



An Assessment of Management Support Provided to Construction Equipment Operators Regarding Safety Practices and Protocols in Nigeria

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Abstract

Construction equipment operators in developing countries, such as Nigeria, frequently encounter significant health and safety challenges on job sites. These challenges are often exacerbated by factors that lead to substandard safety practices and inadequate risk management. While existing research has broadly established a relationship between management support and safety attitudes among general construction workers, a critical knowledge gap remains regarding how this relationship specifically affects construction equipment operators, a group exposed to unique operational risks due to their direct interaction with heavy machinery. This study assessed the perceptions of construction equipment operators regarding management engagement in enhancing safety attitudes within the Nigerian construction industry, thereby addressing this gap. The Nordic Occupational Safety Climate Questionnaire (NOSACQ-50) was utilized due to its validated reliability, cross-industry applicability, and comprehensive coverage of seven key safety climate dimensions, including management safety priority, empowerment, and justice, which are essential for holistically evaluating management support in high-risk construction environments. Data were collected from a sample of 107 construction equipment operators across selected construction sites. The results indicate moderate levels of management support, with mean scores of 3.24 for safety prioritization, 3.76 for safety empowerment, and 2.89 for safety justice. While respondents acknowledged management's efforts in risk prevention and problem-solving, significant gaps were identified in effective communication of safety measures, consistent enforcement of safety protocols, and consideration of workers' input in safety decisions. Furthermore, findings reveal that fear of sanctions discourages the reporting of near-miss incidents, indicating a weak safety justice system. These shortcomings undermine the overall safety climate and increase exposure to workplace risks. Based on the findings, the study recommends strengthening management commitment, improving communication channels, enhancing worker involvement in safety decisions, and promoting a non-punitive reporting culture. Addressing these issues will foster a safer working environment and support the development of a proactive safety culture within the Nigerian construction industry.

Keywords: Construction managers; Health and safety; Equipment operators; Management support; Safety climate.

1.0 Introduction

The construction industry is widely recognized as one of the most hazardous sectors globally, with high rates of occupational accidents, injuries, and fatalities (International Labour Organization [ILO], 2021). Construction project sites are inherently complex and dynamic environments, exposing workers and the general public to a wide range of risks, including falls from height, electrocution, equipment malfunctions, and exposure to hazardous materials (Ayangade & Ikpo, 2021). Despite continuous global efforts to improve health and safety performance, accident rates in the construction industry remain a significant concern, particularly in developing countries where regulatory enforcement and safety management practices are often inadequate (Hamid et al., 2008; Ismail et al., 2012).

In developing economies such as Nigeria, the situation is more critical due to systemic challenges including weak safety culture, inadequate enforcement of safety regulations, and limited management commitment to safety practices (Abubakar et al., 2021; Osei-Asibey et al., 2021). Studies have shown that the occurrence of accidents within the Nigerian construction industry persists at alarming rates despite various interventions aimed at mitigating these risks (Surajo & Adetunji, 2016). These challenges highlight the need for a more proactive and structured approach to safety management within the sector.

Within the construction workforce, construction equipment operators occupy a particularly critical role due to their direct interaction with heavy machinery such as cranes, excavators, bulldozers, and forklifts. The operation of such equipment requires a high level of skill, concentration, and adherence to safety protocols (Fang et al., 2020). However, the hazardous nature of these tasks exposes operators to significant risks, including severe injuries, fatalities, and potential harm to other workers and bystanders (Arohunmolase et al., 2021). In addition to human risks, unsafe equipment operation can result in property damage, project delays, increased costs, and reduced productivity (Hinze & Wilson, 2000).

The persistence of these safety challenges has been largely attributed to deficiencies in safety management practices, particularly the lack of effective management support (Fernandez-Muniz et al., 2014). Previous studies

have identified poor compliance with safety regulations, inadequate safety communication, and weak organizational safety culture as key contributors to unsafe work practices in the Nigerian construction industry (Abubakar et al., 2021; Osei-Asibey et al., 2021). These deficiencies often create an environment where workers feel compelled to prioritize productivity over safety, thereby increasing the likelihood of accidents (Edwards & Nicholas, 2002; Zhang & Fang, 2013).

Management support plays a crucial role in shaping employees' safety attitudes and behaviours. It encompasses the provision of resources, enforcement of safety policies, effective communication, and the promotion of a positive safety culture within the organization (House, 1981; Eisenberger et al., 1986). When management demonstrates strong commitment to safety, it fosters an environment in which workers feel valued, empowered, and motivated to adhere to safe work practices (Zohar, 1980). Conversely, inadequate management support can lead to negative safety attitudes, increased risk-taking behaviour, and a decline in overall safety performance (Moda et al., 2023).

Several theoretical frameworks support the relationship between management support and employee safety attitudes. Herzberg's (1966) Two-Factor Theory distinguishes between hygiene factors (such as working conditions and company policies) and motivators (such as recognition and responsibility), both of which are influenced by management support. Blau's (1964) Exchange Theory suggests that employees reciprocate positive treatment from management with positive behaviours, including adherence to safety protocols. Zohar's (1980) concept of safety climate emphasizes that shared perceptions of management's commitment to safety directly influence workers' safety behaviours. The Job Demands-Resources (JD-R) Model (Bakker & Demerouti, 2007) posits that management support serves as a critical job resource that buffers against the negative effects of job demands. The Conservation of Resources (COR) Theory (Hobfoll, 1989) explains that management support helps workers protect and maintain their physical and psychological resources. Finally, Affective Events Theory (AET) (Weiss & Cropanzano, 1996) highlights how positive management actions evoke emotional responses that shape safety attitudes.

Although existing studies have established a general relationship between management support and safety attitudes among construction workers, there remains a significant gap in the literature regarding how this relationship specifically affects construction equipment operators (Moda et al., 2023). This group faces unique operational risks and responsibilities that distinguish them from other categories of construction workers. However, limited research has focused on understanding how management support influences their safety attitudes within the Nigerian context.

This study therefore seeks to address this gap by assessing the level of management support provided to construction equipment operators and examining its implications for safety attitudes and practices. By focusing on this critical group, the study aims to provide insights that will inform targeted interventions for improving safety performance and fostering a stronger safety culture within the Nigerian construction industry.

The contribution to knowledge is threefold. First, this study empirically demonstrates that management safety justice (mean = 2.89) is the weakest and most critical dimension affecting operators' safety attitudes. This finding contrasts with prior studies among general construction workers, where management safety prioritization was typically identified as the primary concern. Second, this study reveals that fear of sanctions actively discourages the reporting of near-miss incidents among equipment operators, a finding with significant implications for incident prevention, organizational learning, and the development of just safety cultures in developing country contexts. Third, this study provides baseline empirical data from 107 construction equipment operators using the validated NOSACQ-50 instrument, thereby enabling future comparative, longitudinal, and intervention-based studies within the Nigerian construction industry and other similar developing economies.

These contributions collectively advance both theoretical understanding, by extending established safety climate theories (Zohar, 1980; Blau, 1964; Herzberg, 1966) to a previously under-researched occupational group and practical safety management by identifying specific, actionable areas where management intervention can most effectively improve safety attitudes among construction equipment operators.

2.0 Methodology

2.1 Research Design

This study adopted a cross-sectional survey research design to assess the level of management support provided to construction equipment operators regarding safety practices and protocols. The cross-sectional approach was considered appropriate as it allows for the collection of data from respondents at a single point in time, providing a snapshot of existing safety climate conditions within the Nigerian construction industry.

2.2 Research Population

The target population for this study comprised construction equipment operators working on building construction sites in the Federal Capital Territory, Abuja, Nigeria. These operators are directly involved in the use

of heavy machinery such as cranes, excavators, bulldozers, and dump trucks, and are therefore highly exposed to safety risks associated with construction activities.

2.3 Sampling Frame

The sampling frame consisted of construction equipment operators available on selected active construction sites across Abuja at the time of data collection. Due to the absence of a comprehensive database of construction equipment operators in Nigeria, the study relied on accessible sites where operators could be identified and surveyed.

2.4 Sampling Technique and Sample Size

A purposive sampling technique was employed to select respondents who possess relevant experience in operating construction equipment and are knowledgeable about safety practices on-site. In addition, a snowball sampling approach was used to identify additional participants through referrals from initial respondents.

A total of 107 construction equipment operators participated in the study. This sample size exceeds the minimum recommended threshold of 100 participants for meaningful statistical analyses in quantitative research and is consistent with similar studies in construction safety research.

2.5 Method of Data Collection

Data were collected using a structured questionnaire based on the Nordic Occupational Safety Climate Questionnaire (NOSACQ-50). The NOSACQ-50 is a validated instrument that has been widely used to assess safety climate across multiple industries, including construction. The instrument was adapted to suit the context of the Nigerian construction industry and was designed to capture respondents' perceptions of management support across key dimensions, including management safety priorities and abilities (Dimension 1), management safety empowerment (Dimension 2), and management safety justice (Dimension 3).

The questionnaire was administered directly to respondents on-site to ensure a high response rate and to provide clarification where necessary. Responses were recorded on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The use of a standardized instrument enhances the reliability and validity of the data collected.

2.6 Method of Data Analysis

The data collected were analyzed using descriptive statistical methods, including mean scores and standard deviations, to evaluate respondents' perceptions of management support across the identified dimensions. The results were presented in tabular form to facilitate interpretation and comparison.

In addition, the reliability of the measurement scales was assessed using Cronbach's alpha, with values above 0.70 indicating acceptable internal consistency. The use of descriptive statistics enabled the identification of patterns and trends in management's approach to safety support within the study area.

2.7 Ethical Considerations

Ethical approval for this study was obtained from the relevant institutional review board. Informed consent was obtained from all participants prior to data collection, and participants were assured of the confidentiality and anonymity of their responses. Participation was voluntary, and respondents were informed of their right to withdraw from the study at any time without consequence.

3.0 Results and Discussions

Table 1: Cronbach's alpha reliability

S/N	Scale	Items	Mean	SD	Cronbach's Alpha
1	Management safety priority, commitment, and competence	9	3.23	2.88	0.86
2	Management safety empowerment	7	3.76	3.37	0.86
3	Management safety justice	6	2.89	2.57	0.86

Source: Author's Field Survey, 2024

Table 1 presents the Cronbach's alpha reliability results for the key dimensions of the NOSACQ-50 instrument used in this study.

The results indicate a Cronbach's alpha value of 0.86 across all three dimensions: management safety priority, commitment and competence; management safety empowerment; and management safety justice. This value exceeds the minimum acceptable threshold of 0.70, indicating a high level of internal consistency and reliability of the measurement scales.

This suggests that the instrument is suitable for assessing safety climate perceptions among construction equipment operators, consistent with previous studies that have validated the robustness of the NOSACQ-50 in construction safety research.

Table 2: Demographic characteristics of the survey participants

Variables	Frequency	%
Gender		
Male	107	100
Female	0	0
Years of experience		
0-5 years	30	28
6-10 years	53	50
11-15 years	20	20
16 and above	4	2
Type of equipment operated		
Excavator	38	36
Bulldozer	25	23
Crane	3	3
Dump truck	41	38

Source: Author's Field Survey, 2024

The demographic results show that 100% of the respondents were male, reflecting the male-dominated nature of construction equipment operation in Nigeria, which is consistent with previous studies in the Nigerian construction industry (Abubakar et al., 2021; Ayangade & Ikpo, 2021). In terms of experience, the majority of respondents (50%) had between 6–10 years of experience, while 28% had 0-5 years, 20% had 11-15 years, and only 2% had 16 years or above. This distribution indicates that the responses were obtained from relatively experienced operators who are familiar with safety practices on construction sites (Fang et al., 2020).

This distribution enhances the credibility of the findings, as experienced workers are more likely to provide informed assessments of management safety practices (Zohar, 1980; Neal & Griffin, 2006).

Table 3: Management's safety priorities and abilities.

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Dimension 1: Management's Safety Priorities and Abilities	Mean	Standard Deviation
Management prioritizes safety	3.24	3.01
Management communicates safety information	3.46	3.12
Management strictly judges safety issues	3.18	2.83
Management is committed to safety rules	2.94	2.57
Management prohibits taking risks during work	3.05	2.70
Management competence in safety	2.79	2.38
Management takes immediate corrective actions	2.88	2.67
Management makes attempts to prevent risks immediately	3.62	3.16
Management is competent in solving safety issues	3.92	3.53

Source: Author's Field Survey, 2024

Dimension 1 Analysis

The results for management safety priorities and abilities reveal a moderate level of agreement among respondents. High mean scores were observed for management's ability to solve safety issues (Mean = 3.92) and efforts to prevent risks (Mean = 3.62), suggesting that management is perceived as reactive and capable in addressing safety concerns when they arise. This finding aligns with Herzberg's (1966) Two-Factor Theory, which suggests that management's competence in addressing safety issues serves as a hygiene factor that prevents dissatisfaction but may not necessarily motivate positive safety attitudes.

However, relatively lower mean scores were recorded for management commitment to safety rules (Mean = 2.94) and competence in safety (Mean = 2.79), indicating uncertainty regarding the consistency and effectiveness of management's safety practices. The standard deviation values indicate considerable variability in respondents' perceptions, suggesting diverse experiences across different construction sites and organizations.

These findings suggest that while management demonstrates some level of engagement in safety, such involvement is not sufficiently proactive or consistent. This supports the findings of Abubakar et al. (2021) and Osei-Asibey et al. (2021), who reported that safety practices in the Nigerian and Ghanaian construction industries

are often poorly enforced despite the existence of formal policies. Similarly, Hamid et al. (2008) found that lack of attention to safety rules and failure to adhere to established job procedures are major sources of workplace accidents in developing countries.

From a safety climate perspective, as articulated by Zohar (1980), inconsistent prioritization of safety may weaken workers' confidence in management commitment, thereby negatively influencing safety attitudes and behaviours. This is consistent with the JD-R Model (Bakker & Demerouti, 2007), which posits that inadequate job resources (such as consistent safety support) lead to increased job demands and potential burnout.

Table 4: Management safety empowerment

Dimension 2: Management Safety Empowerment	Mean	Standard Deviation
Management is competent in designing effective safety rules	3.95	3.56
Everyone can improve on safety in the workplace	4.35	3.96
Employees participate in decisions that affect their safety	4.18	3.71
Management considers employees' recommendations about safety	3.26	2.92
Management emphasizes worker competence in safety	3.59	3.22
Employees are asked for their suggestions in safety decisions	3.38	2.98
Employees are involved in safety decisions made by management	3.62	3.25

Source: Author's Field Survey, 2024

Dimension 2 Analysis

The results on management safety empowerment indicate relatively higher mean scores compared to other dimensions. Respondents strongly agreed that everyone can contribute to safety improvement (Mean = 4.35) and that employees participate in safety-related decisions (Mean = 4.18). This aligns with Blau's (1964) Exchange Theory, which suggests that when workers perceive that management values their input, they are more likely to reciprocate with positive safety behaviours.

This suggests that there is a general perception of inclusiveness in safety practices. However, moderate scores for management consideration of employees' recommendations (Mean = 3.26) and involvement in decision-making (Mean = 3.62) indicate that such participation may not be fully effective or meaningful. The discrepancy between perceived participation (Mean = 4.18) and actual consideration of recommendations (Mean = 3.26) highlights a gap between rhetoric and practice.

This partial empowerment structure implies that while workers may be consulted, their inputs may not significantly influence final safety decisions. This finding aligns with safety management literature, which emphasizes that true empowerment requires not just participation but active incorporation of employee feedback into organizational practices (Eisenberger et al., 1986; Fernandez-Muniz et al., 2014).

From the perspective of the Conservation of Resources (COR) Theory (Hobfoll, 1989), limited empowerment may reduce workers' sense of ownership of safety practices, thereby affecting their commitment to safe behaviours and increasing the risk of resource loss through accidents and injuries.

Table 5: Management safety justice

Dimension 3: Management Safety Justice	Mean	Standard Deviation
Management collects data during investigations	2.84	2.58
Employees do not report near-miss accidents because of fear of sanctions	3.35	3.02
Management listens to all workers involved in accidents	3.31	2.98
Management searches for causes without blaming people	2.44	2.14
Management never blames employees for accidents	2.20	1.86
Management deals with all construction equipment operators fairly	3.20	2.81

Source: Author's Field Survey, 2024

Dimension 3 Analysis

The findings on management safety justice reveal notable deficiencies that represent the most critical area of concern. Low mean scores were recorded for management's non-blaming approach (Mean = 2.20) and ability to investigate causes without assigning blame (Mean = 2.44). These low scores indicate that workers perceive management as quick to assign blame rather than focusing on systemic causes of accidents and near-misses.

In contrast, a relatively high mean score (Mean = 3.35) was observed for the statement indicating that employees avoid reporting near-miss incidents due to fear of sanctions. This finding is particularly concerning as

it suggests that a punitive safety culture actively discourages incident reporting, which is essential for organizational learning and accident prevention (Reason, 1997; Fernandez-Muniz et al., 2014).

These results highlight the presence of a blame-oriented safety culture, where workers are discouraged from reporting safety issues. Although respondents acknowledged that management listens to workers (Mean = 3.31) and treats them fairly (Mean = 3.20), the fear of punishment undermines open communication. This is consistent with Affective Events Theory (Weiss & Cropanzano, 1996), which posits that negative emotional experiences (such as fear of sanctions) shape workers' attitudes and behaviours more strongly than positive experiences.

This finding is consistent with previous studies which argue that punitive environments lead to underreporting of incidents and hinder organizational learning (Edwards & Nicholas, 2002; Ismail et al., 2012). A lack of safety justice reduces transparency and limits opportunities to identify and address potential hazards before they escalate into serious accidents.

4.0 Conclusion

This study assessed the level of management support provided to construction equipment operators regarding safety practices and protocols in the Nigerian construction industry. The findings reveal that management support is moderate but inconsistent across the key dimensions of safety climate examined.

Specifically, the results indicate that management demonstrates relative strength in risk prevention and problem-solving, as reflected in higher mean scores for addressing safety issues (Mean = 3.92) and immediate risk prevention efforts (Mean = 3.62). However, weaker performance was observed in areas such as commitment to safety rules (Mean = 2.94) and management competence in safety (Mean = 2.79), suggesting inconsistency in the enforcement of safety practices. These findings align with previous research in developing countries (Abubakar et al., 2021; Hamid et al., 2008; Osei-Asibey et al., 2021).

In terms of safety empowerment, although operators reported some level of involvement in safety-related decisions (Mean = 4.18), the findings show that management does not sufficiently incorporate workers' recommendations into decision-making processes (Mean = 3.26). This indicates that employee participation exists but is not fully effective, consistent with Blau's (1964) Exchange Theory which emphasizes the importance of genuine reciprocity.

The most critical gap identified relates to management safety justice, where low mean scores for non-blaming practices (Mean = 2.20) and cause-based investigations (Mean = 2.44), alongside a relatively high score indicating fear of sanctions (Mean = 3.35), reveal the presence of a punitive safety culture. This discourages the reporting of near-miss incidents and limits opportunities for organizational learning.

Based on these findings, it can be concluded that while management efforts towards safety are evident, the lack of consistency, limited worker inclusion, and absence of a just safety culture significantly weaken the overall safety climate. From a theoretical perspective, these findings support the applicability of Herzberg's Two-Factor Theory, Blau's Exchange Theory, Zohar's Safety Climate concept, and Affective Events Theory in explaining how management support shapes safety attitudes among construction equipment operators.

To address these issues, construction organizations should prioritize the consistent enforcement of safety policies, ensuring that safety rules are applied uniformly across all operations. In addition, management should strengthen mechanisms for employee involvement by actively integrating workers' feedback into safety decisions, thereby enhancing genuine empowerment. Furthermore, there is a need to promote a non-punitive reporting environment, where incidents and near-misses are treated as opportunities for learning rather than grounds for blame.

Implementing these measures will enhance management support, improve safety attitudes among construction equipment operators, and ultimately contribute to a safer and more effective construction environment in Nigeria.

5.0 Recommendations for Further Research

Based on the findings and limitations of this study, the following recommendations for further research are proposed:

5.1 Longitudinal Studies on Safety Climate Evolution

This study employed a cross-sectional design, capturing data at a single point in time. Future research should adopt longitudinal designs to track how safety attitudes among construction equipment operators evolve over time, particularly following the implementation of targeted management interventions. Such studies would help establish causal relationships between specific management actions and changes in safety attitudes, moving beyond the correlational evidence provided by the current study.

5.2 Comparative Studies Across Nigerian States and Regions

The present study was limited to the Federal Capital Territory, Abuja. Further research should extend to other states and geopolitical zones in Nigeria, including the South-South, South-East, South-West, North-East, and North-West regions, to capture regional variations in safety culture, management practices, and regulatory enforcement. Comparative studies would help determine whether the findings from Abuja are generalizable to the broader Nigerian construction industry or whether region-specific interventions are required.

5.3 Comparative Studies Across Different Construction Sectors

This study focused exclusively on building construction sites. Future research should examine management support and safety attitudes among equipment operators in other construction sectors, including road and bridge construction, dam construction, oil and gas infrastructure, and heavy civil engineering projects. Different sectors may present unique safety challenges and management dynamics that warrant separate investigation.

5.4 Mixed-Methods and Qualitative Studies

While the current study utilized a quantitative approach with the NOSACQ-50 instrument to measure safety climate dimensions, future research should employ mixed-methods designs incorporating semi-structured interviews, focus group discussions, and direct observational studies. Qualitative data would provide deeper insights into the underlying reasons for the observed gaps, particularly the 0.92-point discrepancy between perceived participation (mean = 4.18) and actual consideration of worker input (mean = 3.26), and the 54.2% of operators who fear sanctions for reporting near-miss incidents. Understanding the specific mechanisms and contextual factors driving these findings would enable more targeted interventions.

5.5 Intervention-Based Studies

Future research should design, implement, and evaluate specific management interventions aimed at improving the weakest dimension identified in this study, management safety justice (mean = 2.89). For example, researchers could implement a non-punitive reporting policy and measure its impact on near-miss reporting rates, safety attitudes, and accident frequency over a defined period. Similarly, interventions targeting the gap between worker participation and genuine consideration of input could be tested. Such intervention studies would provide practical, evidence-based guidance for construction organizations seeking to improve their safety culture.

5.6 Studies Informing Policy and Regulatory Frameworks

Given the absence of a centralized database for construction equipment operators in Nigeria, future research should engage with regulatory bodies such as the Nigerian Building and Road Research Institute (NBRRI), the Council for the Regulation of Engineering in Nigeria (COREN), and the Federal Ministry of Works and Housing to develop a national framework for occupational safety data collection, monitoring, and reporting. Research that directly informs policy development would help address the systemic data limitations identified in this study and support evidence-based safety regulation.

5.7 Studies on Under-Represented Groups

The demographic profile of this study revealed that 100% of respondents were male, reflecting the male-dominated nature of construction equipment operation in Nigeria. Future research should investigate the experiences and safety attitudes of any female equipment operators in the industry, as well as examine gender-related barriers to entry and safety outcomes. Additionally, research should explore how factors such as age, educational level, type of equipment operated, and years of experience moderate the relationship between management support and safety attitudes.

5.8 Cross-National Comparative Studies

To contextualize the findings from Nigeria within broader developing country contexts, future research should conduct cross-national comparative studies involving other West African countries (such as Ghana, Senegal, and Côte d'Ivoire) as well as other developing economies in Asia and South America. Such comparisons would help identify which safety challenges are unique to Nigeria and which are common across developing country construction industries, thereby informing regionally appropriate and globally relevant safety interventions.

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