

Appraisal of Safety Culture among Construction Workers in Akwa Ibom State, Nigeria

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ABSTRACT

This study assessed the safety culture among selected construction companies in Akwa Ibom State, Nigeria. A cross-sectional descriptive multi-case study design was adopted. The target population comprised construction workers in Akwa Ibom State, while four construction companies were purposively selected as the study cases. A total of 40 workers, comprising 16 supervisors/managers and 24 office/technical workers, participated in the study. Data were collected using a structured questionnaire containing 11 safety-culture statements measured on a five-point Likert scale ranging from Strongly Disagree to Strongly Agree. Descriptive statistics, including frequencies, percentages and weighted mean scores, were used to analyse the data. The findings revealed an overwhelmingly positive perception of safety culture among the respondents. Supervisors/managers recorded an overall mean score of approximately 4.84, while office/technical workers recorded an overall mean of approximately 4.69. Among supervisors/managers, the highest scores were recorded for the existence of a safety policy and management commitment to safety (5.00 each), while the lowest was for sharing and learning from incidents (4.63). Among office/technical workers, teamwork recorded the highest mean score (4.88), while organisational commitment to personnel training recorded the lowest (4.58). No respondent selected Strongly Disagree or Disagree for any of the assessed items. The findings suggest that the selected construction companies have generally strong safety-culture characteristics, particularly in management commitment, teamwork, safety communication, safety rules, worker involvement, incident investigation and the prioritisation of safety over production pressure. However, the small sample size, purposive sampling technique and inclusion of only four companies limit generalisation of the findings. The study recommends continuous strengthening of safety training, worker participation, incident learning, hazard reporting and safety leadership. Larger studies involving more construction companies and probability-based sampling are recommended to enhance generalisability.

Keywords: Safety culture; construction industry; construction workers; safety management; safety performance; Akwa Ibom State; Nigeria; multi-case study.

INTRODUCTION

Background to the Study

The construction industry is a major contributor to economic and infrastructural development, providing employment and supporting the delivery of buildings, roads, bridges and other essential infrastructure. Despite its economic importance, construction remains a high-risk industry because workers are exposed to diverse occupational hazards associated with work at height, excavation, machinery and equipment, electricity, falling objects, hazardous substances and a constantly changing work environments [1][2]. The International Labour Organization (ILO) recognises construction as a sector characterised by numerous and

diverse occupational safety and health hazards and emphasises the need for systematic measures to eliminate, reduce and control these risks throughout the construction project life cycle [1][2]. Recent research similarly indicates that the dynamic nature of construction work creates complex safety challenges requiring both technical and organisational controls [3][4].

Effective construction safety, however, extends beyond the existence of regulations, procedures and personal protective equipment. Increasing attention has been given to the role of safety culture in influencing how organisations identify, communicate and control hazards and how workers respond to safety requirements. Safety culture encompasses the shared values, beliefs, attitudes, perceptions and practices that demonstrate the importance an organisation attaches to safety [1][5]. In construction, important dimensions of safety culture include management commitment, safety communication, safety training, supervisory practices, worker participation, safety rules and procedures, safety motivation and safety behaviour [3][5]. A systematic review of safety-climate research in construction found that stronger safety climates are generally associated with improved safety performance and lower accident rates, demonstrating the importance of workers' perceptions of organisational commitment to safety [3][6].

Management commitment is particularly important because organisational leaders influence the resources, priorities and behaviours that shape workplace safety. Visible management support, adequate provision of safety resources, effective communication and worker involvement can reinforce safe practices and encourage workers to participate actively in safety activities [1][5]. In the Nigerian construction industry, empirical evidence has shown that management support can play a critical role in shaping workers' safety attitudes and promoting desirable safety behaviours [7][8]. The ILO's revised Code of Practice on Safety and Health in Construction also emphasises occupational safety and health management systems, cooperation between employers and workers, and the development of a preventive safety and health culture as essential components of construction safety [1][2].

The Nigerian construction sector operates within a context in which challenges relating to safety management, regulatory compliance, worker training and organisational commitment can influence safety outcomes. Studies conducted within the Nigerian construction industry have identified organisational and human factors as important determinants of safety performance and have highlighted the need for stronger safety management and resilient safety cultures [7][8]. Consequently, assessing safety culture at the organisational and worker levels can provide useful information for identifying deficiencies that may not be apparent from accident statistics or compliance inspections alone.

Although safety culture has received increasing attention internationally, there remains limited empirical evidence specifically addressing the prevailing safety culture among construction workers in Akwa Ibom State, Nigeria. Recent studies on the safety culture in the public health sector of Akwa Ibom State and the safety culture among workers in the petrol and liquefied petroleum gas filling stations operators in Akwa Ibom State indicated varying levels of compliance with expected safety standards [9][10]. Furthermore, safety culture may vary among organisations because of differences in management commitment, workforce characteristics, safety training, supervision, communication and available safety resources [3][5]. A systematic assessment of workers' perceptions can therefore provide a useful baseline for identifying strengths and weaknesses in the safety practices of construction companies. This study consequently adopts a cross-sectional approach to assess safety culture among construction workers in Akwa Ibom State, Nigeria using four selected construction companies as the case study, with emphasis on key organisational and behavioural dimensions that influence workplace safety.

Safety Culture in the Construction Industry

Safety culture has emerged as an important determinant of occupational safety performance, particularly in high-risk industries such as construction. It broadly refers to the shared values, beliefs, attitudes, perceptions and behavioural expectations that influence how safety is understood, prioritised and practised within an organisation [11][12]. Unlike formal safety rules and procedures, which provide structured mechanisms for controlling hazards, safety culture reflects the extent to which safety is embedded in organisational decision-making, leadership practices and routine work activities [13][14]. Its importance is particularly pronounced in

the construction industry because construction activities are dynamic and often temporary, involving changing work environments, multiple contractors, diverse workforces and simultaneous exposure to several occupational hazards [11][13].

A positive safety culture is generally characterised by strong management commitment, effective safety communication, adequate training, competent supervision, worker participation and consistent adherence to established safety procedures [11][13]. Management commitment is particularly influential because organisational leaders determine the resources, priorities and organisational conditions within which safety is managed. Evidence from the Nigerian construction industry indicates that management support is an important factor in shaping workers' safety attitudes and encouraging safe work practices [15]. Similarly, research among construction organisations in Nigeria suggests that developing a resilient safety culture can strengthen an organisation's ability to anticipate, respond to and learn from safety-related challenges, thereby contributing to improved safety performance [16].

Safety communication and worker participation are also important elements of a positive safety culture. Toolbox meetings, safety briefings, hazard communication and feedback mechanisms enable workers to understand changing risks and participate in their control [11][13]. Encouraging workers to report hazards and near misses and to participate in safety meetings, inspections and risk assessments can strengthen their involvement and sense of responsibility for workplace safety [13][17]. Safety training complements these activities by providing workers with the knowledge and competence required to identify hazards, follow safe work procedures and respond effectively to emergencies [11][14].

An important conceptual distinction exists between safety culture and safety climate. Safety culture represents the broader organisational values, beliefs and practices concerning safety, whereas safety climate generally reflects workers' perceptions of how safety is prioritised and managed at a particular point in time [13][18]. Consequently, questionnaire-based cross-sectional studies frequently assess workers' perceptions of safety climate as an observable manifestation of aspects of the prevailing safety culture. This distinction is relevant to the present study because the structured questionnaire provides an opportunity to examine workers' perceptions of important safety-culture dimensions, including management commitment, safety communication, training, worker participation, compliance and safety behaviour.

Given the hazardous nature of construction activities, understanding the prevailing safety culture within construction organisations is essential for identifying organisational weaknesses that may contribute to unsafe practices and occupational incidents. Assessing these dimensions among workers in selected construction companies in Akwa Ibom State can therefore provide useful empirical evidence for strengthening safety management practices, improving worker involvement and promoting a more proactive and preventive approach to occupational safety.

Construction Safety in Nigeria

Construction is one of the major sectors supporting Nigeria's economic and infrastructural development, but its activities are associated with significant occupational safety and health risks. Construction workers are routinely exposed to hazards arising from work at height, excavation, electrical installations, moving equipment, falling objects, manual handling and interaction with plant and machinery. The dynamic nature of construction sites, together with the involvement of multiple contractors and subcontractors, changing work conditions and varying levels of worker competence, makes effective safety management particularly challenging [19][20]. Evidence from the Nigerian construction industry indicates that occupational accidents remain a significant concern and that deficiencies in safety practices can adversely affect workers, project performance and organisational productivity [21][22].

The safety challenges in Nigeria are not attributable solely to the physical hazards associated with construction activities. Organisational and human factors also play important roles in determining safety outcomes [23]. Studies of Nigerian construction sites and safety incidents have identified inadequate commitment to safety, weak enforcement of safety requirements, insufficient safety education, poor coordination and non-compliance with established safety procedures among factors contributing to unsafe conditions and accidents [21][23].

Workers' attitudes and behaviours are similarly important, as unsafe acts and inadequate adherence to safety procedures can increase exposure to hazards. Research conducted among construction firms in Lagos, for example, identified unsafe behaviour as an important contributor to construction accidents and emphasised the need for interventions capable of promoting safer worker behaviour [24].

Management commitment represents another important aspect of construction safety in Nigeria. Construction organisations that demonstrate visible leadership commitment to safety are more likely to provide appropriate resources, establish effective safety procedures and encourage workers to adopt safe practices. Conversely, where production targets, project schedules or cost considerations are perceived to take precedence over safety, workers may be encouraged, directly or indirectly, to tolerate unsafe conditions or bypass established procedures [20][22]. Evidence from Nigerian construction workers demonstrates that management support is a critical factor in shaping workers' safety attitudes, suggesting that organisational leadership has an important role in establishing and sustaining positive safety practices [25]. Similarly, research on Nigerian construction organisations indicates that a resilient safety culture can enhance organisational capacity to anticipate, respond to and learn from safety-related challenges [26].

Regulatory and institutional mechanisms also constitute an important component of construction safety in Nigeria. Effective occupational safety management requires appropriate legislation, competent regulatory institutions, employer compliance, worker participation and effective monitoring and enforcement. However, the existence of regulations alone does not guarantee safe construction practices. The effectiveness of the regulatory framework depends substantially on the extent to which safety requirements are implemented and monitored at construction sites [21][22]. Consequently, improving construction safety requires a combination of regulatory enforcement, organisational commitment, worker competence, effective supervision and a strong safety culture.

Against this background, assessing safety culture among construction workers is important because accident statistics alone may not adequately reveal underlying weaknesses in safety management. Workers' perceptions can provide useful information about management commitment, communication, training, participation, compliance and safety behaviour within their organisations [25][26]. Therefore, examining these dimensions among workers in selected construction companies in Akwa Ibom State can provide empirical evidence on the prevailing safety culture and identify areas requiring improvement. Such evidence is particularly valuable for strengthening preventive safety practices and promoting safer construction workplaces within the state.

Problem Statement

Despite the importance of the construction industry to Nigeria's economic and infrastructural development, construction workers continue to face significant occupational safety risks arising from hazardous work environments, unsafe practices, inadequate supervision and weaknesses in safety management [19][21]. The persistence of these risks suggests that the existence of safety regulations, procedures and protective equipment alone may not be sufficient to achieve effective workplace safety. Organisational factors, particularly management commitment, safety communication, worker participation, training, supervision and safety behaviour, can significantly influence the prevailing safety culture and consequently workers' exposure to occupational hazards [25][26].

Although previous studies have examined construction safety, safety measures and workers' safety behaviour in Nigeria and Akwa Ibom State, empirical evidence specifically assessing the multidimensional safety culture of construction organisations in Akwa Ibom State remains limited [17][41]. Without adequate information on workers' perceptions and experiences regarding key safety-culture dimensions, construction organisations may have difficulty identifying weaknesses requiring targeted intervention. There is therefore a need to systematically assess safety culture among workers in selected construction companies in Akwa Ibom State. This study seeks to address this gap by conducting a cross-sectional assessment of safety culture among workers in four selected construction companies, thereby providing evidence that can support improved safety management and preventive practices within the construction industry.

Justification of the Study

The construction industry involves numerous occupational hazards, making effective safety management essential for protecting workers and improving project performance. While compliance with safety regulations and the provision of protective equipment are important, a strong safety culture is necessary to ensure that safety principles are consistently integrated into everyday work practices [19][20]. Assessing safety culture provides insight into workers' perceptions of management commitment, safety communication, training, supervision, participation and compliance, which may not be adequately captured through accident records or routine inspections alone.

There is limited empirical evidence on safety culture among construction workers in Akwa Ibom State. This study is therefore justified by the need to provide baseline information on the prevailing safety culture within selected construction companies. The findings may assist construction managers and health safety and environment (HSE) professionals in identifying areas of strength and weakness, developing targeted safety interventions and strengthening worker participation in safety management. The study may also provide useful evidence for regulators, policymakers and researchers seeking to improve occupational safety practices within Nigeria's construction industry.

Aim and Objectives

The aim of this study is to assess the prevailing safety culture among workers in the construction industry in Akwa Ibom State, Nigeria using four selected companies as the case studies.

The study seeks to achieve the following specific objectives:

1. Assess workers' perceptions of management commitment to occupational safety in the selected construction companies;
2. Evaluate the level of safety communication and safety training provided to workers;
3. Assess workers' compliance with established safety rules and procedures;
4. Determine the extent of workers' participation in workplace safety activities;
5. Assess safety-related reporting practices, including the reporting of hazards and near misses;
6. Examine workers' safety attitudes and behaviours; and
7. Determine the overall level of safety culture among workers in the selected construction companies.

LITERATURE REVIEW

Concept of Safety Culture

Safety culture is a fundamental concept in occupational health and safety and describes the collective values, beliefs, attitudes, perceptions and behaviours that influence how safety is understood and managed within an organisation. It reflects the extent to which safety is regarded as a core organisational value and incorporated into decision-making, work processes and everyday interactions [27][28]. The concept goes beyond the existence of safety policies and procedures because an organisation may have comprehensive safety rules while workers and managers fail to consistently demonstrate commitment to them. Consequently, safety culture is concerned not only with what an organisation formally requires but also with how safety is actually prioritised and practised in routine operations [29][30].

The concept has evolved from attempts to understand why serious accidents occur despite the existence of technical safeguards and formal safety management systems. Early safety-culture literature emphasised organisational values, management commitment, communication and employee involvement as important

influences on safety performance [29][31]. Contemporary perspectives regard safety culture as multidimensional and dynamic, involving interactions between organisational structures, management practices, supervisory behaviour and individual attitudes [27][28]. In this context, a positive safety culture is commonly characterised by visible management commitment, effective communication, appropriate training, adequate resources, worker participation, learning from incidents and consistent reinforcement of safe behaviours [28][32].

Management commitment is particularly central to the concept because workers often interpret management actions as an indication of the organisation's actual safety priorities. When managers allocate adequate resources to safety, participate in safety activities, respond promptly to reported hazards and avoid compromising safety for production targets, they communicate that safety is a genuine organisational priority [9][10][32][33]. Conversely, inconsistent enforcement of safety procedures, inadequate resources and excessive emphasis on production can weaken workers' perception of the importance of safety and encourage unsafe practices [9][28][34].

Safety culture is also closely related to safety climate, although the two concepts are not synonymous. Safety culture generally represents the deeper and more enduring organisational values, beliefs and practices concerning safety, whereas safety climate refers more specifically to workers' perceptions of the organisation's safety policies, practices and priorities at a particular point in time [27][35]. Safety climate can therefore be viewed as an observable or measurable manifestation of aspects of safety culture. This distinction is particularly important in questionnaire-based research because workers' responses generally provide evidence of their perceptions of safety practices rather than a complete measurement of the underlying organisational culture [27][35].

In the construction industry, safety culture is especially significant because work environments are dynamic, hazards change as projects progress, and multiple employers, contractors and workers may operate simultaneously. Effective safety culture can promote communication, hazard reporting, worker participation and adherence to safe work practices, thereby supporting improved safety performance [27][36]. A systematic review of construction safety-climate research identified management commitment, communication, safety training, worker involvement and safety practices among the important dimensions used to assess safety climate within construction organisations [27]. Thus, assessing safety culture provides an important means of understanding the organisational and behavioural factors that influence construction safety and identifying areas requiring improvement.

Conceptual Framework

Safety culture is a multidimensional organisational construct reflecting the values, attitudes, perceptions and practices through which an organisation approaches occupational safety. In the construction industry, safety culture is influenced by organisational leadership, communication, worker involvement, safety procedures, competence and management commitment [27][41]. Previous research has demonstrated that leadership, involvement, procedures, commitment, communication and competence are closely associated with safety-culture maturity and safety behaviour in construction organisations [41]. Similarly, research in the Nigerian construction industry has identified management commitment and support as important factors influencing workers' safety attitudes and safety practices [43]. Recent evidence from Nigerian construction companies also indicates that management commitment, safety training and safety communication are important components of effective safety management and safety performance.

Based on these perspectives, this study conceptualises safety culture as the dependent/outcome construct, while management commitment, safety communication, safety training and worker involvement constitute the principal dimensions through which safety culture is assessed. The framework assumes that strong management commitment provides the organisational foundation for safety by demonstrating that protection of workers is a genuine organisational priority. Management commitment is reflected in the establishment and enforcement of safety policies, allocation of resources, supervisory leadership and prioritisation of safety over production demands. Evidence from the Nigerian construction industry supports the importance of management commitment in influencing workers' safety attitudes.

Safety communication represents the processes through which safety information, expectations, warnings, lessons from incidents and other safety messages are communicated throughout the organisation. Effective communication enables workers to understand hazards, procedures and organisational expectations and facilitates feedback from workers to management. Recent research in Nigerian construction companies has specifically identified safety communication as an important factor in the relationship between safety practices and safety performance.

Safety training represents the provision of knowledge, skills and competence necessary for workers to recognise hazards, comply with safe work procedures and respond appropriately to unsafe situations. Training and orientation have been identified among the critical safety leading indicators in construction, alongside organisational commitment, safety climate and competence.

Worker involvement represents the extent to which employees participate in maintaining and improving workplace safety. It includes participation in safety discussions, hazard identification, reporting, safety inspections, incident learning and other safety-related activities. Worker involvement is important because employees possess direct knowledge of work conditions and can contribute to the identification and control of hazards. Construction safety research has identified employee involvement as an important component of safety culture and safety performance [41]. The conceptualisation is also consistent with evidence that management commitment and worker engagement operate together in creating a positive safety environment.

The framework therefore proposes that management commitment, communication, training and worker involvement interact to shape the prevailing safety culture within construction organisations. These dimensions are not viewed as completely independent; rather, they reinforce one another. For example, management commitment can provide resources for training and establish expectations for communication, while effective communication can encourage worker involvement and facilitate organisational learning. Consequently, a strong safety culture is expected where management demonstrates commitment, safety information is effectively communicated, workers receive appropriate training and employees are actively involved in safety activities.

Dimensions of Safety Culture

Safety culture is a multidimensional concept comprising organisational, managerial and behavioural factors that collectively influence how safety is prioritised and practised in the workplace. Although the dimensions vary across studies, management commitment, safety communication, safety training, supervisory practices, worker participation, safety rules and procedures, incident reporting, and safety behaviour are frequently identified as important components of safety culture in construction organisations [27][41]. These dimensions provide a useful framework for assessing whether safety is embedded in an organisation's routine activities or is treated merely as a regulatory requirement.

Management commitment reflects the extent to which organisational leaders demonstrate visible and sustained support for safety through resource allocation, enforcement of safety requirements and personal involvement in safety activities [32][33]. Safety communication concerns the effectiveness of information exchange regarding hazards, procedures, incidents and preventive measures. Open and timely communication enables workers to understand changing risks and encourages the reporting of unsafe conditions [27][41]. Safety training and competence ensure that workers possess the knowledge and skills required to identify hazards, use equipment safely and respond appropriately to emergencies [32].

Worker participation represents employees' involvement in safety meetings, inspections, risk assessments, hazard reporting and other safety-related decisions. Such participation can enhance workers' ownership of safety and provide management with practical information about hazards encountered during daily operations [27][42]. Supervisory practices are equally important because supervisors directly influence workers' adherence to procedures and can reinforce or undermine organisational safety expectations. Safety rules and procedures provide formal guidance for controlling workplace hazards, while incident and near-miss reporting enables organisations to identify weaknesses and learn from events before they result in serious consequences [32][41]. Finally, safety behaviour reflects the extent to which workers comply with safety requirements and

actively engage in practices that protect themselves and others [42].

Collectively, these dimensions provide a comprehensive basis for evaluating safety culture among construction workers. In the present study, they provide the conceptual basis for assessing workers' perceptions of safety practices within the selected construction companies in Akwa Ibom State.

Safety Culture and Construction Safety Performance

Safety culture is increasingly recognised as an important organisational determinant of safety performance in the construction industry. Construction projects involve changing work environments, multiple contractors and subcontractors, temporary work arrangements and exposure to numerous physical, chemical and operational hazards. Under such conditions, the effectiveness of safety management depends not only on formal procedures and technical controls but also on the values, attitudes and behaviours through which safety is implemented in everyday work [27][41]. A positive safety culture can therefore provide the organisational foundation for translating safety policies into consistent safe practices and improved safety outcomes.

One of the most important pathways through which safety culture influences construction safety performance is management commitment. When managers demonstrate visible commitment to safety, provide adequate resources, participate in safety activities and consistently enforce safety requirements, workers are more likely to perceive safety as a genuine organisational priority [33][43]. Conversely, where management gives greater emphasis to production targets, project schedules or cost reduction than to safety, workers may perceive safety requirements as secondary and become more willing to tolerate unsafe practices [26][43]. Evidence from the Nigerian construction industry indicates that management support can influence workers' safety attitudes, suggesting that leadership commitment is an important component of effective safety performance [33].

Safety communication is another mechanism linking safety culture to safety performance. Construction activities frequently change as projects progress, creating new hazards and altering existing risks. Regular toolbox meetings, safety briefings, warning systems and communication between supervisors and workers enable timely identification and control of these risks [27][41]. Effective communication can also encourage workers to report hazards and near misses, allowing organisations to address unsafe conditions before they develop into accidents. Conversely, poor communication may leave workers unaware of changing hazards or discourage them from raising safety concerns.

Training and competence also contribute significantly to safety performance. Construction workers require appropriate knowledge and skills to recognise hazards, operate equipment safely, use personal protective equipment correctly and respond effectively to emergencies. Safety training is more likely to produce sustained improvements when it is reinforced by effective supervision and organisational practices that support the application of acquired knowledge [32][44]. A safety culture that values continuous learning can consequently enhance workers' capacity to recognise and manage workplace risks.

Worker participation and safety behaviour further strengthen the relationship between safety culture and safety performance. Workers who are actively involved in safety meetings, inspections, risk assessments and hazard reporting can contribute practical knowledge about conditions at the workplace [27][42]. Such participation can promote ownership of safety and increase compliance with safe work procedures. Similarly, when safe behaviour is recognised and reinforced by supervisors and co-workers, it can become an accepted norm within the organisation [39][42]. Conversely, the routine acceptance of unsafe acts can normalise risk-taking and weaken safety performance.

Empirical evidence supports the relationship between safety culture and construction safety outcomes. A systematic review of construction safety-climate research identified management commitment, communication, training, worker involvement and safety practices as important dimensions associated with safety performance [27]. Studies within Nigeria have similarly reported relationships between organisational safety culture, management support, workers' safety attitudes and construction safety performance [26][33]. These findings suggest that improving construction safety requires more than enforcing individual safety rules; it requires the development of organisational conditions in which safe behaviour is consistently expected,

supported and reinforced.

Therefore, safety culture can be viewed as an important underlying factor influencing construction safety performance. A strong culture creates conditions that encourage hazard recognition, effective communication, worker participation, learning and compliance, while a weak culture may allow unsafe practices to become normalised. Assessing safety culture among construction workers can consequently provide an indication of organisational strengths and weaknesses that may influence safety performance. For the present study, examining management commitment, safety communication, training, worker participation, compliance, reporting practices and safety behaviour provides a basis for understanding how safety culture is manifested within selected construction companies in Akwa Ibom State.

Empirical Review

Empirical studies have consistently demonstrated that safety culture and safety climate are important determinants of safety performance in the construction industry. Zhou et al. [27], in a systematic review of safety-climate research in construction, identified management commitment, safety communication, safety training, worker involvement and safety practices among the major dimensions used to assess safety climate. The review further indicated that positive safety-climate perceptions are generally associated with improved safety performance, suggesting that workers' perceptions of organisational safety practices can provide useful indicators of workplace safety conditions.

Evidence from Nigeria similarly demonstrates the importance of organisational factors in construction safety. Abubakar et al. [26] examined the potential of adopting a resilient safety culture among construction organisations in Nigeria and reported that safety culture can contribute to improved safety performance by strengthening organisational resilience and the capacity to anticipate and respond to safety-related challenges. Their findings suggest that organisations with stronger safety-oriented systems are better positioned to manage emerging risks and learn from safety-related events.

Moda et al. [43] investigated management support as a critical success factor for changing workers' safety attitudes in the Nigerian construction industry. Their findings demonstrated the importance of management support in influencing workers' safety attitudes, highlighting the role of leadership in creating conditions that encourage safe behaviour. Similarly, Edem and Akinsola [42] examined human factors associated with occupational safety at a Nigerian construction site using behavioural observation-based indicators. Their study demonstrated the relevance of human and behavioural factors in assessing construction safety and reinforced the need to consider worker behaviour alongside technical safety controls.

Afuye et al. [24] examined perceptions of safety behaviour-modifying techniques among construction firms in Lagos, Nigeria, and reported the importance of behavioural interventions in improving construction safety. Collectively, these studies indicate that construction safety is influenced by a combination of organisational, managerial and human factors rather than by technical controls alone. However, much of the available Nigerian evidence is concentrated in other geographical locations, with limited empirical information on safety culture among construction workers in Akwa Ibom State. The present study therefore seeks to contribute localised evidence by assessing key dimensions of safety culture among workers in selected construction companies in the state.

Knowledge Gap

Although several studies have examined occupational safety practices within the Nigerian construction sector, limited empirical evidence exists concerning workers' perceptions of safety culture among construction companies in Akwa Ibom State. This study therefore seeks to contribute empirical evidence by assessing selected dimensions of safety culture among workers in the construction companies within Akwa Ibom State.

METHODOLOGY

Research Design

This study adopted a cross-sectional descriptive multi-case study design to assess the prevailing safety culture among workers in selected construction companies in Akwa Ibom State, Nigeria. The cross-sectional component was appropriate because data were collected from respondents at a defined period, providing a snapshot of their perceptions and experiences regarding workplace safety culture [45][46]. The descriptive approach was considered suitable because the study sought to describe key dimensions of safety culture without manipulating the study environment or introducing an intervention [47]. The multi-case study approach was adopted because the investigation involved four selected construction companies as distinct cases, allowing safety-culture practices and workers' perceptions to be examined across multiple organisational settings. Multi-case study designs are useful for investigating a phenomenon within its real-life context and for identifying similarities and differences across cases [48][49]. A structured questionnaire was used as the principal instrument for collecting standardised quantitative data from workers in the four participating companies. The combination of cross-sectional, descriptive and multi-case approaches therefore provided an appropriate framework for obtaining a comparative snapshot of safety culture across the selected construction companies. However, because the study was cross-sectional and involved only four selected companies, the findings are interpreted within the context of the participating organisations and should not be assumed to represent all construction companies in Akwa Ibom State.

Study Area

The study was conducted in Akwa Ibom State, Nigeria, located in the South-South geopolitical zone of the country. The state is situated within the Niger Delta region and has a predominantly tropical environment, with economic activities spanning oil and gas, construction, agriculture, commerce and public infrastructure development. The state has experienced considerable infrastructural and urban development, resulting in construction activities involving residential buildings, commercial facilities, roads and other public infrastructure. These activities provide employment opportunities for construction workers but also expose them to various occupational hazards associated with construction operations. The study focused specifically on four selected construction companies operating in Akwa Ibom State, from which workers were recruited as study participants. The area was selected because of the presence of active construction activities and the need to generate empirical evidence on safety culture within the state's construction sector. The study therefore provides a localised assessment of workers' perceptions of safety practices and organisational commitment to safety within the selected companies.

Study Population

The target population for this study comprised all construction workers employed in construction companies operating in Akwa Ibom State, Nigeria. This broad population was considered appropriate because the study sought to provide an understanding of safety-culture practices within the construction industry in the state rather than limiting the conceptual scope to the participating companies. However, due to practical considerations, data were collected from workers in four purposively selected construction companies, which constituted the study cases. The accessible population was therefore the construction workers available within these selected companies during the period of data collection. A total of 40 workers, comprising 10 workers from each company, were subsequently selected as the study sample. Thus, the target population represented the broader group to which the study seeks to contribute evidence, while the 40 respondents constituted the actual sample from which data were obtained. This distinction is important when interpreting the findings and considering their potential generalisability to the wider construction workforce in Akwa Ibom State.

Sample Size

The study comprised 40 construction workers, with 10 workers selected from each of the four participating construction companies. The relatively small sample size was considered appropriate for the exploratory, cross-sectional multi-case design and the purposive sampling technique adopted for the study. The purpose

was to obtain focused information from workers considered relevant to the study and to identify safety-culture patterns that reflect practices commonly encountered within the participating construction organisations. Equal allocation of 10 workers per company ensured balanced representation of the four cases and facilitated comparison of safety-culture perceptions across the organisations. The small sample also made data collection more manageable, allowed closer monitoring of questionnaire administration and reduced logistical and resource requirements. Although the findings are intended to provide an indication of safety-culture practices that may be commonly experienced within the construction industry, the purposive sampling approach and relatively small sample size limit statistical generalisability. Consequently, the findings should be interpreted within the context of the selected companies, while future studies involving larger sample sizes, more construction companies and probability-based sampling techniques are recommended to enhance the representativeness and generalisability of the findings..

Sampling Technique

The study adopted a purposive sampling technique for the selection of the construction companies and respondents. Purposive sampling involves deliberately selecting participants or cases because they possess characteristics, experience or knowledge relevant to the objectives of a study. This approach was considered appropriate because the study sought to obtain information from workers who had direct experience of safety practices within construction organisations. It was also consistent with the multi-case nature of the study, where information-rich cases were required to provide meaningful insight into safety culture.

Four construction companies were purposively selected for the study. Within the selected companies, respondents were also deliberately selected from different organisational levels to ensure that the assessment of safety culture was not based exclusively on managerial perceptions. A total of 16 questionnaires [40%] were administered to supervisors/managers, while 24 questionnaires [60%] were administered to office/technical workers. The inclusion of respondents from different levels was considered important because safety culture may be perceived differently across organisational levels. Research in the construction industry has demonstrated differences in safety perceptions among management, supervisory personnel and workers, supporting the value of obtaining information from more than one organisational level [41].

The purposive approach was further justified by the objective of obtaining information-rich responses from personnel who were sufficiently familiar with their organisations' safety policies, procedures and practices. In construction safety research, management commitment, worker involvement, communication and safety procedures are commonly assessed through workers' perceptions [41]. Moreover, construction safety culture has a multi-level character, with organisational management, supervisors and workers contributing differently to the development and experience of safety culture [41]. The deliberate inclusion of supervisors/managers and office/technical workers therefore provided a broader basis for assessing the safety culture of the selected organisations.

Despite the advantages, purposive sampling has the potential to introduce selection bias. Because the companies and respondents were deliberately selected rather than randomly chosen, the participating organisations may differ systematically from construction companies that were not included in the study. For example, companies with relatively well-established safety systems or greater willingness to participate in safety research may have been more likely to permit access to their workers. Conversely, organisations experiencing substantial safety challenges may have been less willing to participate. Consequently, the highly positive safety-culture perceptions observed in this study may partly reflect the characteristics of the selected organisations.

There is also a possibility of organisational bias and response bias. Respondents may have been influenced by their employment relationship with the participating companies and may therefore have provided responses that portrayed their organisations positively. This is particularly relevant when employees are asked to assess management commitment, safety policies and organisational safety practices. Previous construction safety research has shown that perceptions of safety can differ between management and workers, with management sometimes reporting more favourable safety perceptions than workers [41].

To minimise this potential bias, the study included respondents from different organisational levels rather than relying exclusively on supervisors or managers. The inclusion of 24 office/technical workers alongside 16 supervisors/managers allowed the study to capture perceptions beyond the management level. This approach is supported by evidence that multi-level assessment provides a more comprehensive understanding of construction safety culture and can reveal differences in perceptions between organisational groups [41].

Nevertheless, the findings should be interpreted as indicative of safety-culture conditions within the four selected construction companies rather than statistically representative of all construction companies or workers in Akwa Ibom State. The purposive sampling technique was appropriate for the exploratory multi-case assessment, but larger studies using probability-based sampling are recommended to reduce selection bias and improve the generalisability of findings. The limitation is particularly important because the study's purpose was to provide an initial empirical assessment of safety culture rather than to estimate its prevalence across the entire construction workforce in the state.

Research Instrument

Data were collected using a structured self-administered questionnaire developed to assess the prevailing safety culture among workers in the selected construction companies. The questionnaire was developed in line with the objectives of the study and the major dimensions of safety culture identified in the relevant literature, including management commitment, safety communication, safety training, worker participation, safety rules and procedures, safety reporting and safety behaviour [27][41]. A structured questionnaire was considered appropriate because it provided a consistent format for collecting comparable information from respondents across the four participating companies and facilitated quantitative analysis of their perceptions.

The questionnaire employed a five-point Likert scale consisting of *Strongly Disagree* (1), *Disagree* (2), *Neutral* (3), *Agree* (4), and *Strongly Agree* (5). Likert-type scales are widely used for measuring respondents' attitudes, perceptions and levels of agreement with structured statements [52][53]. The *Neutral* option was deliberately provided for respondents who neither agreed nor disagreed with a statement or who did not have sufficient information or experience to make a reasonable assessment. This option was considered important because workers from different occupational and organisational levels may not have adequate knowledge of every aspect of their company's safety management system. Its inclusion therefore reduced the likelihood of forcing respondents to select an agreement or disagreement option when neither accurately represented their position.

The questionnaire consisted of statements relating to the major safety-culture dimensions investigated in the study. Respondents were required to indicate the response that best represented their perception or experience of each statement. For positively worded statements, higher scores represented stronger agreement with desirable safety practices, while lower scores indicated weaker perceptions. The uniform response format facilitated coding, tabulation and comparison of responses across the four participating companies and among different categories of workers. The questionnaire was administered directly to the selected respondents, with appropriate clarification provided where necessary to ensure that the questions were understood consistently.

Validity and Reliability of the Instrument

The validity of the questionnaire was established through expert review and content validation. The instrument was developed from the study objectives and relevant literature on safety culture and construction safety, ensuring that the questionnaire items adequately represented the major dimensions under investigation. The draft questionnaire was compared to the questionnaire successfully deployed for similar study on public health sector and reviewed by an expert in occupational health and safety, construction safety and research methodology for relevance, clarity, adequacy of coverage and appropriateness of the wording of the items. The observations and recommendations were incorporated into the final version of the instrument. Expert assessment of questionnaire content is an established approach for determining whether an instrument adequately covers the construct it is intended to measure [54][55].

The reliability of the instrument refers to the consistency of the measurements produced by the questionnaire. The internal consistency of the questionnaire was assessed using Cronbach's alpha coefficient. The 11 items measuring safety culture were subjected to reliability analysis to determine the extent to which they consistently measured the underlying construct. A Cronbach's alpha coefficient of 0.70 or above was considered indicative of acceptable internal consistency [56][57]. The reliability analysis was conducted using the individual responses obtained during the instrument validation/reliability exercise.

The validity and reliability procedures were undertaken to enhance the quality and credibility of the data generated by the instrument. Establishing both content validity and internal consistency was particularly important because the study relied on workers' perceptions of organisational safety practices. These procedures provided reasonable assurance that the questionnaire adequately represented the constructs being investigated and that the responses obtained were sufficiently consistent for subsequent analysis.

Data Collection Procedure

Data were collected through the administration of the structured questionnaire to the selected workers in the four participating construction companies. Prior to data collection, the researchers obtained the necessary permission from the management of the participating companies and explained the purpose and scope of the study to the respondents. Participation was voluntary, and respondents were informed that the information provided would be used strictly for academic purposes and treated confidentially and in aggregate format.

The questionnaires were personally administered to the selected respondents to enhance the response rate and ensure that participants clearly understood the instructions and items. The researchers also ensured that respondents were drawn from different organisational levels in accordance with the sampling plan, including supervisors/managers, office and technical workers, and other relevant workers. Respondents were encouraged to provide answers based on their actual experiences and perceptions of safety practices within their respective organisations.

Each respondent completed the questionnaire independently using the five-point Likert scale of *Strongly Disagree*, *Disagree*, *Neutral*, *Agree* and *Strongly Agree*. The *neutral* option was available to respondents who neither agreed nor disagreed with a statement or who considered themselves insufficiently informed to make an appropriate assessment. Completed questionnaires were collected and checked for completeness before being coded for analysis. Questionnaires with substantial missing responses were excluded from the analysis where necessary. The data collection process was conducted within the period specified for the study, after which the completed and usable questionnaires were compiled for statistical analysis.

Data Analysis

The completed questionnaires were coded and analysed using descriptive statistical techniques. The responses were based on a five-point Likert scale, coded as *Strongly Disagree* = 1, *Disagree* = 2, *Neutral* = 3, *Agree* = 4, and *Strongly Agree* = 5. For each questionnaire item, the frequency and percentage of respondents selecting each response category were determined. Descriptive statistics were considered appropriate because the primary purpose of the study was to describe workers' perceptions of the prevailing safety culture across the four selected construction companies rather than to establish causal relationships [52][53].

For each item, a weighted mean score was calculated using the assigned Likert values. The weighted mean was obtained by multiplying the frequency of each response category by its corresponding score, summing the products and dividing the result by the total number of valid responses. The general formula was:

$$\text{Weighted Mean} = \frac{\sum(f \times x)}{N}$$

where f represents the frequency of each response, x represents the Likert score assigned to the response, and N

represents the total number of respondents. The mean scores were interpreted using the following decision rule: 1.00–1.80 = *Strongly Disagree*; 1.81–2.60 = *Disagree*; 2.61–3.40 = *Neutral*; 3.41–4.20 = *Agree*; and 4.21–5.00 = *Strongly Agree*. Higher mean scores therefore indicated more positive perceptions of the safety-culture dimension being assessed.

The responses were also analysed separately for the supervisors/managers ($n = 16$) and office/technical workers ($n = 24$). This separation was necessary because the study deliberately included respondents from different organisational levels to determine whether perceptions of safety culture were broadly consistent across management/supervisory and office/technical personnel. The two groups were subsequently compared descriptively to identify similarities and differences in their perceptions of management commitment, teamwork, worker involvement, safety rules and procedures, training, incident learning, safety communication, reporting, accident investigation and production pressure.

The overall safety-culture assessment was obtained by considering the pattern of responses and the mean scores across the 11 questionnaire items. The use of frequencies, percentages and weighted means provides a straightforward approach for summarising Likert-scale responses and identifying dominant patterns within the data [52][53]. Given the purposive sampling technique, relatively small sample size of 40 workers and multi-case design, the analysis was primarily descriptive, and the findings were interpreted within the context of the four participating construction companies rather than subjected to statistical generalisation to all construction workers in Akwa Ibom State.

Ethical Considerations

Ethical principles were observed throughout the study to protect the rights, dignity, privacy and welfare of the participants. Before administering the questionnaires, the purpose of the study was explained clearly to the participating construction companies and respondents. Participation was voluntary, and respondents were informed that they had the right to decline participation or withdraw from the study without penalty or adverse consequences. Informed consent was obtained from participants before they completed the questionnaire, consistent with established ethical principles for research involving human participants [59][60].

Confidentiality and anonymity were also maintained. Respondents were not required to provide names or other personal identifiers that could directly link their responses to them. Information obtained from the questionnaires was used strictly for academic and research purposes, and individual responses were not disclosed to company management or other third parties. The results were presented in aggregate form to prevent individual participants from being identified. Particular care was taken because the study involved workers providing perceptions about safety practices within their organisations, which could potentially create concerns about employment-related consequences if individual responses were disclosed.

The researchers also ensured that participation did not expose respondents to unnecessary physical, psychological, professional or social risks. Participants were allowed to complete the questionnaire at an appropriate time and in a manner that did not interfere unduly with their work responsibilities. Data obtained from the study were securely handled and made accessible only for purposes related to the research. The study also maintained scientific integrity by ensuring that responses were recorded and analysed as provided by participants without deliberate alteration or manipulation. These measures were adopted to promote respect for participants, voluntary participation, confidentiality and responsible conduct of research [59][61].

RESULTS

A total of 40 questionnaires were administered to workers across the four selected construction companies, comprising 16 supervisors/managers and 24 office/technical workers. All 40 questionnaires were adequately completed and considered suitable for analysis, giving a 100% response rate.

Table 1 presents the summary of the responses from both the supervisors/managers and office/technical workers.

Table 1: Summary of Responses from All Respondents

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. My organization has a safety policy	0	0	0	8	32
2. My supervisor, manager or director demonstrates commitment to safety	0	0	0	5	35
3. We work as a team to ensure safety is maintained in my Organization	0	0	0	6	34
4. The workforce are directly involved in maintaining Safety	0	0	0	11	29
5. There are safety rules and procedures in my organization	0	0	0	6	34
6. My organization is committed to personnel training to enhance safety compliance	0	0	2	10	28
7. In my organization, we have a culture of sharing and learning from incidents	0	0	1	13	26
8. My organizational leaders regularly share safety messages and communications	0	0	0	5	35
9. My organization encourages reporting of unsafe conditions, unsafe acts and accidents	0	0	2	9	29
10. In my organization, accidents are promptly investigated to determine root causes to prevent recurrence	0	0	0	11	29
11. At my workplace, we work in a relaxed atmosphere – there is no pressure for production or company business at the expense of safety	0	0	1	6	33

The results are further broken down and presented using frequencies, percentages and weighted mean scores based on the five-point Likert scale: *Strongly Disagree* (SA) = 1, *Disagree* (D) = 2, *Neutral* (N) = 3, *Agree* (A) = 4 and *Strongly Agree* (SA) = 5.

Safety Culture among Supervisors/Managers

Table 2 presents the responses of the 16 supervisors/managers to the 11 safety-culture statements.

Table 2: Safety Culture Responses among Supervisors/Managers (n = 16)

No.	Safety Culture Statement	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)	Mean
1	Organisation has a safety policy	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	16 (100.0)	5.00
2	Management demonstrates commitment to safety	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	16 (100.0)	5.00
3	Workers work as a team to maintain safety	0 (0.0)	0 (0.0)	0 (0.0)	3 (18.8)	13 (81.3)	4.81
4	Workforce is directly involved in maintaining safety	0 (0.0)	0 (0.0)	0 (0.0)	2 (12.5)	14 (87.5)	4.88
5	Safety rules and procedures exist	0 (0.0)	0 (0.0)	0 (0.0)	2 (12.5)	14 (87.5)	4.88
6	Organisation is committed to personnel training	0 (0.0)	0 (0.0)	0 (0.0)	4 (25.0)	12 (75.0)	4.75
7	Culture of sharing and learning from incidents	0 (0.0)	0 (0.0)	0 (0.0)	6 (37.5)	10 (62.5)	4.63
8	Leaders regularly share safety messages	0 (0.0)	0 (0.0)	0 (0.0)	1 (6.3)	15 (93.8)	4.94
9	Organisation encourages reporting of unsafe conditions/acts and accidents	0 (0.0)	0 (0.0)	0 (0.0)	4 (25.0)	12 (75.0)	4.75
10	Accidents are promptly investigated for root causes	0 (0.0)	0 (0.0)	0 (0.0)	5 (31.3)	11 (68.8)	4.69
11	Safety is not compromised by production pressure	0 (0.0)	0 (0.0)	0 (0.0)	2 (12.5)	14 (87.5)	4.88

The results show that supervisors/managers expressed highly positive perceptions across all 11 safety-culture indicators. All respondents strongly agreed that their organisations had safety policies and that management demonstrated commitment to safety, producing a mean score of 5.00 for both items. The highest remaining mean was recorded for regular communication of safety messages (4.94), followed by workforce involvement, safety rules and procedures, and freedom from production pressure compromising safety (4.88 each).

The lowest mean score was recorded for the culture of sharing and learning from incidents (4.63), although this still falls within the *Strongly Agree* category. Overall, no supervisor/manager selected *Strongly Disagree*, *Disagree* or *Neutral* for any of the 11 statements.

Safety Culture among Office/Technical Workers

Table 3 presents the responses of the 24 office/technical workers.

Table 3: Safety Culture Responses among Office/Technical Workers (n = 24)

No.	Safety Culture Statement	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)	Mean
1	Organisation has a safety policy	0 (0.0)	0 (0.0)	0 (0.0)	8 (33.3)	16 (66.7)	4.67
2	Management demonstrates commitment to safety	0 (0.0)	0 (0.0)	0 (0.0)	5 (20.8)	19 (79.2)	4.79
3	Workers work as a team to maintain safety	0 (0.0)	0 (0.0)	0 (0.0)	3 (12.5)	21 (87.5)	4.88
4	Workforce is directly involved in maintaining safety	0 (0.0)	0 (0.0)	0 (0.0)	9 (37.5)	15 (62.5)	4.63
5	Safety rules and procedures exist	0 (0.0)	0 (0.0)	0 (0.0)	4 (16.7)	20 (83.3)	4.83
6	Organisation is committed to personnel training	0 (0.0)	0 (0.0)	2 (8.3)	6 (25.0)	16 (66.7)	4.58
7	Culture of sharing and learning from incidents	0 (0.0)	0 (0.0)	1 (4.2)	7 (29.2)	16 (66.7)	4.63
8	Leaders regularly share safety messages	0 (0.0)	0 (0.0)	0 (0.0)	4 (16.7)	20 (83.3)	4.83
9	Organisation encourages reporting of unsafe conditions/acts and accidents	0 (0.0)	0 (0.0)	2 (8.3)	5 (20.8)	17 (70.8)	4.63
10	Accidents are promptly investigated for root causes	0 (0.0)	0 (0.0)	0 (0.0)	6 (25.0)	18 (75.0)	4.75
11	Safety is not compromised by production pressure	0 (0.0)	0 (0.0)	1 (4.2)	4 (16.7)	19 (79.2)	4.75

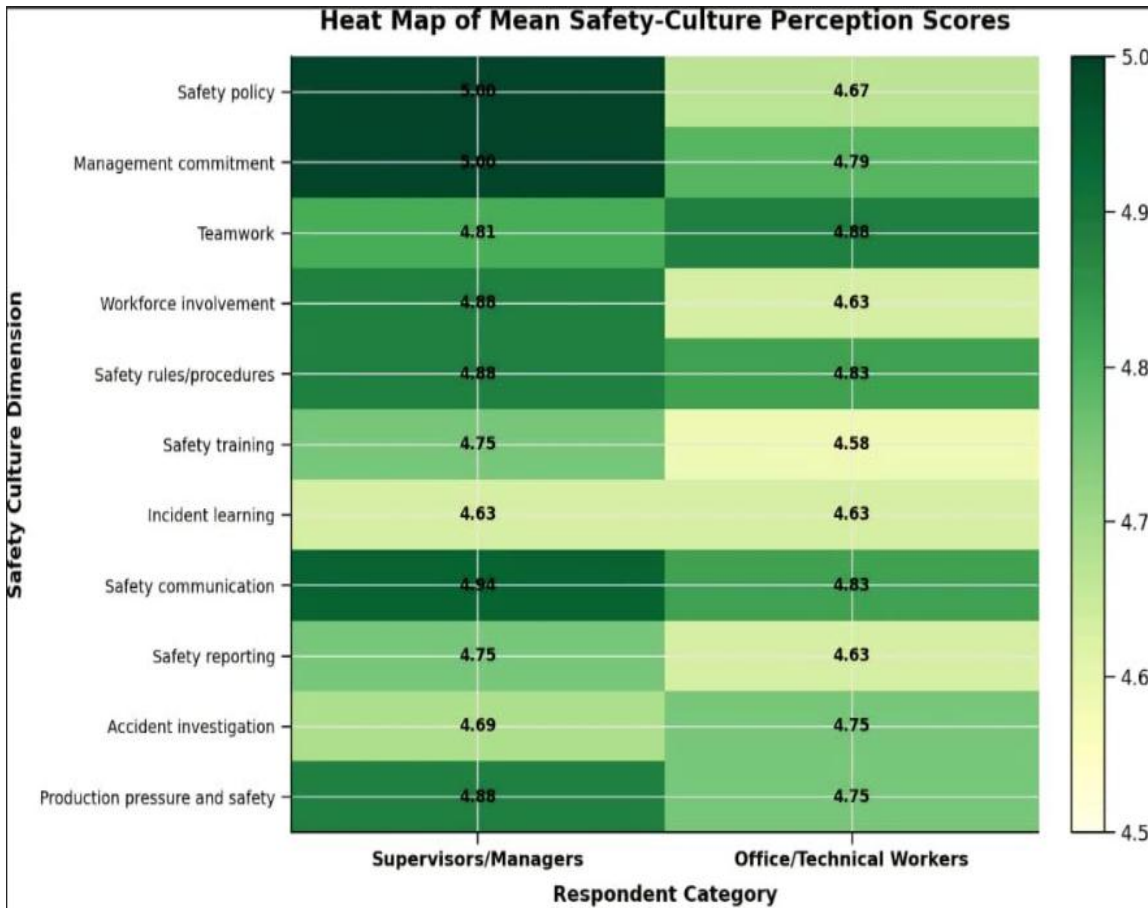
The office/technical workers also reported predominantly positive perceptions of safety culture. The highest mean score was recorded for teamwork in maintaining safety (4.88), followed by management commitment (4.79). Safety rules and procedures and regular communication of safety messages both recorded mean scores of 4.83.

The lowest mean score was recorded for organisational commitment to personnel training (4.58). The dimensions relating to workforce involvement, incident learning and reporting each recorded a mean of 4.63. Only three neutral responses were recorded across the 11 items: two for personnel training, one for incident learning and two for reporting of unsafe conditions/acts and accidents. No respondent selected either *Strongly Disagree* or *Disagree* for any of the statements.

Comparative Assessment of the Two Respondent Groups

A comparison of the two respondent groups (see table 4) indicates that both supervisors/managers and office/technical workers perceived the safety culture of their organisations positively. The mean scores for all 11 items exceeded 4.50 in both groups, indicating that the overall response was between *Agree* and *Strongly Agree*, with most responses falling within the *Strongly Agree* category.

Table 4: Mean Safety-Culture Perception Scores



The results show that supervisors/managers recorded higher mean scores than office/technical workers on seven of the 11 indicators, while office/technical workers recorded higher scores on teamwork and accident investigation. Both groups recorded the same mean score for incident learning (4.63). The differences between the two groups were generally small, indicating considerable consistency in their perceptions of safety culture.

The overall mean score was approximately 4.84 for supervisors/managers and 4.69 for office/technical workers, indicating a very positive overall perception of safety culture among both groups. When the two groups are considered together, the findings suggest that the selected construction companies demonstrate a generally strong safety culture across the dimensions assessed.

DISCUSSION

Overall Safety Culture among the Selected Construction Companies

The findings of this study (see Tables 1 and 4) indicate a strongly positive safety culture among the four selected construction companies in Akwa Ibom State. Across the 11 safety-culture indicators assessed, responses were overwhelmingly concentrated in the *Agree* and *Strongly Agree* categories, with no responses recorded under *Strongly Disagree* or *Disagree* for most items. This suggests that workers generally perceive safety as an important organisational priority and that the selected companies have established several elements of a positive safety culture. The finding is consistent with evidence that management commitment, safety communication, worker involvement, training and safety practices are important dimensions of safety climate and safety culture in construction organisations [27][41].

The results are particularly notable because the assessment included workers from different organisational levels. Sixteen respondents were supervisors/managers (see Table 2), while 24 were office/technical workers (see Table 3). The consistency of responses across these groups provides some indication that positive safety practices are not perceived solely at the management level but are also recognised by workers who interact with the organisation's safety systems in their respective roles. Nevertheless, the results should be interpreted

cautiously because the study used purposive sampling and involved only 40 respondents from four companies.

Management Commitment to Safety

The findings demonstrate a particularly strong perception of management commitment to safety. All 16 supervisors/managers strongly agreed that their organisations had safety policies and that supervisors, managers or directors demonstrated commitment to safety. Among the office/technical workers, all 24 respondents also agreed or strongly agreed that their organisations had safety policies and that management demonstrated commitment to safety. This represents an important strength because management commitment is widely regarded as one of the most influential components of a positive safety culture.

The finding agrees with Moda et al. [43], who reported that management support is a critical factor in changing workers' safety attitudes within the Nigerian construction industry. It is also consistent with Abubakar et al. [26], who emphasised the importance of organisational safety culture and resilience in improving safety performance among Nigerian construction organisations. Visible management commitment can influence how workers interpret organisational priorities. When managers consistently communicate and demonstrate that safety is important, workers are more likely to regard safety procedures as legitimate organisational expectations rather than merely regulatory requirements [33].

The strong responses in the present study may therefore suggest that managements in the participating companies have established a foundation upon which other elements of safety culture can be developed. However, the uniformly positive responses may also reflect the possibility of social desirability or response bias, particularly because respondents were employees of the organisations being assessed. This possibility should be considered when interpreting the results.

Teamwork and Worker Participation

The study also revealed positive perceptions regarding teamwork and worker involvement in safety. Among supervisors/managers, 13 of 16 respondents strongly agreed that workers worked as a team to maintain safety, while the remaining three agreed. Similarly, among office/technical workers, 21 strongly agreed and three agreed with the statement. No respondent disagreed with the statement.

A similar pattern was observed regarding direct workforce involvement in maintaining safety. Fourteen supervisors/managers strongly agreed and two agreed, while 15 office/technical workers strongly agreed and nine agreed. These findings indicate that safety is perceived as a shared responsibility rather than solely the responsibility of management or HSE personnel. Worker participation is important because workers possess practical knowledge of workplace conditions and may identify hazards that are not readily apparent to management [27][41].

The finding is also consistent with Edem and Akinsola [42], whose study of a Nigerian construction site demonstrated the importance of human and behavioural factors in occupational safety. Effective worker involvement can encourage hazard identification, reporting and compliance while strengthening workers' sense of ownership of safety. The high level of agreement in this study therefore represents a positive indication of participatory safety culture within the selected organisations.

Safety Rules, Procedures and Training

The findings indicate that formal safety arrangements were well established in the participating companies. All supervisors/managers agreed or strongly agreed that safety rules and procedures existed in their organisations, with 14 of the 16 strongly agreeing. Among office/technical workers, 20 strongly agreed and four agreed with the same statement. This suggests that respondents were generally aware of formal mechanisms for controlling workplace hazards.

Similarly, the results indicate strong organisational commitment to personnel training. Twelve supervisors/managers strongly agreed and four agreed that their organisations were committed to personnel training to enhance safety compliance. Among office/technical workers, 16 strongly agreed, six agreed and

only two selected the neutral option. The absence of disagreement is encouraging and suggests that safety training is generally recognised as an important organisational activity.

These findings support the position of the International Labour Organization that appropriate safety training, competence development and effective safety management are essential elements of construction safety [32]. Training enables workers to recognise hazards, understand safe work procedures and respond appropriately to emergencies. However, the two neutral responses among office/technical workers suggest that not every worker may have sufficient information or experience to assess the extent of organisational commitment to training. This observation reinforces the value of retaining the neutral response option in the questionnaire.

Incident Learning and Safety Communication

The findings further indicate a strong culture of safety communication and learning from incidents. Fifteen of the 16 supervisors/managers strongly agreed that organisational leaders regularly shared safety messages and communications, while the remaining respondent agreed. Among office/technical workers, 20 strongly agreed and four agreed. These results suggest that safety communication is highly visible within the participating organisations.

The findings are consistent with Zhou et al. [27], who identified safety communication as one of the important dimensions of construction safety climate. Effective communication is particularly important in construction because hazards and work activities change as projects progress. Regular safety messages, toolbox meetings and other communication mechanisms can help workers recognise changing risks and reinforce safe practices.

The responses regarding the sharing and learning from incidents were also positive, although slightly less emphatic than those relating to general safety communication. Ten supervisors/managers strongly agreed and six agreed that their organisations had a culture of sharing and learning from incidents. Among office/technical workers, 16 strongly agreed, seven agreed and one was neutral. This indicates that incident learning is present but may provide greater opportunity for improvement than some of the other assessed dimensions. Organisations that systematically learn from incidents and near misses can identify underlying weaknesses and prevent recurrence rather than treating each incident as an isolated event [26][32].

Hazard Reporting and Accident Investigation

The study found a strong perception that the participating companies encourage the reporting of unsafe conditions, unsafe acts and accidents. Twelve supervisors/managers strongly agreed and four agreed with this statement. Among office/technical workers, 17 strongly agreed, five agreed and two were neutral. No respondent disagreed.

This finding is important because effective reporting systems are essential for proactive safety management. Encouraging workers to report unsafe conditions allows organisations to identify hazards before they result in injury or property damage. It also promotes a learning-oriented safety culture in which workers feel that reporting safety concerns is valued rather than regarded as an admission of failure.

Similarly, respondents reported positively on the prompt investigation of accidents to determine root causes and prevent recurrence. Eleven supervisors/managers strongly agreed and five agreed, while 18 office/technical workers strongly agreed and six agreed. The absence of disagreement suggests that accident investigation is perceived as an established practice within the selected companies. This is consistent with the principles of effective safety management, which emphasise learning from incidents and addressing underlying or systemic causes rather than merely identifying individual errors [37][38].

Production Pressure and Safety

One of the important findings concerns the perceived relationship between production demands and safety. Fourteen supervisors/managers strongly agreed and two agreed that they worked in a relaxed atmosphere where production or company business did not take place at the expense of safety. Among office/technical workers, 19 strongly agreed, four agreed and one was neutral.

This result suggests that workers generally perceive safety as being given priority over production pressures. Such a perception is important because excessive production pressure can encourage workers to bypass procedures, work beyond safe limits or tolerate hazardous conditions in order to meet project deadlines. Management commitment to safety therefore needs to be demonstrated not only through policies and training but also through decisions made when safety and production objectives potentially conflict [26][33].

The overwhelmingly positive responses should nevertheless be interpreted with some caution. Because the questionnaire was administered within the participating companies, respondents may have been reluctant to express negative opinions about organisational practices. Future studies could strengthen this finding through confidential interviews, observations and independent safety audits.

Comparison between Supervisors/Managers and Office/Technical Workers

Overall, the responses of supervisors/managers and office/technical workers were remarkably consistent (see Table 4). Both groups demonstrated overwhelmingly positive perceptions across the 11 indicators. This consistency is important because it suggests that the positive safety culture identified in the study is not restricted to those occupying supervisory or managerial positions. Office and technical workers also perceived strong management commitment, teamwork, safety procedures, training, communication, reporting and incident investigation.

However, the office/technical group recorded a small number of neutral responses on training, incident learning, reporting and production pressure, whereas supervisors/managers provided no neutral responses. This difference may indicate that supervisors and managers possess greater knowledge of organisational safety policies and processes, while some workers may have less information about certain management-level activities. It may also reflect differences in exposure to safety-management decision-making.

Overall, the findings compare favourably with previous Nigerian studies that have emphasised the importance of management support, worker behaviour and organisational safety culture in construction safety [24][26][33][42]. The study therefore provides evidence that the selected construction companies have several characteristics associated with a positive safety culture. Nevertheless, the results should be regarded as a descriptive indication of safety culture among the selected cases, rather than definitive evidence of the safety culture of the entire construction industry in Akwa Ibom State. Larger studies involving more companies and probability-based sampling would be required to establish broader generalisability.

CONCLUSION

This study assessed the prevailing safety culture among workers in four selected construction companies in Akwa Ibom State, Nigeria, using a cross-sectional descriptive multi-case study design. Data obtained from 40 workers revealed an overwhelmingly positive perception of safety culture across the organisations. Respondents generally agreed or strongly agreed that their organisations had safety policies, demonstrated management commitment to safety, promoted teamwork and worker involvement, maintained safety rules and procedures, provided safety training and communicated safety messages regularly.

The findings also indicate that the selected companies have important elements of a proactive safety culture, particularly in relation to hazard and accident reporting, incident investigation, learning from incidents and maintaining safety without placing production demands above worker safety. The consistency of responses between supervisors/managers and office/technical workers further suggests that positive safety practices are recognised across different organisational levels.

Nevertheless, the findings should be interpreted within the limitations of the study. The use of purposive sampling, the relatively small sample of 40 workers and the inclusion of only four construction companies limit the statistical generalisability of the results to the wider construction workforce in Akwa Ibom State. The study therefore provides an indicative assessment rather than a definitive representation of the entire construction industry in the state.

Overall, the study concludes that the selected construction companies demonstrate a generally strong and positive safety culture, but continuous improvement remains necessary. Construction organisations should sustain management commitment, strengthen worker participation, maintain effective safety communication and training, encourage hazard and near-miss reporting, and promote systematic learning from incidents. Future studies involving larger samples, more construction companies and probability-based sampling techniques are recommended to provide stronger evidence and enhance the generalisability of findings on construction safety culture in Akwa Ibom State.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are made:

1. Sustained management commitment to safety: Construction company management should maintain visible and consistent commitment to occupational safety by providing adequate resources, enforcing safety requirements and demonstrating through their decisions that safety takes precedence over production pressures.
2. Strengthened safety training and competence: Regular, task-specific and refresher safety training should be provided to workers, supervisors and managers. Training should address hazard identification, safe work procedures, emergency preparedness, incident reporting and appropriate use of personal protective equipment.
3. Enhanced worker participation: Workers should be actively involved in toolbox meetings, safety inspections, risk assessments, incident investigations and safety improvement initiatives. Their practical knowledge of workplace hazards should be recognised as an important component of safety management.
4. Improved safety communication: Construction companies should maintain effective channels for communicating safety information, including toolbox talks, safety briefings, safety alerts and feedback mechanisms. Safety messages should be clear, timely and relevant to the changing conditions of construction activities.
5. Promote hazard and near-miss reporting: Organisations should establish and maintain accessible, non-punitive reporting mechanisms that encourage workers to report unsafe conditions, unsafe acts and near misses. Reported hazards should be promptly assessed and corrective actions communicated to the workforce.
6. Strengthen incident investigation and organisational learning: Accidents and near misses should be systematically investigated to identify immediate, underlying and root causes. Lessons learned should be communicated across the organisation and incorporated into procedures, training and risk-control measures to prevent recurrence.
7. Maintain effective safety rules and procedures: Safety policies, rules and procedures should be regularly reviewed and updated to reflect changes in construction activities, equipment, legislation and identified risks. Supervisors should ensure that these requirements are consistently implemented at the worksite.
8. Strengthen supervisory safety leadership: Supervisors should receive appropriate training in safety leadership, communication, behavioural reinforcement and hazard control because of their direct influence on workers' day-to-day safety behaviour.
9. Conduct periodic safety-culture assessments: Construction companies should periodically assess their safety culture using structured questionnaires, interviews, observations and safety-performance indicators. Such assessments can help identify emerging weaknesses before they contribute to serious incidents.
10. Expand future research: Further studies should involve a larger number of construction companies and workers across Akwa Ibom State and employ probability-based sampling techniques where feasible. Longitudinal studies are also recommended to examine changes in safety culture over time and determine

whether improvements in safety culture are associated with measurable improvements in safety performance.

LIMITATIONS OF THE STUDY

This study has several limitations that should be considered when interpreting its findings. First, the study involved only 40 workers from four purposively selected construction companies in Akwa Ibom State. Although the sample provided representation across the four cases and different categories of workers, its relatively small size limits the statistical power and generalisability of the findings to the wider construction workforce in the state.

Second, the use of purposive sampling means that the participating companies and respondents were not selected through a probability-based procedure. Consequently, the findings reflect the experiences and perceptions of the selected participants and cannot be assumed to be statistically representative of all construction companies or workers in Akwa Ibom State.

Third, the study relied primarily on self-reported questionnaire responses. Respondents may have provided socially desirable answers, particularly because questions concerned their organisations' safety practices and management commitment. This may have contributed to the overwhelmingly positive responses observed in the study. The findings may therefore not completely reflect actual safety practices at the worksites.

Fourth, the cross-sectional design captured safety-culture perceptions at one point in time. Safety culture is dynamic and may change in response to management practices, workforce changes, project phases, incidents and other organisational conditions. The study therefore cannot establish how safety culture changes over time or determine causal relationships between safety culture and safety performance.

Finally, the study focused primarily on workers' perceptions and did not incorporate extensive worksite observations, interviews, safety audits or historical accident data to triangulate the questionnaire findings. Future studies should consider combining quantitative questionnaires with qualitative interviews, direct observations and organisational safety-performance records. Larger, longitudinal and multi-site studies would also provide stronger evidence for understanding and generalising construction safety culture in Akwa Ibom State.

CONTRIBUTION TO KNOWLEDGE

This study contributes to knowledge by providing empirical evidence on safety culture among construction workers in Akwa Ibom State, an area for which relatively limited location-specific evidence is available. While previous studies have examined construction safety and safety culture in other parts of Nigeria, this study provides a localised assessment based on workers' perceptions across four construction companies.

The study also contributes by examining safety culture from the perspectives of different organisational levels, including supervisors/managers and office/technical workers. The inclusion of these groups provides a broader understanding of safety culture and demonstrates that perceptions of management commitment, safety communication, worker participation, training, reporting and incident investigation can be examined across different categories of construction personnel.

Methodologically, the study demonstrates the usefulness of combining a cross-sectional descriptive approach with a multi-case study design to obtain a comparative assessment of safety culture across construction organisations. The purposive selection of information-rich cases and the balanced allocation of respondents across the participating companies provide a practical approach for exploratory assessment of organisational safety culture, particularly where resources and access to construction organisations may be limited.

The findings further contribute by identifying specific dimensions that appear to characterise the prevailing safety culture within the participating companies. The strong positive responses relating to management commitment, safety policies, teamwork, worker involvement, training, communication, reporting and incident

investigation provide a baseline against which future assessments can be compared. At the same time, the study highlights the need for continuous assessment rather than assuming that the existence of positive perceptions necessarily guarantees effective safety performance.

Finally, the study provides a baseline for future research and safety-policy development in Akwa Ibom State. It provides a foundation for larger studies involving more construction companies, larger samples and probability-based sampling techniques. Future researchers can also build upon these findings by incorporating worksite observations, safety audits, accident records and longitudinal assessments to determine whether positive safety-culture perceptions translate into measurable improvements in construction safety performance.

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