

# Analyzing the Causes and Safety Practices of Controlling Accidents and Fatalities in Construction Site in Tertiary Institutions in North-West Nigeria: A Pathway to Improved Safety Practices

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## ABSTRACT:

The thrust of this study is to investigate the causes of accidents and fatalities and the safety practices in construction sites in tertiary institutions in north-west Nigeria. The study adopted the survey research design and purposive sampling technique to select forty-two participants for the study comprises of directors of works, physical planning, chief builders and supervisors of contracting firms. A 5-point Likert scale questionnaire of strongly agreed to strongly disagree was designed to obtain pertinent data from respondents and the obtained data were subjected to analysis using the relative importance index (RII). Findings from the analysis reveals that the lack of proper training on safety protocols and procedures is the most significant causes of accidents and fatalities in constructions sites, with an RII of 0.9143 followed by Poor safety culture, where speed and efficiency are prioritized over safety, ranks second with an RII of 0.8476. Furthermore, data analysis shows that conducting regular safety inspections of the construction site to identify potential hazards and ensure compliance with safety regulations and standards and mandating the use of appropriate PPE, such as helmets, gloves, safety boots, and high-visibility vests emerged highly important amongst the safety practices in the construction sites in the tertiary institutions. It is therefore concluded that there is need for continuous improvement in safety standards, emphasizing proactive measures such as strict adherence to safety protocols, the provision of adequate personal protective equipment (PPE) and robust training. Integrating safety considerations into all phases of project management emerges as crucial for achieving

sustainable safety outcomes. Moreover, the study advocates for fostering a strong safety culture that permeates organizational policies and practices, ensuring on-going commitment to safety at all levels.

**Key words:** Accidents and fatalities, safety practices, construction sites, Tertiary institutions, North-West Nigeria.

## I. INTRODUCTION:

The construction industry is the cornerstone of infrastructural development in any nation, serving as the catalyst for progress. However, the construction industry is acknowledged as one of the most hazardous industries, witnessing frequent accidents and fatalities worldwide (Burn, 2019). Accidents at construction sites can arise from physical occurrences due to site negligence or behavioural factors stemming from workers' unsafe practices (Kolo, 2015). In Nigeria, like many other developing countries, the construction sector is fraught with safety challenges, leading to numerous injuries and fatalities annually (Famakin et al., 2023). Safety practices within the construction industry are paramount, as they not only protect the lives of the workers but also ensure the successful completion of projects (Singh & Misra, 2021).

Furthermore, the construction industry in Nigeria, particularly within the North-West region, faces unique challenges related to safety (Garba, 2022; Yar Adua, 2022). Despite efforts to implement safety regulations and standards, fatalities and accidents still occur, highlighting the need to re-evaluate the sustainability of safety practices (Vincoli, 2024). The North-West region

of Nigeria, which comprises seven states (Kano, Kaduna, Katsina, Kebbi, Sokoto, Zamfara, and Jigawa), has witnessed an upsurge in construction activities, particularly within tertiary institutions (Sidi et al., 2020). Despite this growth, safety practices on construction sites remain a pressing issue. The region's unique socio-economic and environmental factors, coupled with the rapid pace of construction, contribute to safety challenges (Aiyewunmi, 2023).

This study aims to investigate the causes of accidents and fatalities and the sustainable safety practices in controlling fatalities on construction project sites within tertiary institutions in North-West Nigeria. By identifying the challenges, analysing current safety practices, and proposing strategies for improvement, this research seeks to contribute to the reduction of fatalities and the enhancement of safety standards in the construction industry of Nigeria.

## II. LITERATURE REVIEW

### 2.1. The Concept of Safety Practices

The concept of safety encompasses both the state of being protected and the ability to ensure one's survival and existence (Lizák&Etemova, 2023). It is a fundamental human need, with its definition and content evolving over time and space (Robla-Gómez, 2017). Safety is also a legal and practical requirement, involving the assessment and management of risks to prevent harm (Grzebieta, 2015). These perspectives collectively highlight the complex and essential nature of safety in human life.

However, when considering safety practices, it becomes evident that the concept is equally multifaceted. Safety practices encompass organizational culture and specific procedures, as emphasized by Manuele (2003), who sees safety as a reflection of an organization's culture, outlining principles and requirements for its practice. Ind (2007) furthers this notion by highlighting the need for safety to be ingrained in management philosophy, rather than merely a visual display. Reis et al., (2018) shifts the focus to the healthcare industry, discussing the role of regulations and guidelines in promoting a culture of patient safety. Meanwhile, Fowler & Tiemeyer, (2006) challenges common misconceptions, asserting that safety relies not solely on equipment reliability but also on comprehensive process-based assurance. These diverse perspectives highlight the complexity and depth of safety practices, emphasizing the necessity of a holistic approach to ensure effective risk management and harm prevention.

### 2.1. The Concept of Accidents and Fatalities in Construction Sites

Asanka and Ranasinghe (2015) define an accident as an unexpected event that results in unplanned costs and can significantly alter organizational goals, potentially making a company uncompetitive in the industry. However, Chan et al., (2018) sees an accident at a construction site to be an event where victims suffer injuries, death, loss, or damage of properties, often due to faults by either the construction companies or the workers themselves. Hamid et al., (2019); Ahmed (2018) argued that accident on a construction site are any events that can negatively impact the sector's image and involves harm to workers or the community, often due to non-compliance with safety regulations and effective safety practices. On the other hand, Marchiori et al., (2024) defines fatalities in the context of building construction as death that occur due to an accident. Similarly, Asanke&Ranasinghe (2015) view fatalities as a severe outcome of an accident resulting into loss of life. Accidents and fatalities in construction project sites are a significant concern, with human errors, negligence, and lack of safety awareness being key contributing factors (Martin et al., 2021). These incidents not only result in human suffering and loss of life but also have financial implications, including additional costs and project delays (Chan et al., 2018). To address these issues, it is crucial to enhance safety performance through a commitment to good practices, comprehensive accident causation analysis, and safety education and training for workers (Asanka& Ranasinghe, 2016; Oni et al., 2022).

### 2.2. Causes of Accidents and Fatalities in Construction Sites

The prevention of accidents is a central theme in construction safety, and numerous studies have explored the types and causes of accidents inherent in the construction industry. Kartam&Bouz (1998) identified falling from heights as a major cause of construction injuries and fatalities in Kuwait, while Yilmaz (2015) highlighted various accidents such as being hit by dashing and flitting objects, being hit by objects, falling objects, and being stung by something as prevalent in Istanbul, Turkey. Abdelhamid & Everett (2000) developed an accident root causes tracing model for the construction industry, emphasizing factors related to workers, workplace issues, equipment shortcomings, material suitability, and deficiencies in risk management. Similarly, Al-Tabtabai (2002) and William et al.

(2018) identified negligence, failure to obey work procedures, lack of safety devices, poor site management, and inadequate personal protective equipment as significant contributors to construction accidents in Kuwait and Malaysia, respectively. Oni et al., (2022) highlighted worker ignorance, lack of safety warnings, drug/alcohol use, defective equipment, and insufficient working platforms as primary causes of accidents in Malaysia, emphasizing the urgent need for comprehensive safety measures. Sanni-Anibire et al., (2020) in a study on 15 large construction sites across the Eastern Province of Saudi-Arabia found that the highest risk accident in construction sites is falling objects and the causes of the accident is excessive winds on the project site. Orji et al., (2016) further emphasized unsafe practices and the failure to use personal protective equipment as key causes of accidents and fatalities in construction sites. Additionally, Abukhashabah et al. (2020) emphasized the lack of safety education and training, particularly in developing countries, as a significant contributing factor to accidents in the construction industry. These studies collectively underscore the multifaceted nature of construction accidents and the importance of addressing various factors, including worker behaviour, workplace conditions, equipment reliability, and safety education, to prevent accidents and fatalities effectively.

Furthermore, Shah &Algarni(2018) emphasizes the impact of ergonomic injuries on productivity and safety in highway construction sites, attributing workplace injuries to musculoskeletal disorders and accidents involving equipment and vehicles. Saeed (2017) identifies poor construction planning, lack of safety in design, inadequate safety training, worker behaviour, inherent safety risks, and lack of knowledge of site rules as key contributors to accidents and injuries. Agraphari (2019) highlights the significance of safety on construction sites, citing worker attitudes, safety climate, hazardous materials, leadership, and worker posture as factors influencing safety. Sethi (2022) stresses the need for comprehensive safety measures in construction projects, particularly in rapidly growing industries like India. Giri (2023) in research conducted on safety management in public building construction in Pokhara Valley, Nepal identified several key safety issues, including a lack of regular safety inspection, inadequate use of personal protective equipment, and a lack of safety training and policy.

In conclusion, construction safety is a critical concern, with numerous studies

highlighting the types and causes of accidents in the industry. Factors such as falling from heights, being struck by objects, negligence, lack of safety devices, inadequate training, and unsafe practices contribute to accidents and fatalities in construction sites worldwide. These studies emphasize the dynamic nature of construction accidents and highlight the importance of addressing various factors, including worker behaviour, workplace conditions, equipment reliability, and safety education. Measures such as implementing comprehensive safety protocols, providing adequate training, improving site management, and ensuring the use of personal protective equipment are essential in preventing accidents and fatalities effectively. Moreover, the recognition of emerging issues such as ergonomic injuries, poor construction planning, and inadequate safety training further highlights the need for continuous improvement and vigilance in construction safety practices. By addressing these concerns and implementing proactive safety measures, construction companies can create safer work environments, protect workers' well-being, and ultimately enhance productivity and project outcomes in the construction industry.

### **2.3. Safety Practices in Construction Project Sites**

Current safety practices in construction projects sites include a range of measures such as safety policy, education and training, site safety inspection, safety auditing, safety meeting, site safety organization, personal protective equipment, emergency support, safety measuring devices, fall protective systems, and safety promotions (Keng& Razak, 2014). However, there are still challenges such as worker ignorance, lack of financial allocation, and language barriers (Kelwade, 2022). Effective safety training, budget allocation, and top management commitment are suggested strategies to address these issues (Keng& Razak, 2014). Specific safety management practices, such as safety committees, written safety policies, and safety training schemes, have been found to significantly impact project performance (Cheng, 2015).

Yusof et al., (2015) emphasizes the importance of safety practices in the construction industry to prevent accidents and reduce hazards. The study found that there is a need for improvement in safety practices to achieve the goal of zero accidents at construction sites. However, Azil&Jabar (2021) preliminary survey on safety practices at construction sites highlights the need

for improved safety measures to protect the public. The study emphasizes the importance of barricading entrances and exits to prevent public access, particularly in congested urban areas. This research is valuable for government agencies and industry bodies in identifying and implementing effective safety practices. Gambatase (2000) stressed the role of engineers and architects in improving construction site safety through design practices. These include scheduling to minimize night time and overtime work, setting up sites for simultaneous construction, and orienting projects to reduce work on steep slopes. More so, Razak (2012) provides a comprehensive review of safety practices at construction sites, identifying ten key areas including safety policy, education and training, safety inspection, and personal protective equipment. Giri (2023) conducted a study on safety management in public building construction in Pokhara Valley, Nepal. The research identified several key safety issues, including a lack of regular safety inspection, inadequate use of personal protective equipment, and a lack of safety training and policy. The study emphasized the importance of increasing worker safety awareness and implementing safe working practices through training and induction programs. These findings are crucial for the development of a project-based construction site safety policy.

In conclusion, ensuring safety practices in construction project sites is imperative for preventing accidents and minimizing hazards. These findings collectively emphasize the critical role of proactive safety management in construction projects. By addressing safety issues comprehensively and implementing effective safety protocols, construction companies and government agencies can create safer work environments, reduce the risk of accidents, and protect the well-being of workers and the public alike.

### III. RESEARCH METHODOLOGY

This study adopts a quantitative method which involves the collection of data from

#### 1. Causes of Accidents and Fatalities at Construction Project Sites in Tertiary Institutions in the North-West of Nigeria

Item	Response (Frequency)					Total
	SA	A	N	D	SD	
1. Lack of Proper Training on Safety protocols and procedures	24	18	0	0	0	42
2. Poor Safety Culture like prioritizing speed and efficiency over safety	11	30	1	0	0	42
3. Abuse of Drugs and Alcohol	1	16	19	5	1	42
4. Insufficient or substandard safety	8	21	13	0	0	42

participants from the field. The study population includes the director of physical planning, directors of Works, chief builder and site supervisors of the contracting firms in the tertiary institutions in the North-West region of Nigeria. 42 participants were selected for the study using a purposive sampling technique and a well-structured questionnaire of 5-point Likert scale of strongly agreed to strongly disagree was designed to collect pertinent data for the study. Data collected for this study will be analysed using the Relative Important Index (RII).

$$\text{Relative Important Index} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{A * N}$$

Where  $n_5$  = Number of respondents for strongly agree

$n_4$  = Number of respondents for agree

$n_3$  = Number of respondents for neutral

$n_2$  = Number of respondents for disagree

$n_1$  = Number of respondents for strongly disagree

A=Highest Weight (5)

N = Total number of respondents (42)

### IV. DATA PRESENTATION AND ANALYSIS

This study examines the causes of accidents and fatalities and the safety practices in Construction Project Sites of Tertiary institutions in North-West, Nigerian. A sample size of forty-two was drawn across tertiary institutions in the north-west region of Nigeria. Subsequently, a well-structured questionnaire of 5-point Likert scale of 5-Strongly agree, 4-Agree, 3-Neutral, 4-Disagree and 1-Strongly disagreed were administered to the respondents to elicit responses that would answer the study's research questions. To achieve these objectives the Related Importance Index (RII) was adopted to reveals the key factors that causes accidents and fatalities in construction sites and the safety practices adopted at construction sites in the north-west tertiary institutions. The key findings from the analysis of data are organised and summarised to aid the discussion in Chapter Five.

equipment							
5. Unsafe working conditions like inadequate lighting, poor ventilation and unstable scaffolding	7	23	11	1	0		42
6. Lack of Supervision	2	15	8	13	4		42
7. Use of substandard materials resulting into structural failure	9	20	6	7	0		42
8. Poor communication between workers, supervisors, and other stakeholders leading to errors that compromise safety	0	7	19	14	2		42
9. Extreme weather condition, such as heavy rain or high winds.	3	22	11	6	0		42
10. Neglecting regular maintenance of equipment and infrastructure leading to malfunctioning or failure	9	16	15	2	0		42
11. Pressure to Meet Deadlines	10	19	13	0	0		42

Source: Field Survey, 2024.

**COMPUTATION OF RELATIVE IMPORTANCE INDEX (RII)**

Item	Response (Frequency)					Total	Relative Importance Index(RII)			
	S A	A	N	D	S D		N	A*N	RII	Rank
1. Lack of Proper Training on Safety protocols and procedures	12 0	72	0	0	0	192	42	210	0.914	1
2. Poor Safety Culture like prioritizing speed and efficiency over safety	55	12 0	3	0	0	178	42	210	0.847	2
3. Abuse of Drugs and Alcohol	5	64	57	10	1	137	42	210	0.652	9
4. Insufficient or substandard safety equipment	40	84	39	0	0	163	42	210	0.772	4
5. Unsafe working conditions like inadequate lighting, poor ventilation and unstable scaffolding	35	92	33	2	0	162	42	210	0.771	5
6. Lack of Supervision	10	60	24	26	4	124	42	210	0.590	10
7. Use of substandard materials resulting into structural failure	45	80	18	14	0	157	42	210	0.747	7
8. Poor communication between workers, supervisors, and other stakeholders leading to errors that compromise safety	0	28	57	28	2	115	42	210	0.547	11
9. Extreme weather condition, such as heavy rain or high winds.	15	88	33	12	0	148	42	210	0.704	8
10. Neglecting regular maintenance of equipment and infrastructure leading to malfunctioning or failure	45	64	45	4	0	158	42	210	0.752	6
11. Pressure to Meet Deadlines	50	76	39	0	0	165	42	210	0.785	3

Source: Author's computation from Field Survey, 2024.

The analysis of the Relative Importance Index (RII) for the causes of accidents and fatalities at construction project sites in tertiary institutions in North-West Nigeria reveals several critical insights. The data shows that the lack of proper training on safety protocols and procedures is the most significant cause, with an RII of 0.914, emphasizing the urgent need for comprehensive and effective safety training programs to equip workers with the necessary knowledge and skills to prevent accidents. Poor safety culture, where speed and efficiency are prioritized over safety, ranks second with an RII of 0.847, indicating that a shift in organizational values towards prioritizing safety is essential. The pressure to meet deadlines, with an RII of 0.785, is also a major contributing factor, highlighting the need for realistic project timelines that do not compromise worker safety. Additionally, the use of insufficient or substandard safety equipment and unsafe working conditions, such as inadequate lighting, poor ventilation, and unstable scaffolding, are identified as significant causes, with RIIs of 0.772 and 0.771, respectively. These findings suggest that ensuring the availability and proper use of high-quality safety equipment, as well as maintaining safe working

conditions, are crucial steps in mitigating accidents. Neglecting regular maintenance of equipment and infrastructure, resulting in malfunction or failure, ranks sixth with an RII of 0.752, underscoring the importance of regular inspections and maintenance. The use of substandard materials leading to structural failure, extreme weather conditions, and the abuse of drugs and alcohol are also important factors, with RIIs of 0.747, 0.704, and 0.652, respectively. While these factors are significant, they highlight the need for stringent quality control, robust emergency planning, and strict substance abuse policies. The lack of supervision and poor communication between workers, supervisors, and other stakeholders, with RIIs of 0.5905 and 0.5476, are recognized as less critical but still noteworthy causes. These findings suggest that improving supervision and communication can further enhance safety. Overall, the analysis indicates that addressing these key factors through comprehensive safety training, fostering a robust safety culture, ensuring the availability of high-quality safety equipment, maintaining safe working conditions, and implementing realistic project timelines are essential steps in reducing accidents and fatalities in construction project sites.

**2. Safety practices in construction project sites at tertiary institutions in North-West Nigeria**

Item	Response (Frequency)					Total
	SA	A	N	D	SD	
1. Safety Training and Education on hazard recognition, proper use of equipment, emergency procedures, and the importance of personal protective equipment (PPE)	12	13	8	6	3	42
2. Mandating the use of appropriate Personal Protective Equipment (PPE) such as helmets, gloves, safety boots, and high-visibility vests.	17	15	5	3	2	42
3. Conducting regular safety inspections of the construction site to identify potential hazards and ensure compliance with safety regulations and standards.	21	11	3	5	2	42
4. Posting clear and visible safety signs throughout the construction site to indicate hazards, emergency procedures, and safety protocols.	11	17	7	4	3	42
5. Implementing measures to prevent falls from heights, such as the use of guardrails, safety nets, and fall arrest systems.	9	14	11	4	4	42
6. Adhering to electrical safety practices, including proper grounding, insulation, and installation of electrical systems to prevent electrocution and fires.	7	13	11	7	4	42
7. Assigning competent supervisors to oversee construction activities and ensure that safety protocols are followed.	9	16	8	7	2	42
8. Conducting regular safety meetings or toolbox talks to discuss safety issues, reinforce safety protocols, and address any concerns raised by workers.	4	8	23	4	3	42

9. Implementing measures to minimize environmental hazards such as pollution, chemical spills, and soil erosion during construction activities.	7	9	19	6	1	42
10. Developing and practicing emergency response plans for situations such as fires, medical emergencies, and natural disasters.	9	15	14	3	1	42

Source: Field Survey, 2024.

**COMPUTATION OF RELATIVE IMPORTANCE INDEX (RII)**

Item	Response (Frequency)						Total	Relative Importance Index(RII)		
	SA	A	N	D	SD	N		A* N	RII	Rank
1. Safety Training and Education on hazard recognition, proper use of equipment, emergency procedures, and the importance of personal protective equipment (PPE)	60	52	24	1 2	3	151	42	210	0.7190	5
2. Mandating the use of appropriate Personal Protective Equipment (PPE) such as helmets, gloves, safety boots, and high-visibility vests.	85	60	15	6	2	168	42	210	0.8000	2
3. Conducting regular safety inspections of the construction site to identify potential hazards and ensure compliance with safety regulations and standards.	105	44	9	1 0	2	170	42	210	0.8095	1
4. Posting clear and visible safety signs throughout the construction site to indicate hazards, emergency procedures, and safety protocols.	55	68	21	8	3	155	42	211	0.7345	3
5. Implementing measures to prevent falls from heights, such as the use of guardrails, safety nets, and fall arrest systems.	45	56	33	8	4	146	42	210	0.6952	7
6. Adhering to electrical safety practices, including proper grounding, insulation, and installation of electrical systems to prevent electrocution and fires.	35	52	33	1 4	4	138	42	210	0.6571	9
7. Assigning competent supervisors to oversee construction activities and ensure that safety protocols are followed.	45	64	24	1 4	2	149	42	210	0.7095	6
8. Conducting regular safety meetings or toolbox talks to discuss safety issues, reinforce safety protocols, and address any concerns raised by workers.	20	32	69	8	3	132	42	210	0.6286	10

9. Implementing measures to minimize environmental hazards such as pollution, chemical spills, and soil erosion during construction activities.	35	36	57	1 2	1	141	42	210	0.6714	8
10. Developing and practicing emergency response plans for situations such as fires, medical emergencies, and natural disasters.	45	60	42	6	1	154	42	210	0.7333	4

**Source: Author’s computation from Field Survey, 2024.**

The analysis of the Relative Importance Index (RII) for safety practices in construction project sites at tertiary institutions in North-West Nigeria reveals critical insights into the perceived importance of various safety measures. Conducting regular safety inspections of the construction site to identify potential hazards and ensure compliance with safety regulations and standards emerged as highly important, with an RII of 0.8095. This emphasized a strong recognition of the need for comprehensive safety checks and rigorous inspections to identify potential hazards and ensure compliance with safety regulations. Mandating the use of appropriate PPE, such as helmets, gloves, safety boots, and high-visibility vests, was also deemed very important, with an RII of 0.8000, ranking second. This highlights the critical role of PPE in maintaining safety on construction sites. Posting clear and visible safety signs throughout the construction site, with an RII of 0.7345, ranked third, indicating the importance of effective communication of safety protocols and hazard indications. Developing and practicing emergency response plans for situations such as fires, medical emergencies, and natural disasters was considered relatively important, with an RII of 0.7333, ranking fourth. Measures to prevent falls from heights, such as the use of guardrails, safety nets, and fall arrest systems, scored an RII of 0.6952, ranking seventh, showing recognition of their importance but also suggesting room for improvement. Assigning competent supervisors to oversee construction activities, with an RII of 0.7095, ranked sixth, emphasizing the need for experienced oversight to ensure safety protocols are followed. Adhering to electrical safety practices, including proper grounding, insulation, and installation of electrical systems to prevent electrocution and fires, had a lower RII of 0.6571, ranking ninth, indicating a need for increased emphasis on electrical safety. Implementing measures to minimize environmental hazards such as pollution, chemical spills, and soil erosion during construction activities had an RII of 0.6714, ranking eighth, highlighting the importance

of environmental safety alongside worker safety. Lastly, conducting regular safety meetings or toolbox talks to discuss safety issues, reinforce safety protocols, and address concerns raised by workers had the lowest RII of 0.6286, ranking tenth. This suggests that while these meetings are recognized as necessary, their implementation may be ineffective or poorly communicated, thus reducing their perceived importance. In conclusion, while the analysis highlights the high importance of safety training, PPE usage, and regular inspections, it also identifies areas such as electrical safety and regular safety meetings that require more effective implementation and better communication to enhance their perceived value and effectiveness in improving overall safety on construction sites.

## V. DISCUSSION OF RESULTS

Based on your RII analysis of construction site accidents in North-West Nigeria's tertiary institutions, it's clear that several key factors contribute significantly to safety risks. The highest-ranked cause, lack of proper safety training, aligns with findings from various global studies. For instance, Abdelhamid and Everett (2000) emphasize similar root causes in their tracing model, highlighting worker-related factors and deficiencies in safety protocols. Moreover, the study's finding of a poor safety culture and deadline pressures echoes concerns raised by Kartam and Bouz (1998) in Kuwait and Al-Tabtabai (2002) in Malaysia, who noted organizational and management issues as critical contributors to accidents. The emphasis on inadequate safety equipment and working conditions resonates with studies by Yilmaz (2015) in Istanbul and Hamid et al. (2008) in Malaysia, emphasizing the universal challenges in ensuring workplace safety infrastructure. Furthermore, this study's findings also complement research by Sanni-Anibire et al., (2020) in Saudi Arabia, who highlighted falling objects due to environmental factors as a significant risk, supporting the need for robust safety measures in varying conditions. In



conclusion, these findings not only validate but also enrich the existing literature on construction site safety by providing localized insights and emphasizing the urgent need for targeted interventions in training, safety culture improvement, equipment provision, and environmental management. These efforts are crucial for mitigating risks and enhancing safety outcomes in construction projects.

Again, the analysis of the Relative Importance Index (RII) for safety practices at construction project sites in North-West Nigeria's tertiary institutions reveals the critical importance of comprehensive PPE usage, and regular inspections, each, highlighting their role in hazard identification and compliance with safety regulations. This finding aligns with Keng & Razak (2014); Cheng, (2015) who emphasized the need for effective safety training and education, despite challenges like worker ignorance and language barriers (Kelwade, 2022). Mandating PPE usage, deemed very important with an RII of 0.8000, supports Tan's (2014) findings on financial constraints impacting adequate PPE provision. The importance of clear safety signage and emergency response plans is echoed by Azil & Jabar (2021) and Yusof et al., (2015), respectively. However, areas like fall prevention measures, competent supervision, electrical safety, and environmental safety need more emphasis, reflecting gaps identified by Gambatese (2000) and Razak (2012). Lastly, the lower RII for safety meetings (0.6286) suggests a need for improved implementation and communication, as supported by Keng & Razak (2014). These findings highlight the urgent need for targeted interventions in training, safety culture improvement, equipment provision, and environmental management to enhance overall safety on construction sites.

## VI. CONCLUSION

This study highlights the paramount importance of effective safety management in construction projects within tertiary institutions across North-West Nigeria. By prioritizing comprehensive safety practices, institutions can significantly mitigate risks, safeguard the well-being of their workers, enhance project efficiency, and bolster their overall reputation. The findings stressed the necessity for continuous improvement in safety standards, emphasizing proactive measures such as robust safety training, strict adherence to safety protocols, and the provision of adequate personal protective equipment (PPE). Integrating safety considerations into all phases of

project management emerges as crucial for achieving sustainable safety outcomes. Moreover, the study advocates for fostering a strong safety culture that permeates organizational policies and practices, ensuring on-going commitment to safety at all levels. Moving forward, collaborative efforts among stakeholders, including educational institutions, regulatory bodies, and construction firms, are essential to implement and enforce comprehensive safety measures effectively. By doing so, these institutions can not only mitigate immediate risks but also contribute to broader societal goals of promoting workplace safety and well-being in the construction industry.

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