress (CWs) and safety behaviours was conducted by (Alsulami *et al.*, 2023). Data was collected from CWs at a primary construction site in Jeddah. Results showed that EI is important in enhancing safety behaviours and reducing workplace stress. Stakeholders discussed the findings to recommend a seven-point therapeutic role of EI for safety. According to several heat stress models, Nizam *et al.* (2021) reviewed the effects of heat stress on construction workers' productivity and health. According to these research results, the WBGT level is over the safe range for medium and heavy construction work in hot and humid nations, including India, China, Hong Kong, Thailand, Japan, Iran, Saudi Arabia, Egypt, United Arab Emirates, and Australia. These countries also have WBGT levels of at least 28°C.

According to estimates, productivity drops by up to 2% for every 1°C above the safe WBGT limit in temperature. Productivities can drop from 48% to 94% in excessively high temperatures. Minor heat-related illnesses include thirst, weariness, headaches, dehydration, vertigo, nausea, and muscle soreness, among the adverse health effects of heat stress. Ammar *et al.* (2016) found that a lack of autonomy and inadequate safety equipment leads to emotional stress, and a poor physical environment leads to job stress among CWs. Yee *et al.* (2011) found that work, emotional, and physical stress had a U-shaped relationship with CW injury incidents. Turner *et al.* (2020) explored the impact of musculoskeletal bodily pain on construction workers' mental health. A mixed-method approach involving survey and interview data revealed that participants whose pain originated from work had higher levels of depression, anxiety, and stress severity. Key themes from the interview data included the expectation of pain, managing pain, the impact of pain on mental health, pressure to work with pain, workability, and the stigma of mental health. Chan *et al.* (2012) investigate the impact on construction rebar workers by replicating clinical experimentation to field studies. Four hundred-eleven meteorological and physiological data sets were collected to derive the optimal recovery time. Results showed that recovery time is a significant variable in predicting the recovery rate, and additional rest times should be introduced between works in sweltering weather. Dutta *et al.* (2015) examined the effects of heat on construction workers from a site in Gandhinagar. It used a mixed methods approach consisting of a cross-sectional survey, four focus groups, and environmental measurements. Results showed that heat-related symptoms increased in summer. At the same time, focus groups revealed four dominant themes: non-occupational stressors compound work stressors, workers were particularly attuned to the impact of heat on their health, and few resources were available to protect workers from heat stress. Kamal *et al.* (2017) study looked into how stressful construction jobs may be for different types of workers. Based on the results, which were determined using canonical discriminate functions, it was determined how many construction employees felt stressed or not after a demanding day at work by analysing group characteristics,

including age, gender, education level, and job title. Jebelli *et al.* (2018) study proposes a procedure to automatically recognise workers' stress in construction sites using EEG signals. Results showed that the fixed windowing approach and the Gaussian Support Vector Machine (SVM) yielded the highest classification accuracy of 80.32%, which is promising given the similar accuracy of stress recognition in clinical domains.

Lim *et al.* (2018) examined the psychological conditions of construction field workers using four categories: stress, personal temperament, emotional disturbance, and drinking habits. Results showed a high level of stress, problem-focused coping, depression, trait anxiety, and alcohol-use problems. Alqahtani *et al.* (2022) analysed the relationship between work-related stressors found on construction job sites and self-reported injury rates of workers using a meta-analysis methodology. Seven work-related stressors were identified as significant predictors of injury rates, representing a significant step towards formally identifying work-related stressors.

The various studies emphasise the effects of organisational stressors, safety practises, emotional intelligence, technologies, heat stress, physical discomfort, and job-related stressors on construction workers' physical and mental health. The findings indicate that safety behaviours and emotional intelligence can improve safety and lessen stress. In contrast, insufficient safety equipment, a lack of autonomy, and a poor physical environment can do the opposite. Technology like wearable sensors, VR, and mobile phones are readily available and can help people regulate their stress levels. Workplace stresses can forecast injury rates, whereas high temperatures can cause heat stress, poor productivity, and other health impacts. It is possible to enhance the health and well-being of employees by using rest breaks and pain management techniques. In general, construction companies must prioritise the health of their employees and address the issues that lead to stress and accidents.

4.0 Bibliometric Result Presentation

4.1 Keywords Co-Occurrence

Keywords Co-occurrence analysis is a text analysis method that involves identifying and analysing word or phrase co-occurrence patterns in a corpus of text. The analysis is predicated on the idea that the frequency with which two or more words occur together in a given context indicates how closely related their meanings or topics are to one another. The analysis often uses statistical techniques to pinpoint the most frequent word pairings or phrases and to display these patterns as a network or graph. The analysis results can pinpoint essential themes or subjects in the text, investigate connections between various concepts or ideas, and spot systematic discourse and language patterns. Previous studies have adopted this approach (Ellegaard & Wallin, 2015; Wang & Guo, 2022). A total of 243 keywords appeared from the 15 articles considered. In order to understand the relationship between the articles, a selection criterion was set in VOSviewer, which makes the software identify terms that appear more

than twice. A total of 42 keywords met the threshold for the co-occurrence network, as shown in Figure 2. The thickness of lines between two terms shows the frequency with which they appear together.

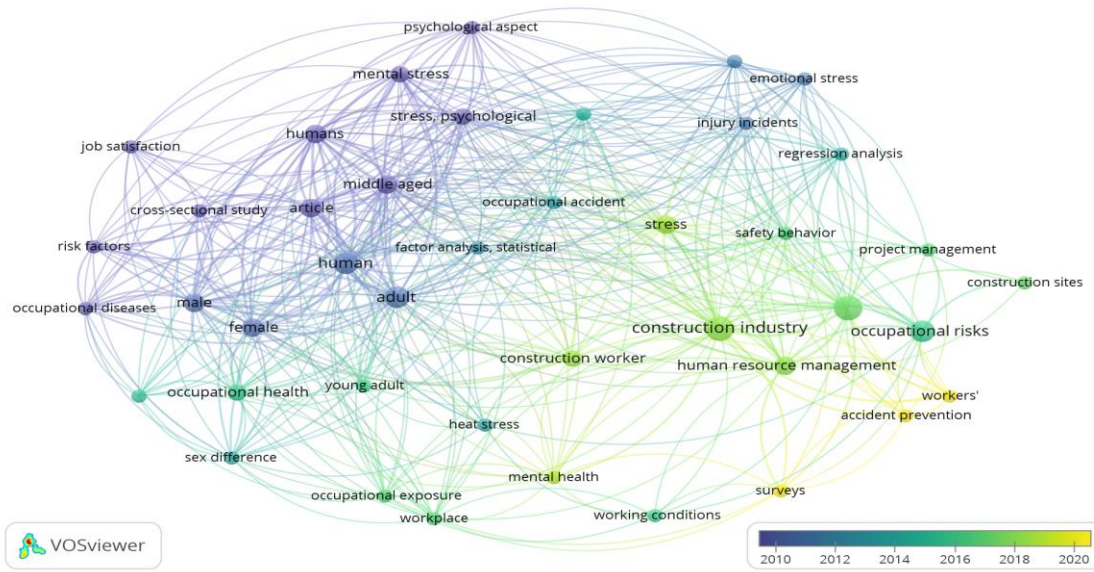


Figure 2: Analysis of Keywords Co-Occurrence

4.2 Co-Occurrence by Country

Table 1 shows the top 12 countries ranked by the number of documents and citations. Based on the document's number and citations, the United States (D = 4, C = 356), Hong Kong (D = 5, C = 325), South Korea (D = 2, C = 200), and the United Kingdom (D = 2, C = 135) are the top 4 countries with most academic impact on stress impact in the construction industry. Other contributing countries include China, India, Australia, Morocco, Pakistan, Saudi Arabia, Malaysia, and Nigeria. Among the listed countries, as shown in Table 1, only documents from Malaysia and Nigeria have not received any citations when carrying out this study.

Table 1: Countries that Contribute to Employee Stress Study

ID	Country	Documents	Citations
1	United States	4	356
2	Hong Kong	5	325
3	South Korea	2	200
4	United Kingdom	2	135
5	China	1	51
6	India	2	50
7	Australia	1	14
8	Morocco	1	2
9	Pakistan	1	2
10	Saudi Arabia	1	2
11	Malaysia	1	0
12	Nigeria	1	0

D = Documents; C = Citations

4.3 Publication Sources

The credibility of a publication plays a vital role in influencing its general impression (Wang & Guo, 2022). Analysing the extracted papers based on their citation rates using publication sources is crucial. Four article sources have been cited more than a hundred times, as shown in Table 2. Automation in Construction (173), Journal of Management in Engineering (135), Accident Analysis and Prevention (131), and Journal of Occupational Health Psychology (113). Other contributing article sources include Building and Environment (51), Indian Journal of Occupational and Environmental Medicine (48), International Journal of Occupational and Environmental Health (27), Social Science and Medicine (22), Construction Management and Economics (14), and Journal of Construction Engineering and Management (6). The VOS viewer for the publication is shown in Figure 3.

Table 2: Article Sources

ID	Source	Documents	Citations
1	Automation in Construction	1	173
2	Journal of Management in Engineering	1	135
3	Accident Analysis and Prevention	1	131
4	Journal of Occupational Health Psychology	1	113
5	Building and Environment	1	51
6	Indian Journal of Occupational and Environmental Medicine	1	48
7	International Journal of Occupational and Environmental Health	1	27
8	Social Science and Medicine	1	22
9	Construction Management and Economics	1	14
10	Journal of Construction Engineering and Management	1	6
11	Association of Researchers in Construction Management, ARCOM 2011 - Proceedings of the 27th Annual Conference	1	2
12	Engineering, Construction and Architectural Management	1	2
13	International Journal of Civil Engineering and Technology	1	2
14	International Journal of Construction Management	1	0
15	Journal of Advanced Research in Fluid Mechanics and Thermal Sciences	1	0

Note: TLS = Total Link Strength

5.0 Study Findings

According to the study's findings, stress is a significant worry for workers in the construction business. It can have a significant influence on their productivity. The systematic review of the literature found several characteristics that lead to stress, including work expectations, a lack of social support, job satisfaction, and a lack of control over one's employment. Stress has been linked to unfavourable effects like lower job satisfaction, higher absenteeism, and higher turnover rates. Additionally, it was discovered that stress has a detrimental effect on work quality and productivity, which could lead to higher expenses and longer project completion times.

The bibliometric research showed that the construction industry is increasingly interested in stress management interventions and methods, such as training, employee assistance programmes, and mindfulness practices. The link between stress and job expectations has also received attention. Overall, the results of this study point to the necessity of stress management interventions and strategies to enhance the performance and general well-being of workers in the construction sector. These interventions and techniques can address the identified stress-causing causes, raising job satisfaction, decreasing absenteeism and turnover rates, and improving productivity and work quality.

6.0 Discussion

Through a thorough assessment of the literature and bibliometric analysis, the study sought to determine the effect of stress on worker performance in the construction industry. According to the study's findings, stress is a significant worry for workers in the construction business. It can have a significant influence on their productivity. The comprehensive literature review found that several factors, including workplace expectations, a lack of control over one's work, social support, and low job satisfaction, lead to stress in the construction business. These elements negatively correlate with reduced work satisfaction, absenteeism, and higher turnover rates. Stress was also discovered to have a detrimental effect on job output and quality, leading to higher expenses and longer project completion times. Additionally, there has been an increase in interest in interventions and methods of stress management in the construction sector, such as stress management training, employee assistance programmes, and mindfulness practices.

The findings of this study can guide future studies on stress in the construction sector. Future studies should specifically concentrate on assessing the efficacy of interventions and techniques for controlling stress in the construction industry. Research can also look into the connection between human characteristics like coping mechanisms and personality types and how stress affects worker performance in the construction sector.

7.0 Conclusion

Complex work situations and high-stress levels prevalent in the construction industry are well-documented. In order to better understand how stress affects worker performance in the construction business, a thorough literature review and bibliometric analysis were conducted. The results of this study offer a thorough understanding of the significant effects of stress on workers in the construction sector and emphasise the need for interventions and strategies for stress management in order to enhance their performance and well-being.

The comprehensive analysis of the literature identified several variables that influence stress in the construction sector, including workplace expectations, a lack of control over one's work, inadequate social support, and low job satisfaction. These stressors were discovered to have detrimental effects like lower job satisfaction, higher absenteeism, and higher turnover rates. Stress has been shown to negatively affect both productivity and the standard of work, which can lead to higher expenses and longer project completion times.

The study's findings are significant for practitioners and scholars in the building sector. Practitioners can use the data presented in this study to create and implement stress management interventions and strategies to improve employee performance. Employers can, for instance, develop employee assistance programmes, provide training in stress management, and offer possibilities for social support and job control. These strategies may lessen the harmful impacts of stress on workers while enhancing output and job satisfaction.

In conclusion, this study's findings show how stress substantially impacts how well construction sector workers perform. The results imply that treatments and strategies for stress management are required to improve the performance and general well-being of workers in this sector. Employers can increase productivity, their employees' work calibre, and general happiness by putting employee well-being first and employing stress management techniques. Future studies on this subject will surely aid in creating useful stress management strategies that can improve the performance and well-being of workers in the construction sector.

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