



An Appraisal of Occupational Fire Safety Management in Industrial Buildings

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ABSTRACT

Fire is globally recognised as a prevalent hazard that is more disruptive and destructive than any other hazard in buildings and that, more often than all, necessitates external assistance or support for its management compared to other incidents. Industrial buildings in particular are identified as the leading buildings or structures with difficult-to-control sources of ignition frequencies and far-reaching impacts of fire as compared to other fire cases. In the last few years, a number of calamitous industrial fires have been experienced in Nigeria and Lagos State, in particular, and these have drawn a lot of attention to properly redress the situation. Consequently, the study was carried out to contribute to knowledge and provide relevant recommendations that can help enhance effective occupational fire safety management in industrial buildings.

The study employed a cross-sectional research design. Primary data were collected from a random selection of six hundred (600) industrial workers from industrial hubs in Lagos State, Nigeria, including three hundred (300) factory and warehouse workers, respectively, using a well-structured questionnaire. Likewise, physical fire safety inspections, key informant interviews, and in-depth interviews were conducted at the industrial buildings selected for the study to gather all the necessary information to achieve the study's objectives. Subsequently, descriptive statistics and structural equation modeling (SEM) were used to analyse the collected data for the study.

The study's findings revealed that occupational fire safety practices, employees' fire safety awareness, and commitment of organisations' management to fire safety policies and standards have significant positive impacts on occupational fire safety management in industrial buildings, while the cause of occupational fire incidents has a significant negative impact on occupational fire safety management in industrial buildings with regression coefficients of 0.50, 0.49, 0.32, and -0.15, respectively. A probe into the causes of fire

incidents affirmed that human carelessness, error, accidents, malfunctioning mechanical/electrical equipment/systems, and arson are the major factors responsible for fire incidents in industrial buildings. Additionally, the study found out that most organisations' management performed poorly in conducting regular holistic fire safety audits, allocating sufficient budgetary funds for fire safety, and implementing/enforcing fire safety policies, standards, and regulations in industrial buildings.

The study thus recommends that organisations' management should ensure compliance with fire safety policies, standards, and regulations to reduce the risk of fires; allocate adequate budgetary funds for effective occupational fire safety management; and conduct regular fire safety audits of work areas and equipment/systems, followed by necessary actions for optimal fire prevention in industrial buildings. Similarly, the fire service should launch a robust public campaign to enhance occupational fire safety awareness, ensure strict compliance with adherence to fire safety practices, and enforce fire safety policies and standards, thereby guaranteeing improved occupational fire safety management. Simultaneously, governments at all levels should provide more fire stations with functional fire engines and hydrants to ensure timely emergency response and adequate fire safety coverage across Nigeria.

KEYWORDS: Occupational Fire Safety Management, Industrial Buildings, Factories, Warehouses, Structural Equation Modeling (SEM).

I. INTRODUCTION

Globally, occupational fire safety management is recognised as an integral part of industrial facility management, aiming to promote health and safety in workplaces. In spite of the acknowledged importance of health and safety promotion in workplaces, fire remains one of the most common hazards, posing significant risks to lives, structures, properties, materials, business continuity, supply chains, and the environment (Coombes, 2015). Industrial buildings are widely



known to have the highest number of hard-to-control fire risks and serious consequences compared to other types of buildings, but sadly, only large fires tend to receive much attention, even though industrial buildings face significant fire risk (Umar et al., 2015; Adekunle et al., 2020; Alkis et al., 2021; Nadarajah et al., 2024). Industrial fires are usually unanticipated and mostly anthropogenic, and such industrial buildings or structures without strategic occupational fire safety management are often faced with frequent fire incidents and their heightened catastrophes.

Occupational fire safety management encompasses a range of management practices and measures targeted at ensuring optimal fire prevention, prompt detection, effective mitigation, and preparedness to adequately respond to fire emergencies, efficiently control fire risks and safely evacuate all individuals in workplaces. Occupational fire safety management creates and promotes awareness about fire safety practices in workplaces through its proper planning, implementation, coordination, communication, education, and training as well as commitment to fire safety protocols, legislation, and standards with the provision and regular maintenance of fire safety facilities. Occupational fire safety management is considered highly important in workplaces due to the moral obligations of employers to provide a safe environment free from life-threatening risks; the potential detrimental effects on business since an organisation affected by a serious fire may not be able to recover; and the legislative requirement to ensure no life is put at risk (Thomson, 2002).

Fire starts when any of the building contents (referred to as fuel) in combination with a sufficient quantity of oxygen is exposed to a source of heat above a certain temperature, which in turn produces a self-sustaining chain chemical reaction that reduces fuel and oxygen quantities or volumes to produce heat, smoke, light, and other combustion products. Studies have ascribed the factors contributing to the rapid development, spread, and intensity of fire in industrial buildings to include their large-size nature, open floor spaces, and high ceilings, which cause delay in the detection of fire; availability and arrangement of a large amount of densely packed goods and materials which are mostly combustible in nature, making up for high fire load and severity of fire and smoke due to difficulty in locating the seat of fire; configuration of the storage areas, including the aisles' height and width and the flue spaces of the shelves, pallet racks, and pallet stack storage systems, which allow heat and fire transmission from horizontal to vertical

pattern spread; poor compartmentalisation, structural design and layout, use of sandwich construction, and other poor fire-performance construction materials, which allow fire to grow and spread uncontrollably; and the lack of fire safety systems or their potential failure due to poor maintenance culture where available, resulting in regrettable outbreaks of fire with widespread losses and impacts.

Fires involving industrial buildings, in particular the warehouses and factories, have become a serious concern, as they are disastrous, causing loss of life, severe injury, loss of human body parts, downtime, and large-scale property or material damages. Such instances of fire incidents that make the daily news headlines in Nigeria include the inferno involving the Erisco Foods warehouse at Ikeja, Lagos State, with goods and raw materials worth over four hundred and fifty million naira lost (Punch Newspaper, 22 November 2016). Additionally, the fire that engulfed the 22-storey Great Nigeria Insurance Building, which was used for clothing storage on Martins Street, Lagos Island, Lagos State, spread to seven adjoining buildings on December 24, 2025, resulting in twelve (12) fatalities, numerous injuries, and significant structural damage, with properties worth billions of naira lost (Premium Times Newspaper, January 12, 2026). Again, the Nnewi factory fire in Anambra State resulted in the destruction of the factory's production equipment and goods worth billions of naira (Vanguard Newspaper, November 26, 2025). Another incident is the warehouse fire involving Imperio International, located in Ikeja, Lagos State, which led to the destruction of items worth billions of naira (Vanguard Newspaper, November 14, 2024). Likewise, the blaze that ravaged a warehouse at Amuwo-Odofin Industrial Estate, Lagos State, resulted in the destruction of several items worth millions of naira (Punch Newspaper, January 25, 2026).

The increasing fire disaster in Nigeria may be attributed to poor management of the nation's population growth, urbanisation, and industrialisation, with minimal attention to fire safety management during and after most building construction and sparsely distributed fire stations responding to the increasing fire emergencies (Iheama et al., 2025). Consequentially, it has become essential for all building owners, users, and occupants to implement effective fire safety plans to reduce both the frequency and severity of fire incidents, since the best-fought fire is the one that is prevented. While fire outbreaks are often unavoidable, it is crucial to have adequate, effective,



and operational fire response services in place to avert catastrophic effects. Working in tandem is pragmatic for addressing the current challenges with managing fire disasters in Nigeria, ensuring that both prevention strategies and effective response services are integrated to enhance overall fire safety and minimise risks.

Statement of Research Problems

Lagos State, a leading industrial and commercial centre in Nigeria, has witnessed a proportionally high number of fire incidents with devastating consequences over the past two decades (Ogunnaike et al., 2025). A total of 8,045 fire incidents were reported between 2020 and 2025 in Lagos State, and among these were industrial buildings and business hubs (LSFRS, 2026). The reported high rate of fire emergencies in Lagos State may be attributed to its megacity status, which is characterised by large public gatherings, multiple buildings, and very high economic activities, as well as the challenges posed by an ever-busy road network.

A fire that starts small in an industrial building can quickly escalate into a major blaze if prompt action is not taken; therefore, proactive occupational fire safety management in industrial buildings is essential to prevent manageable fire emergency situations from turning into disasters. Most causes of fire outbreaks are identifiable and almost preventable, and outbreaks of fire can be detected early, confined, and extinguished at the incipient stage if fire safety management is prioritised within facilities or structures.

Against this backdrop, the study aims to evaluate occupational fire safety management in industrial buildings in Lagos State, Nigeria's economic capital, which has the highest number of reported calamitous fire incidents, and to propose solutions for addressing the challenges associated with fire disaster management in Nigeria and the world at large.

The study has the following objectives:

1. Find out the causes of occupational fire incidents in industrial buildings within the study area.
2. Examine the level of occupational fire safety awareness among the employees working in industrial buildings within the study area.
3. Appraise the occupational fire safety practices in industrial buildings within the study area.
4. Assess the organisations' commitment to occupational fire safety policies and

standards in industrial buildings within the study area.

5. Analyse the overall occupational fire safety management in industrial buildings within the study area.
6. Enquire about the challenges associated with occupational fire safety management in industrial buildings within the study area.

Justification of the Study

There are several available studies on fire safety in warehouses, markets, factories, offices, hospitals, airports, schools, residential, commercial, industrial, and other types of buildings (Umar et al., 2015; Zivanic et al., 2019; Adekunle et al., 2020; Alkis et al., 2021; Amro et al., 2023; Nadarajah et al., 2024; Jembola, 2024; Ishaku et al., 2025; Laturkar et al., 2026, etc.). However, the applications of the structural equation modeling (SEM) approach to appraising occupational fire safety management in industrial buildings are still limited, particularly in terms of understanding the specific factors that influence fire safety outcomes and the effectiveness of current occupational fire safety management. On this premise, it is hoped that the study will make a unique contribution to the available literature on the empirical assessment of occupational fire safety management in workplaces.

Furthermore, the empirical findings of this study will significantly assist in providing relevant recommendations to ensure effective occupational fire safety management in industrial buildings.

Review of Past Empirical Studies

Research has established that the level of management directly influences the rate of fire outbreaks and their consequences. Omunagbe and Kaseem (2023) stated that the possibility of occurrences of fire outbreaks and their significant loss largely depends on the proper fire safety management implemented and whether suitable critical components of fire safety management are incorporated into the guidelines to manage fire in buildings. Similarly, Kodur et al. (2020) opined that the challenges of managing fire safety include poor compliance with fire safety regulations, inadequacy of fire fighting resources in both quality and in quantity, lack of occupants' fire safety education, excessive costs for installing and maintaining fire protection measures, insufficient knowledge of fire safety in buildings, and longer response times for firefighting operations due to adverse traffic conditions, narrow lanes, and irregularly planned cities. Corroborating this assertion, Iheama (2025)



posited that inadequate regulatory enforcement, financial constraints, a lack of technical expertise, limited public engagement in fire safety practices, insufficient fire safety training, and lack of routine drills by workplace employees contribute to the low preparedness for fire emergencies.

In ensuring the safety of buildings, their occupants, and their contents, Umar et al. (2015) identified three crucial criteria and attributes for ensuring fire safety in factories: passive fire protection, active fire protection, and fire safety management. In the same vein, Alao et al. (2020) highlighted the ten basic components of fire safety management in office buildings to include maintenance of fire equipment and standards, fire safety organisation, provision of a fire safety budget, reporting and investigating fire incidents, fire safety audits, fire safety training, fire risk assessment, fire safety communication and information, an emergency plan/fire safety procedure, and compliance with fire safety regulations.

II. RESEARCH METHODOLOGY

A cross-sectional research design was employed for the study. The technique was utilised because it is straightforward, cost-effective, and allows for the rapid collection of data from a large pool of subjects without undue pressure to probe physical enquiries from respondents.

Sources of Data Collection

The primary data used for the study were collected through the administration of well-structured questionnaires to factory and warehouse workers in industrial hubs in Lagos State, Nigeria. Likewise, physical fire safety inspections, key informant interviews, and in-depth interviews were conducted within the industrial buildings selected for the study to gather all the necessary information to achieve the study's objectives.

Sampling Procedures and Sampling Size

The study employed a multistage sampling technique to ensure that the selected respondents fit the purpose of the study under review. The sample size for the study was six hundred (600).

Lagos State, southwestern Nigeria, has three senatorial districts, namely Lagos West Senatorial District with ten (10) local government areas; Lagos East Senatorial District with five (5) local government areas; and Lagos Central Senatorial District with five (5) local government areas.

The first stage involved the purposive selection of the Lagos West Senatorial District,

which is the most populous district with the highest number of local government areas that contain a concentration of industrial buildings.

The second stage involved the purposive selection of industrial areas within the chosen senatorial district, specifically Ogba and Agindigbi in Ikeja Local Government Area; Isolo and Ilasamaja in Oshodi-Isolo Local Government Area; and Ilupeju and Matori in Mushin Local Government Area, because these areas have a high concentration of industrial buildings engaging in the production, storage, and distribution of finished goods, products, or materials. This process makes a total number of six (6) industrial areas selected for the study.

The third stage involved random selection of five (5) factory buildings and warehouses each from the respective industrial hubs selected for the study. This step makes a total number of thirty (30) warehouses and thirty (30) factory buildings used for the study.

The final stage involves the random selection of ten (10) employees (respondents) from each of the thirty (30) selected factory buildings and warehouses for the study. This procedure makes a total of three hundred (300) workplace employees, each selected from the factory buildings and warehouses for the study. Therefore, the study used a total of six hundred (600) industrial workers.

Data Analytical Technique

The study used IBM Statistical Package for Social Studies (SPSS) software version 23 to code the collected dataset. Descriptive analysis in the form of frequency tables, percentages, and mean scores was first conducted to determine the demography of survey respondents. Furthermore, a psychometric scale was used to measure the non-numeric information about the respondents' perceptions. The respondents selected their choices on a 1 to 5 rating scale, which included strongly disagree (SD), disagree (D), undecided (U), agree (A), and strongly agree (SA), in that order. The four (4) independent variables constructed for the study include causes of occupational fire incidents, awareness of occupational fire safety among employees, organisations' management commitment to occupational fire safety policies and standards, and occupational fire safety practices, while the dependent variable for the study is the overall occupational fire safety management in industrial buildings.

The preliminary tests were performed on the dataset to check for redundant respondents who selected the same option for every question, outliers



whose responses did not correlate with others, variable commonalities, reliability, and validity using Cronbach's alpha based on standardised items, and principal component analysis (PCA), which produced a Kaiser-Meyer-Olkin (KMO) value. Cronbach's alpha and KMO threshold values above 0.7 and 0.6, respectively, are considered satisfactory for the subsequent statistical procedure.

The psychometric scale dataset saved on the IBM Statistical Package for the Social Sciences (SPSS) was loaded on the IBM SPSS Analysis of Moment of Structures (AMOS) software version 23 for the structural equation modeling (SEM) and analysis conducted. Structural equation modeling (SEM) is a multivariate statistical tool that is used to model complex relationships between directly and indirectly observed (latent) variables (Stein et al., 2012). SEM combines factor analysis and multiple regression to analyse relationships among multiple variables.

Structural equation modeling (SEM) consists of two orders: first-order confirmatory factor analysis (CFA) and second-order SEM, which are both instruments for analysing and testing correlations in ordinal scale data. The CFA is a validating procedure in the SEM (Awang, 2015). The first-order CFA involves visualising the hypothesised model by creating "path diagrams" that illustrate the latent constructs and the relationships between the independent variables and the dependent variable, based on prior knowledge and theories before loading the observed or measured variables, referred to as factors, and generating the corresponding standardised regression weights (SRW) and square multiple correlation (SMC) (Pahlevan and Sharif, 2018). The first-order is completed once the model goodness-of-fit is attained and the conditions for reliability and validity are met. The standard regression weight (SRW) and square multiple correlation (SMC) of 0.5 and 0.25 values, respectively, are the recommended thresholds for the CFA result.

The second-order SEM creates a comprehensive model using the results of the first-order CFA to generate the relationships existing between the latent (i.e., independent) constructs and the independent constructs. However, the second-order SEM is not conducted for this study, as its objectives do not include formulating a hypothesis for statistical testing techniques.

III. RESULTS AND DISCUSSIONS

Demography Distribution of Respondents

Table 1 below presents the demographic distribution of the respondents sampled for the study. Just below two-thirds (65.50%) are male, while just above one-third (34.50%) are female, and nearly three-fifths (59.83%) of the total respondents are married. The study largely considered both the male and female gender opinions to be important, without any form of bias, while taking the sample. The dominance of males in industrial buildings is probably due to general perceptions that factory and warehouse work is physically labour-intensive, which most women may deem difficult to cope with and therefore discourage them from pursuing careers in these fields.

The mean age of the distribution of respondents is thirty-six (36) years, and a very high proportion of the respondents (98.33%) are mature, agile, economically active, and responsible enough to make important decisions about life as well as provide necessary information for the study. Furthermore, over two-thirds (69.83%) of the respondents possess post-secondary education, indicating their literacy and potential to understand and provide relevant responses to the issues the study wants to address. Likewise, the vast majority (81%) of the respondents have worked for more than five years in the industrial buildings sampled for the study. Therefore, the respondents will provide crucial information in achieving the objectives of the study, considering their experiences and insights related to the industrial buildings and the issues being investigated.



Table 1: Demography of Survey Respondents

Demography of Respondents		Frequency	Percentage (%)
Gender	Male	393	65.50
	Female	207	34.50
	Total	600	100.00
Age distribution (year)	18-30	92	15.33
	31-40	319	53.17
	41-50	144	24.00
	51-60	35	5.83
	61 and above	10	1.67
	Total	600	100.00
	Educational attainment	Secondary/High School	181
Graduate/College		327	54.50
Postgraduate		92	15.33
Total		600	100.00
Marital status	Single	226	37.67
	Married	359	59.83
	Widow(er)	15	2.50
	Total	600	100.00
Period of work in industrial buildings (year)	Less than 1	31	5.17
	1-5	83	13.83
	6-10	178	29.67
	11-15	156	26.00
	16-20	110	18.33
	Above 20	42	7.00
	Total	600	100.00

Source: Authors' Field Survey, 2026

Reliability and Validity Test

The study achieved a Cronbach's alpha of 0.967 for the collected data, above the 0.7 threshold appropriate for utilising a data set for the subsequent statistical procedure, as shown in Table 2 below. This indicates that the measures are reliable and have strong internal consistency. Furthermore, the

Principal Component Analysis (PCA) produced a Kaiser-Meyer-Olkin (KMO) sampling adequacy value of 0.906, above the required minimum of 0.6 measures, while the Bartlett's Test of Sphericity produced a significant 0.000 value, confirming the suitability of the data for the SEM analysis.

Table 2: Reliability and Validity Statistics of Collected Data

Reliability Statistics			
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items	
0.967	0.968	76	
Case Processing Summary			
Cases	Valid	N	%
	Excluded ^a	0	0.0
	Total	600	100.0

a. Listwise deletion based on all variables in the procedure.

Source: Authors' Computation, 2026

Structural Equation Modeling (SEM) for Occupational Fire Safety Management in Industrial Buildings

Figure 1 below presents the first-order Confirmatory Factor Analysis (CFA) path diagram

of the Structural Equation Modeling (SEM) for occupational fire safety management in industrial buildings in Nigeria. The five (5) constructs in the SEM include causes, awareness, policies, practices, and management; these represent the causes of



occupational fire incidents, employees' awareness of occupational fire safety, organisations' management commitment to occupational fire safety policies and standards, occupational fire safety practices, and occupational fire safety management in industrial buildings, respectively. The path diagram shows that occupational fire safety awareness among employees, organisations' management commitments to occupational fire safety policies and standards, occupational fire safety practices, and causes of occupational fire incidents have standardised regression weight

coefficients (or β -coefficients) of 0.49, 0.32, 0.50, and -0.15, respectively. This finding implies that occupational fire safety awareness among employees, organisations' management commitment to occupational fire safety policies and standards, and occupational fire safety practices have significant positive impacts on occupational fire safety management in industrial buildings in Nigeria, while the cause of occupational fire incidents has a significant negative impact on occupational fire safety in industrial buildings in Nigeria.

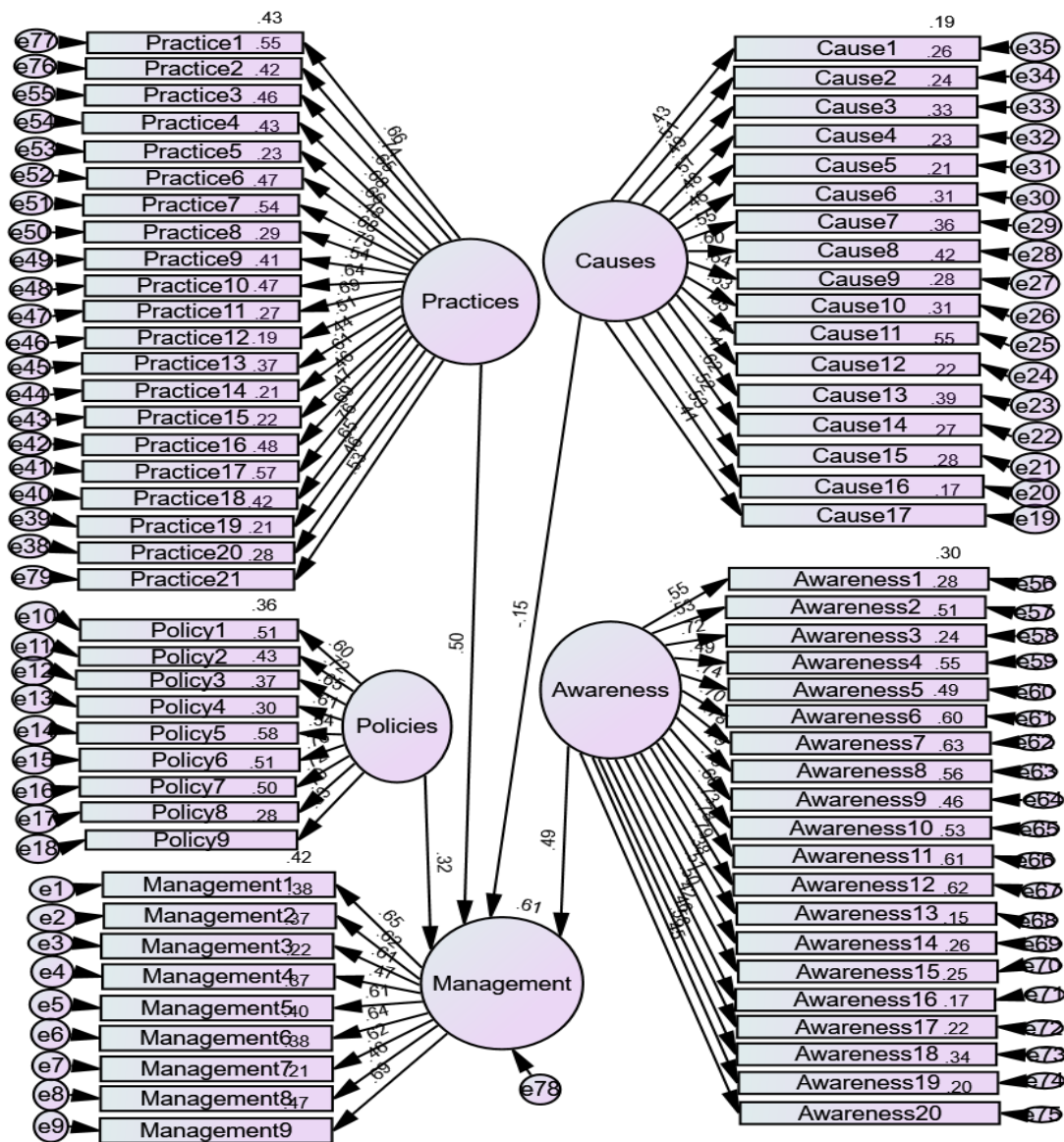


Figure 1: SEM for Occupational Fire Safety Management in Industrial Buildings in Nigeria
 Source: Authors' Computation, 2026



Causes of Occupational Fire Incidents in Industrial Buildings

Table 3 below presents the results of the standardised regression weights (SRW), squared multiple correlations (SMC), internal validity, and reliability for the seventeen (17) variables, coded from 1 to 17, which make up the construct for the causes of occupational fire incidents in industrial buildings in Nigeria. The construct's SRW ranges

from lowest (0.407) to highest (0.744); consequently, the construct's SMC ranges from lowest (0.166) to highest (0.553). Additionally, a Cronbach's alpha of 0.807, which exceeds the minimum limit of 0.7, is obtained, and sixteen (16) out of the seventeen (17) variables under the causes of occupational fire incidents construct are significant at a 99 percent confidence level.

Table 3: Causes of Fire Incidents in Industrial Buildings

Construct	Code	Variable	SRW	SMC	Validity	Cronbach's Alpha
Causes of Fire Incidents in Industrial Buildings	Cause1	Poor smoking habits	0.433	0.188	000***	0.807
	Cause2	Poor housekeeping practices (indoor and outdoor)	0.510	0.260	000***	
	Cause3	Leakage/spillage of flammable liquids or gases	0.488	0.238	000***	
	Cause4	Failure to observe charging protocols for automated/battery-powered systems	0.571	0.326		
	Cause5	Indiscriminate/wrong use of flames	0.484	0.234	000***	
	Cause6	Electrostatic sparks/charges/static electricity	0.463	0.214	000***	
	Cause7	Poor/wrong connection or installation of cable, mechanical, electrical, and heating equipment/appliances	0.552	0.305	000***	
	Cause8	Malfunctioning/faulty mechanical and electrical appliances/equipment	0.600	0.360	000***	
	Cause9	Poor supervision of work, unpermitted/unauthorised operational activities, operating mechanical/electrical systems/equipment without required certification, inappropriate procedural approach, and failure to put adequate and functional safety measures in close proximity during work operations	0.645	0.416	000***	
	Cause10	Poor inspection and maintenance of electrical, gas, and mechanical equipment or systems	0.529	0.280	000***	
	Cause11	Incorrect use or operation of gas, mechanical and electrical equipment or systems	0.554	0.307	000***	
	Cause12	Improper storage, application, or handling of flammable, combustible, or reactive materials, as well as abandoned or discarded materials and products	0.744	0.553	000***	
	Cause13	Arson or deliberate act	0.467	0.218	000***	
	Cause14	Poor ventilation of the work area while volatile hazardous materials (e.g., gasoline, thinner) are in use can cause the atmosphere to become saturated with explosive or flammable vapours or gases	0.621	0.386	000***	
	Cause15	Accumulation of combustible/flammable dusts	0.519	0.269	000***	
	Cause16	Poor trash/waste management, e.g., skips, refuse bins, and other collection vessels overfilled with combustible waste lying near the facility or without adequate spacing from the external walls	0.526	0.277	000***	
	Cause17	Natural events such as flooding, stormy wind, thunder/lightning effects, etc.	0.407	0.166	000	

Note: Cronbach's Alpha > 0.7; * significant at 99% confidence level**

Source: Authors' Computation, 2026

The employees demonstrate a high level of knowledge of the causes of fire incidents, and since the cause of fire incidents is a negative construct, inferences can be drawn that causes of fire incidents in industrial buildings in Nigeria stem from the following:

- Improper storage, application, or handling of flammable, combustible, or reactive materials as well as abandoned or discarded materials and products such as chemicals, paints, oils, cardboard boxes, empty/idle wood pallets, paper products, packaging materials, solvents, aerosol products,



sodium chlorate, white spirit, liquefied petroleum gas, acetylene gas, hydrocarbon products, ammonium nitrate, gasoline, thinner, etc. close to potential sources of ignition; failure to use appropriate fire-resistant containers and containment measures; self-reaction/interaction of reactive chemicals; storing chemical materials for extended periods leading to self-ignition; failure to consider hot or moist conditions for storing substances leading to unexpected reactions, fire or explosions; failure to keep safe lamp clearance distances and positions within aisles during material storage, etc. (0.744).

- Poor supervision of work, unpermitted/unauthorised operational activities, operating mechanical/electrical equipment/systems without required certification, inappropriate procedural approach, and failure to put adequate and functional safety measures in close proximity during work operations, especially those involving the use/generation of flame, spark, or heat, such as melting, cutting, heating, brazing, soldering, circuit sawing, drilling, grinding, hot-jointing, welding, or similar activities around/too close to flammable/combustible dust, gas, or vapour; packaging materials; chemicals; rigid polyurethane (PU); urethane; sodium chlorate; or in such saturated work environments, as well as failure to lockout/tagout (LOTO) in order to lock in place, de-energise, or shut off equipment/machinery during repair/maintenance work to prevent unwanted start-up which can lead to outbreaks of fire (0.645).
- Poor ventilation of the work area while volatile hazardous materials (e.g., gasoline, thinner) are in use, making the atmosphere become saturated with explosive/flammable vapour or gases which can trigger fire on the introduction of an ignition source (0.621).
- Malfunctioning or faulty mechanical and electrical appliances or equipment due to high electrical voltage/surge, electrical short circuits, breaks in electrical cables, insulator failure, manufacturer's defects, poor or lack of protection, etc. (0.600).
- Failure to observe charging protocols for automated/battery-powered systems such as lithium-ion type batteries; these include poor battery charging operation processes, overcharging of batteries, storing flammable or combustible material(s) around the battery-charging area, allowing an ignition source around the battery-charging area, overloading the battery charger, charging a battery in a poorly ventilated area or non-designated charging area or charging without a clear

space of at least 2 metres around the charging equipment and the truck undergoing charge, and release of hydrogen gas from automated/battery-powered systems (0.571).

- Incorrect use or operation of gas/mechanical/electrical equipment, systems, or plants. These include leaving them on while not in use; allowing them to operate for extended periods; refilling carelessly; and overloading circuits, plugs, or sockets, which can result in overheating, electrical surges, or sparks. Examples of such industrial equipment include power-generating sets; conveyors; heaters (both electrical and gas- or oil-fired, whether fixed or portable); mixers; coolers; blow lamps; gas torches; burners; boilers; furnaces; angle grinders; bench grinders; lathes; cutters; elevators; welding machines; heat kettles; lighting equipment; computer numerical control (CNC) machines; and shrink-wrapping and heat-sealing equipment used for sealing or wrapping goods in a thin plastic (0.554).
- Poor/wrong connection or installation of cable, mechanical, electrical, and heating equipment/appliances (0.552).
- Poor inspection/maintenance of electrical, gas, and mechanical equipment, plant, and machinery in accordance with the manufacturer's instruction and relevant safety regulations, e.g., failure to replace frayed electrical cords; poor lubrication of bearings, conveyors and drive belts; poor maintenance of self-enclosing devices or other related plant; incorrect tightening of fan belts; fitting of wrong fuses; clogging of mechanical system vents with dust or other obstructing materials leading to overheating of machines or generation of high frictional heat (0.529).
- Poor trash/waste management, e.g., skips, refuse bins, and other collection vessels overfilled with combustible waste lying near the facility or without adequate spacing from the external walls (0.526).
- Accumulation of combustible/flammable dusts which include sawdust, coal, paper, sugar, lint/fluff, flour, plastic, and metal shavings (e.g., aluminium, magnesium, titanium, sodium, potassium, zirconium, etc.) in the facility, on equipment surfaces, in difficult-to-reach areas, or on materials such as the suspended lamps, etc. (0.519).
- Poor housekeeping practices (indoor and outdoor) (0.510).
- Leakage/spillage of flammable liquids or gases (0.488).



- Indiscriminate/wrong use of flames (such as candles, lighters, naked flames, gas, open-flame equipment, and matches) (0.484).
- Arson or deliberate act (0.467).
- Electrostatic sparks/charges can be caused by lack of/poor earthing/grounding systems; failure to adequately earth the facility from lightning/thunder effects; poor bonding for metal vessels, ducting, chutes, pipes, or hoses causing electrostatic charges to build up; failure to use antistatic footwear and clothing by employees while decanting liquid or gas, etc. (0.463).
- Poor smoking habits such as smoking in a non-designated area, reckless disposal of smoking materials or failure to use an ashtray for cigarette stubs/butts, etc. (0.433).

Factors responsible for fire incidents in industrial buildings include human carelessness, errors, poor behavioural practices, accidents, malfunctioning mechanical and electrical equipment, and arson. All fire incidents have the potential to cause widespread human, material, economic or environmental impacts and losses. Preventing and mitigating these factors are pivotal to achieving effective occupational fire safety management in industrial buildings. This finding is consistent with Thomson (2002), who highlighted careless actions and accidents; misuse of equipment; defective machinery or equipment; discarded smokers' materials and matches; hot work operations; naked flames; lighting; unsafe storage of flammable liquid; rubbish and other debris; static electricity; and deliberate ignition (arson) as the common causes of industrial fires. Similarly, Umoh (2015), in a related study, opined that the major causes of fires and explosions in industrial buildings include combustible dust, hot work, flammable liquid and gases, faulty electrical and mechanical equipment, and poor housekeeping.

Employees' Awareness of Occupational Fire Safety in Industrial Buildings

Table 4 below presents the results of the standardised regression weights (SRW), squared multiple correlations (SMC), internal validity, and reliability for the twenty (20) variables in the occupational fire safety awareness construct, coded from 1 to 20. The construct's SRW values range from lowest (0.383) to highest (0.792); consequently, the construct's SMC values range from lowest (0.147) to highest (0.626). With a Cronbach's alpha of 0.956, above the 0.7 minimum limit, all twenty (20) variables under the employees' awareness of the occupational fire

safety construct are significant at a 99 percent confidence level.

The employees demonstrate considerable knowledge of occupational fire safety. However, there is still a need for increased awareness of fire emergency action plans and evacuation procedures in industrial buildings, as five (5) of the SRWs and SMCs are below the minimum threshold levels of 0.5 and 0.25, respectively, while five (5) others are close to the minimum threshold levels. Adequate knowledge and awareness of fire safety are to guide the employees on the appropriate steps or actions to take in preventing fire risk as well as make them responsive in managing fire risk.

All fire hazards or near misses must be taken seriously and considered significant; even when successfully managed by the employee, they must all be reported quickly to the management, and all the necessary actions should be taken immediately. During a fire emergency situation, employees should not wait to collect personal belongings or valuables from the facility; instead, they should utilise their knowledge of the fire safety systems and equipment to respond swiftly and effectively in extinguishing fire while still in the incipient stage. If they are unable to do so, they should quickly and calmly evacuate the area. In an enclosed area with doors and windows, they should be shut behind, and no object on fire should be moved about within the facility to impede fire spread and development and allow for safe evacuation from every section of the building.

Additionally, fire and smoke doors should not be propped open with any object to maintain their effectiveness. Employee(s) should also confirm if a closed door is not hot before opening it to avoid sudden explosions, known as 'backdraft'. Only fire service personnel should certify that it is safe to re-enter a facility after a fire has occurred and been extinguished by any employees for further industrial activities. Furthermore, management should provide regular training on the safe use, handling, transportation, and storage of the available materials as well as the safe use of equipment/appliances to improve employees' awareness of fire safety. Regular emergency evacuation drills should be conducted for all employees to facilitate the easy identification of alternative exit routes and to promote safe emergency evacuations in case the main exit route is smoke-logged or blocked by fire during a real fire emergency. Likewise, if anyone's clothes catch fire, they should stop, drop, and roll to extinguish the flames. This position is in line with the Institution



Table 4: Employees' Awareness of Occupational Fire Safety in Industrial Buildings

Construct	Code	Variables	SRW	SMC	Validity	Cronbach's Alpha
Awareness of Fire Safety	Awareness1	One should walk out quickly, smartly, and calmly upon hearing a fire alarm to evacuate the facility to the designated muster point, and roll call should be made immediately to know if anyone is left behind/trapped	0.552	0.305	000***	0.956
	Awareness2	Any object, material, or good on fire should not be moved about in the facility	0.531	0.282	000***	
	Awareness3	All materials must be kept clear of escape routes, fire doors, and fire safety equipment in the facility to prevent obstruction	0.716	0.512	000***	
	Awareness4	Any fire hazards noticed or near misses occurring must be immediately reported to the manager, and necessary actions taken immediately	0.494	0.244	000***	
	Awareness5	The very first things to do when fire breaks out are to alert others by raising an alarm and then call the fire service immediately after leaving the risk area	0.743	0.552	000***	
	Awareness6	Wearing of necklaces, bracelets, watches, or any other metallic objects could lead to short-circuits or sparks during battery handling and charging operations	0.699	0.489	000***	
	Awareness7	I know the alternative route(s) to take in case the normal/usual route of exits gets cut off by fire	0.778	0.605	000***	
	Awareness8	When a compartment is smoke-logged, one should crawl out of the compartment to avoid smoke inhalation and allow for clear visibility and safe evacuation	0.792	0.626	000***	
	Awareness9	I know the respective locations, usages, and operations of fire safety equipment and systems within the facility	0.748	0.559	000***	
	Awareness10	In case gas leakage or spillage of flammable liquid is noticed, naked flame or spark should not be allowed in the area	0.679	0.461	000***	
	Awareness11	I am aware and understand the meaning of all safety signage/notices posted all around the facility	0.752	0.526	000***	
	Awareness12	In case of fire, I know how to activate a fire alarm to alert all other employees and the necessary actions to take when fire breaks out	0.781	0.610	000***	
	Awareness13	I can operate a fire extinguisher without any assistance or fear by following the PASS procedure, which stands for Pull, Aim, Squeeze, and Sweep	0.786	0.619	000***	
	Awareness14	Only the Fire Service can certify the re-entering of the facility should a fire occur and be extinguished by any personnel	0.383	0.147	000***	
	Awareness15	Ensure all employees have appropriate training on safe use, handling, transportation, and storage of all available materials as well as the safe use of equipment/appliances	0.508	0.258	000***	
	Awareness16	One should stop, drop, and roll when one's clothes catch fire	0.504	0.254	000***	
	Awareness17	During an outbreak of fire, one must verify a closed door and use the "if it is cool, open it approach"	0.416	0.173	000***	
	Awareness18	One should not wait to pick up any personal belongings or valuables from the facility during a fire emergency	0.464	0.215	000***	
	Awareness19	Fire/smoke doors should not be wedged with any object or material to ensure their functionality	0.583	0.340	000***	
	Awareness20	One can locate the available alternative exit easily should the main exit become smoke-logged or become trapped by fire	0.447	0.200	000***	

Note: Cronbach's Alpha > 0.7; * significant at 99% confidence level**

Source: Authors' Computation, 2026



of Fire Engineers' standards, which identified adequate knowledge and awareness of fire safety among employees, a capacity needed to ensure no life is made vulnerable in the workplace (IFE, 2017).

Occupational Fire Safety Practices in Industrial Buildings

Table 5 below presents the results of standardised regression weights (SRW), square multiple correlations (SMC), internal validity, and reliability. The construct for fire safety practices has twenty-one (21) variables coded from 1 to 21, with the construct's SRWs ranging from the lowest (0.437) to the highest (0.758); consequently, the construct's SMCs range from the lowest (0.191) to the highest (0.574). All the twenty-one (21) variables in the fire safety practices construct are significant at a 99 percent confidence level, with a Cronbach's alpha of 0.938 surpassing the 0.7 minimum limit.

A significant level of fire safety practices is demonstrated in industrial buildings, as most of the variables that make up the fire safety construct recorded high SRW and SMC scores. However, there is still a need to improve fire safety practices in industrial buildings, as five (5) of the SRWs and SMCs fall below the minimum threshold levels at 0.5 and 0.25, respectively. Additionally, three (3) other scores are close to the minimum threshold levels and are essential for optimal safety; these include the following:

- Periodic inspections, testing, services, and maintenance are conducted on all emergency lighting equipment/systems and fire alarm, detection, notification, suppression, and extinguishing equipment/systems with proper documentation in a fire safety logbook by reliable, competent, and trained person(s) and in accordance with the appropriate standards and guidelines to ensure their functionality, effectiveness, and range of operation are not affected when activated (0.536). Identified fire safety facilities within the study area are fire detection and notification equipment/systems (such as heat, smoke, gas, and flame detectors; a high-decibel fire alarm bell with a bright light strobe; fire alarm call points; a public address system; and an emergency communication system); fire suppression and extinguishing equipment/systems (such as fire extinguishers, fireballs, fire hose reels, fire hydrants, automatic sprinkler

systems, high-pressure water mist systems, fire pumps, fire sand buckets, and specialised fire-extinguishing systems); fire emergency lighting systems; fire safety signage and fire safety notices; and heat, smoke, and fire control systems (such as fire shutters, fire doors, smoke purging systems, smoke vents, and heat and smoke extraction systems).

- Organise regular fire safety drills and training on fire prevention, detection, notification, what to do on discovering a fire, response, activation of fire safety equipment and systems, safe fire extinguisher use, first aid treatment, means of escape, and emergency evacuation for all personnel with proper documentation and ensure their review for necessary actions to be taken in the subsequent ones (0.529).
- Ensure fire safety inspection/risk assessment is regularly conducted within and around the facility for the identification, reduction, removal, control, and management of fire hazards or risks such as the ignition sources; conduct regular checks on the ventilation system to ensure that airflow rates are sufficient to extract fumes and heat to maintain the integrity of the unit; conduct periodic inspection and tests for cables, circuits, wiring, plugs, tanks, couplings, combustion systems, and battery elements; and investigate all near-miss occurrences by competent, experienced, and certified person(s), etc. (0.515).
- Ensure regular inspection/maintenance/testing of electrical, gas, and mechanical equipment/systems as well as their fittings/connections by competent, trained, reliable, and qualified person(s) to prevent mechanical or electrical faults, failures, and gas leakages that can lead to fire (0.480).
- Implement engineering controls to isolate and protect all individuals from fire hazards. These measures include providing an effective ventilation system to ensure proper air distribution and prevent the accumulation of flammable gases, dust, and heat, thereby reducing the risk of fire or explosion. Additionally, utilise dust collection systems and air cleaning technologies, such as high-efficiency particulate air (HEPA) filters and electrostatic precipitators (ESPs), etc.; the



Table 5: Occupational Fire Safety Practices in Industrial Buildings

Construct	Code	Variable	SRW	SMC	Validity	Cronbach's Alpha
Safety Practices	Practice1	Ensure exit/fire escape doors are made wide enough, open in the direction of travel, and made easy to open without the use of a key to allow people to pass through quickly in the event of an evacuation	0.659	0.435	000***	0.938
	Practice2	Ensure appropriate waste management (waste, rubbish, packaging materials and other debris) and prevent arsonist(s) from using them in causing fire	0.742	0.550		
	Practice3	Ensure adequate provision and the correct usage of personal protective equipment for all personnel within the facility at all times	0.648	0.420	000***	
	Practice4	In automatic battery-charging operations, only the number of batteries specified by the manufacturer must be charged simultaneously	0.676	0.456		
	Practice5	Ensure all electrical, mechanical, and heating equipment/systems usage guidelines are followed at all times, e.g., ensuring sockets are not overloaded; appliances/systems are switched off and disconnected from the source while not in use or while away, etc.	0.656	0.430		
	Practice6	Ensure regular inspection/maintenance/testing of electrical, gas, and mechanical equipment/systems as well as their fittings/connections by competent, trained, reliable, and qualified person(s) to prevent mechanical or electrical faults, failures, and gas leakages	0.480	0.230		
	Practice7	Ensure adequate provision, suitability, easy accessibility, unobstructed, well-designed and proper installation of emergency lighting systems and fire safety equipment/systems with photoluminescent signage for fire safety warning signs, fire notices, and fire assembly points	0.685	0.469	000***	
	Practice8	Ensure good administrative/management practices for the prevention and control of fire hazards and sources of ignition	0.732	0.537	000***	
	Practice9	Periodic inspection, testing, and maintenance are conducted on all emergency lighting equipment/systems and fire alarm, detection, notification, suppression, and extinguishing equipment/systems with proper documentation in a fire safety logbook	0.536	0.287	000***	
	Practice10	Develop a detailed fire emergency action plan and procedures and ensure the plan developed is incorporated into the architectural drawings of the facility to indicate all the safety measures put in place and their locations within the facility	0.638	0.407	000***	
	Practice11	Ensure that the fire emergency exists, escape routes, gangways, and pathways are well-illuminated, adequate, suitable, easily accessible, clearly marked, kept clear and unobstructed, and unlocked, with a direct channel to the muster point that is free of any flammable materials along the path	0.689	0.475	000***	
	Practice12	Ensure fire safety inspection/risk assessment is regularly conducted within and around the facility	0.515	0.265	000***	
	Practice13	Carry out an initial examination on the work area to remove available flammable materials/gases from the area before granting a permit for hot work or related operations; follow the right work procedures and permitted time span allowed for the activity with adequate supervision, protection and provisions of safety measures, followed by a subsequent check/fire watch to ensure there are no smouldering or hot materials that could allow a fire to break out at a later time	0.437	0.191	000***	
	Practice14	Ensure goods are separated from one aisle to another and from the walls to prevent fire spread and follow standard maximum storage heights to give enough clearance between the storage goods and the lower part of the roof beam with at least a metre separation distance between the highest storage point and the fire detectors and the sprinkler heads	0.609	0.370	000***	
	Practice15	Conduct a daily pre-start test on the forklift truck and make provision for checklists stating the condition of the state of all the important sections of the truck	0.461	0.213	000***	
	Practice16	Implementing engineering controls to isolate and protect all individuals from fire hazard	0.471	0.221	000***	
	Practice17	Ensure a safe storage distance for empty pallets (at least 20 metres) from the outer walls of the facility and ensure arsonist(s) cannot use them as an advantage in causing fire	0.692	0.478	000***	
	Practice18	Provide a separate area for chemical storage with strict safety measures in line with safety regulations and standards	0.758	0.574	000***	
	Practice19	Ensure an adequate water supply for fire-extinguishment purposes and its regular testing	0.647	0.418	000***	
	Practice20	Conduct regular portable appliance tests (PAT) for all portable electrical equipment to ensure they are in perfect condition and safe to use	0.459	0.211	000***	
	Practice21	Organise regular fire safety drills and training on fire prevention, detection, notification, what to do on discovering a fire, response, activation of fire safety equipment and systems, safe fire extinguisher use, first aid treatment, means of escape, and emergency evacuation for all personnel with proper documentation and ensure their review for necessary actions to be taken in the subsequent ones	0.529	0.280	000***	

Note: Cronbach's Alpha > 0.7; * significant at 99% confidence level**
Source: Authors' Computation, 2026



installation of automatic shut-off system for high-temperature machines; utilising all power strips with built-in circuit breakers; the use of fuses with correct power ratings or power surge protectors for electrical appliances; use of flame-extinguishing or spark containment devices around the exhaust pipe outlet of thermal engines using diesel, petrol, or gas; use of industrial-grade electrical cables with proper grounding; use of predictive techniques like thermal imaging thermal camera (thermography) at least once a year to detect electrical faults and exposed/frayed electrical cords; use of monitoring equipment for wear and tear of machines, etc.; the use of ground-fault circuit interrupters (GCFIs) and proper grounding systems to prevent ground faults and static electricity build-up; the use of flammable gas and vapour monitoring/detection devices to ensure safe conditions and emergency shutdown; the use of air filtration systems that use filters to trap and remove combustible particles from the air; use of fixed conventional heating systems/apparatus as against the use of portable electrical/heating equipment/tools; the use of skylights for natural light; and the use of energy-saver lights/lamps rather than the use of high-density discharge lamps/lighting, etc. (0.471).

- Conduct a daily pre-start test on the forklift truck and make provision for checklists stating the condition of the state of all the important sections of the truck (0.461).
- Conduct regular portable appliance tests (PAT) for all portable electrical equipment to ensure they are in perfect condition and safe to use (0.459).
- Carry out an initial examination on the work area to remove available flammable materials/gases from the area before granting a permit for hot work or related operations; follow the right work procedures and permitted time span allowed for the activity with adequate supervision, protection and provisions of safety measures, followed by a subsequent check/fire watch to ensure there are no smouldering or hot materials that could allow a fire to reignite at a later time (0.437).

It can be deduced that ensuring regular inspection, maintenance, and testing of all

equipment/systems as well as their fittings and connections; using engineering controls; conducting daily pre-start tests on forklift trucks; regular portable appliance tests for all portable equipment; carrying out an initial examination on the work area; proper and regular fire risk assessment and safety inspection; fire safety drills and training for all personnel; coupled with periodic inspection, testing, servicing, and maintenance of all fire safety and emergency lighting equipment and systems are required to ensure optimal fire safety in industrial buildings. Simply installing a fire safety system and equipment in the workplace does not guarantee safety; proactive measures are necessary to minimise the risk of fire outbreaks at a manageable level, ensure all fire safety facilities are functional, and provide employees with adequate knowledge through training in safe practices and the proper use of fire safety equipment and systems. Amro et al. (2023), in a similar study, posited that observing fire safety protocols; regular maintenance of mechanical and electrical systems and equipment; proper storage of flammable materials; ensuring functionality of fire safety systems and equipment with their regular maintenance and testing; and having a functional emergency action plan in place are germane to enhancing fire safety in warehouses.

Commitment to Occupational Fire Safety Policies and Standards in Industrial Buildings

Table 6 below presents the results of the standardised regression weights (SRW), squared multiple correlations (SMC), internal validity, and reliability for the nine (9) variables in the commitment to occupational fire safety policies and standards in industrial buildings construct, coded from 1 to 9. The construct's SRW values range from lowest (0.526) to highest (0.763). With a Cronbach's alpha of 0.808, above the 0.7 minimum limit, all nine (9) variables under the commitment to occupational fire safety policies and standards construct are significant at a 99 percent confidence level.

The management demonstrates a considerable level of commitment to fire safety policies and standards; however, there is still a need to ensure absolute organisational commitment to occupational fire safety policies and standards in industrial buildings, as two of the SRWs' scores are close to the minimum threshold of 0.5. These include assuring implementation and compliance with the applicable fire safety regulations, policies, and standards (0.545) as well as the enforcement of the fire safety standards, regulations, policies, and practices in industrial buildings (0.526).



This finding signifies the need for a higher degree of the implementation, compliance, and enforcement of fire safety policies, standards, regulations, and practices in industrial buildings, which are essential to reduce vulnerability to fire risk. Engaging the management and workers of organisations in the objectives of the fire safety policies, standards, regulations, and practices will help to promote their implementation and compliance in the workplace, aiming to ensure optimum safety by minimising and mitigating fire

impacts, rather than being misinterpreted as a means for the government to generate revenue from organisations. Adaeze (2021) stated that, despite the provisions in the Factories Act and other existing laws in Nigeria that establish the right to a safe workplace as a basic human right to ensure that no worker has to choose between their life and their job, risks to the safety, health, and welfare of the Nigerian workers are still on the increase due to the poor enforcement of the relevant laws.

Table 6: Commitment to Occupational Fire Safety Policies and Standard in Industrial Buildings

Construct	Code	Variable	SRW	SMC	Validity	Cronbach's Alpha
Safety Policies and Standards	Policy1	Ensure the proper communication of the available fire safety regulations and standards	0.603	0.364	000***	0.808
	Policy2	Ensure regular review and revision of the fire risk assessment and resultant emergency action plan to make them up-to-date and allow for improvement	0.716	0.512	000***	
	Policy3	Evaluate the efficacy of the fire safety plan and policies	0.653	0.426	000***	
	Policy4	Record and keep a fire-safety inventory	0.610	0.372	000***	
	Policy5	Assure implementation and compliance of applicable fire safety regulations, policies, and standards, including fire safety codes, approval, certification, permits, and fire risk transfer, e.g., fire insurance, etc.	0.545	0.297	000***	
	Policy6	Ensure the specified architectural design and compartmentalisation standards are followed	0.763	0.583	000***	
	Policy7	Write, develop, and document a fire safety plan	0.717	0.515	000***	
	Policy8	Have a good layout and road network to allow for prompt emergency response into the facility	0.704	0.496	000***	
	Policy9	Enforcement of fire safety standards, regulations, policies, and practices	0.526	0.276	000***	

Note: Cronbach's Alpha > 0.7; * significant at 99% confidence level**

Source: Author's Computation, 2026

Occupational Fire Safety Management in Industrial Buildings

Table 7 below presents the results of the standardised regression weights (SRW), square multiple correlations (SMC), internal validity, and reliability for the construct of occupational fire safety management for industrial buildings with nine (9) variables coded from 1 to 9. The construct's SRWs for the occupational fire safety management in industrial buildings range from lowest (0.457) to highest (0.687); consequently, the construct's SMCs range from lowest (0.209) to highest (0.471). All the nine (9) variables in the construct for occupational fire safety management are significant at a 99 percent confidence level, with a Cronbach's alpha of 0.815 surpassing the 0.7 minimum limit.

Two (2) of the SRWs fall below the average lower limit of 0.5, specifically those related to ensuring the regular conduct of fire safety audits and providing adequate budgetary funds for fire

safety management (0.457) as well as the commitment to occupational fire safety policies and standards (0.472). Based on this finding, a conclusion can be drawn that poor fire safety audits, budgetary fund provisions, and compliance with fire safety policies and standards contribute to haphazard occupational fire safety management in industrial buildings. In achieving the objectives of the occupational fire safety management in industrial buildings in Nigeria, organisations' management must ensure fire safety audits are regularly carried out, adequate budgets are provided for fire safety management, and there is total compliance with the fire safety policies and standards.

This approach will ensure that adequate and functional resources are provided for fire safety management, as well as for the capacity building of employees, enabling them to effectively and efficiently prevent, mitigate, prepare for, and respond to fire risk. Since fire safety management is



a continuous process throughout the life cycle of a building or structure, complying with fire safety standards and requirements regularly promotes effective fire safety management. Consistent with this finding is Boskovic et al. (2023), who maintained that commitment to the building code

provisions and other fire safety rules enhanced the increase in the provision of fire safety features, employees' fire safety awareness, and the proper use of technology and resources in industrial buildings to reduce the risk of fire in warehouses.

Table 7: Occupational Fire Safety Management in Industrial Buildings

Construct	Code	Variable	SRW	SMC	Validity	Cronbach's Alpha
Management	Safety Management1	Awareness of occupational fire safety	0.650	0.422	000***	0.815
	Safety Management2	Occupational fire safety practices	0.618	0.383	000***	
	Safety Management3	Have a designated fire safety team/fire watcher within the organisation who oversees fire safety practices, liaises, and maintains easily accessible contact information for fire services in case there are emergencies	0.611	0.373	000***	
	Safety Management4	Commitment to occupational fire safety policies and standards	0.472	0.222	000***	
	Safety Management5	Have a system for communicating fire-safety information	0.611	0.374	000***	
	Safety Management6	Develop a procedure for conducting a thorough assessment of the facility, both internally and externally, with responsible and reliable individuals overseeing a formal shutdown procedure and inspection at the end of each working day or shift	0.635	0.404	000***	
	Safety Management7	Form a joint team to manage fire safety with organisations that share boundaries	0.616	0.380	000***	
	Safety Management8	Conduct regular fire safety audits and ensure adequate budgetary fund provision for fire safety management	0.457	0.209	000***	
	Safety Management9	Use high-level fire-resistance construction materials and quality insulation for partitions, lobbies, exits, passages, floors, roofs, ceilings, joints, coatings, stairwells, and battery charging areas, as well as install fire breaks into open voids, etc.	0.687	0.471	000***	

Note: Cronbach's Alpha > 0.7; * significant at 99% confidence level**

Source: Author's Computation, 2026

IV. SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Summary

The study found out that occupational fire safety practices, fire safety awareness among employees, and commitment of organisations' management to fire safety policies and standards have significant positive impacts on occupational fire safety management in industrial buildings, while the cause of occupational fire incidents has a significant negative impact on occupational fire safety management in industrial buildings, with regression coefficients of 0.50, 0.49, 0.32, and -0.15, respectively.

The study identified human carelessness, errors, poor behavioural practices, accidents, malfunctioning mechanical and electrical equipment and systems, and arson as factors responsible for fire incidents in industrial buildings. The study also found that industrial workers exhibited low fire safety practices and awareness and that most industrial buildings in Nigeria suffered from poor fire safety audits, insufficient budget allocations for fire safety management, and weak implementation, compliance, and enforcement of fire safety policies, standards, regulations, and practices by management.



Conclusion

The study identified several factors contributing to poor occupational fire safety management in industrial buildings, including unsatisfactory fire safety practices and awareness among industrial workers, inadequate fire safety audits, insufficient budgetary provisions for fire safety management, and weak implementation, compliance, and enforcement of fire safety policies, standards, regulations, and practices by management of organisations; addressing these issues is essential to reduce societal vulnerability to fire risk.

Policy Recommendations

Based on the findings of the study, the following policy recommendations are hereby put forward to address the identified challenges facing occupational fire management in industrial buildings:

1. Organisations' management should ensure full fire safety policies, standards, regulations, protocols, and practices compliance to reduce vulnerability to fire risk.
2. Organisations' management should perform safety audits regularly and provide adequate budgetary allocation for proficient occupational fire safety management.
3. Routine safety inspections should be conducted on the work area, equipment, and systems, with necessary actions being taken immediately to ensure optimum fire prevention.
4. The fire services should launch a robust public campaign to raise awareness about occupational fire safety and enforce strict policies for compliance and effective management in industrial buildings.
5. The government at all levels should provide more fire stations with functional fire engines and hydrants to ensure timely emergency response and adequate fire safety coverage across Nigeria.

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