MAN, ENVIRONMENT AND SOCIETY
Vol. 3, No. 1, 2022, pp. 65-83, ISSN: 2582-7669

URL : www.arfjournals.com/mes
https://DOI: 10.47509/MES.2022.v03i01.05

SELF-REPORTED INDUSTRIAL ACCIDENTS AND A SAFETY CLIMATE ANALYSIS OF A FOOD MANUFACTURING COMPANY IN NIGERIA

Qudus Olawepo[1], Mariam Seedat Khan [2] and Aradhana Ramnund-Mansingh[*]
[1] *Department of Industrial Organisation and Labour Studies, University of KwaZulu Natal, Durban, South Africa*
[2]*Department of Sociology, University of KwaZulu Natal, Durban, South Africa, E-mail: seedatm@ukzn.ac.za*
[*]*Corresponding Author, Human Resources Academic Cluster, MANCOSA Honoris United Universities,*
26 Samora Machel Street, Durban, 4001, KwaZulu Natal, South Africa.,
E-mail: raakheemansingh17@gmail.com

Article History
Received : 19 March 2022
Revised : 02 April 2022
Accepted : 11 April 2022
Published : 22 June 2022

Keywords
Industrial Accident, Safety Climate, Communicating Safety, Leading Safety, Knowing Safety, Resourcing Safety

Abstract: *Background*: The study examines the relationship between employees' safety climate and industrial accidents in a food manufacturing company in Nigeria. Scholars identify safety climate as a plausible determinant of positive safety performance. The relationship between safety climate and industrial accidents has not attracted enough research in the food-manufacturing sector in Nigeria.

Methods: The study employed a quantitative approach, utilizing a survey research design to administer structured questionnaires to employees. The questionnaires assessed respondents' views on organizational safety climate and self-reported accidents.

Results: The findings reveal a weak positive relationship between employees' perceptions of safety and self-reported accident rate; and a difference in the perceptions of the six safety climate dimensions. Effective communication and leadership skills are the two leading factors that accounted for the variation in accident rates in the company. Findings show a high perception of the safety climate among the employees, but room for improvement in the sub-dimensions.

Conclusion: This study confirms there is no substitute for effective communication and leadership to achieve positive safety performance. Top management, should incorporate safety predictors into their Safety Management System to focus on regular and continuous training to promote excellent safety performance in the industries.

To cite this article

Q. Olawepo, M. S. Khan & A. R. Mansingh (2022). Self-Reported Industrial Accidents and a Safety Climate Analysis of a Food Manufacturing Company in Nigeria. *Man, Environment and Society*, Vol. 3, No. 1, pp. 65-83. https://DOI: 10.47509/MES.2022.v03i01.05

Introduction

Nigeria's manufacturing sector houses the food and beverage sub-sector, recognized as the leading, gross domestic product contributor with 52.74 % in 2013 out of the sector total (NBS, 2014). As in the first quarter of 2019, the sub-sector grew by 1.76% from 2.22% in the fourth quarter of 2018. This growth rate was superior to the chemical and pharmaceutical 1.66%, wood products 1.39% and oil refining -49.62% sub-sector (NBS, 2019). Despite the impressive growth in the food and drinks sub-sector, industrial accidents have increased (Victor, 2013; Adelaja, 2020). Umeokafor, Evaggelimos, Lundy, Isaac, Allan, Igwegbe, Umeokafor and Umeadi (2014) reported that the food processing sub-sector had the highest reported accident cases after rubber products in the manufacturing sector in Nigeria. They confirm that between 2002 and 2012, the food and drink sub-sector reported nine accidents,12 deaths, 20 injuries and a fatality rate of 60%. The International Labour Organisations (ILO, 2020) report confirms a range of 2 200 000 annual work-related mortalities. Likewise, the report indicates that 340 000 000 non-fatal occupational accidents and 160 000 000 work-related diseases were estimated to occur annually. The conjecture pre-dating the 20th century believed accidents were *"an act of God and unavoidable"* (Smith, 2012:135). The theory subsequently led to investigations on industrial accidents that established government-prescribed industry regulations and safety protocols associated with Africa (Silbey, 2009). Since the 1900s, studies on the causes of industrial accidents focused primarily on technical or design failure (Khan and Abbasi, 1999; O'Toole, 2002; Abdulrauf and Elsayad, 2020). The remarkable progress in designing different types of machinery with protective guards and physical controls is evident. In the 1930s, human and organizational factors attributed the leading cause of industrial accidents to negligent managers (Glendon and Stanton, 2000; Umeokafor *et al.* 2014; Victor, 2013; Adeyemo and Smallwood, 2017). Equally, progress has been made in the enforcement of rules and procedures in workplaces internationally.

Globally, studies on industrial accidents took a new turn following the aftermath of the 1986 nuclear disaster of a former Soviet Union satellite that occurred in Ukraine. A group of nuclear experts called the International Nuclear Safety Group -INSAG reported that the incident happened due to the inadequate safety culture of operators (Cox and Flin, 1998). The safety culture construct conceived by the INSAG in their report refers to characteristics of the work environment responsible for creating a conducive atmosphere for safe practices. Subsequently, researchers have extended the construct to high-risk organizations in their attempt to explain the causes of accidents in industrial enterprises (Mearns and Flin, 1999).

Machida (2009) posits that accident statistics are difficult to collect and analyze. African countries have failed to implement coordinated Occupational Safety and Health-OSH reporting systems mandated by the Promotional Framework for Occupational Safety and Health Convention, No.187 ILO (2006). The absence of reporting systems makes it challenging to analyze and compare the severity of accident rates in African countries. Conversely, developed nations have comprehensive reporting systems that enable them to monitor safety performance. The European Commission, through the framework directive 89/391/EEC, mandates employers to report industrial accidents under their national laws.

The commission launched the European Statistics on Accidents at Work -ESAW (2013) project in 1990 *"to harmonize data on accidents at work for all accidents resulting in more than three days' absence from work"* (ESAW, 2013:5). European statistics on accidents at work (2019) for 28 countries detail 3 300 000 non-fatal accidents and 3552 fatal accidents in 2017. Eurostat (2019) provides evidence of a reduction of 217 800 non-fatal accidents between 2010 and 2017, and a decrease of 36 deaths between 2016 and 2017. The decline indicates a reduction in fatal accidents is made possible by the synchronized reporting system (Eurostat, 2019). Correspondingly, the United States of America has mandated the Occupation Safety and Health Administration -OSHA to direct employers to report, within twenty-four hours, any work-related loss of sight, in-patient hospitalization and work-related amputation. The new requirement took effect on January 1, 2015. Accident statistics accessed from government agencies' statutory legal reporting systems or insurance claims (Micheals, 2016). The link between employees' safety climate and industrial accidents has not attracted sufficient research significance in the Nigerian food manufacturing sector. This study, therefore, examines the relationship between employees' safety climate and the industrial accident rate. In proportion to the research objectives, the study tested the hypothesis that there is a correlation between employees' safety climate and the accident rate in the organization.

A Brief Review of Recent Studies

The Concept of Safety Climate

The concept of 'safety climate' comes from research in the 1980s (Glendon and Stanton, 2000). Safety climate was first proposed in 1980 by Zohar (1980) in an article on "*Safety climate in industrial organizations: theoretical and applied implications"* (Mearns and Flin, 1999; Blewett, 2011). Mearns and Flin (1999:8) concede that Zohar (1980:96) was one of the first to propose a safety climate, which he operationalizes as the *"summary of molar perceptions employees shared about their work environment and the relative importance of safety behaviour"*. Subsequently, several definitions have been coined, through measures and dimensions of safety climate reporting and evaluation (Coyle, Sleeman and Adams, 1995; Cox and Flin, 1998; Chen and Jin, 2013). Organizational climate includes different aspects and characteristics of the overall work environment, with safety climate constituting a significant aspect of the organizational climate to address safety explicitly (Zohar, 1980). Employee perceptions of organizational safety are recognized as a safety climate. Zohar (1980) elaborates that this perception provides a frame of reference that guides employees' safety behaviour. He, therefore, defines a safety climate as the *"shared organization perceptions of safety by the employees"* (Zohar, 1980:97). William, Feyer, Caurns and Biancotti (1997:16) view safety climate as "*a summary concept describing the safety ethic in an organization or workplace which is reflected in employees' beliefs about safety and is thought to predict the way employees behave concerning safety in that workplace"*. Coyle, Sleeman and Adams (1995:248), an advance that safety climate "*is best considered a subset of organizational climate, safety climate could be further divided to include such areas as work practices, work style, operator training and industrial hygiene"*. Coyle, Sleeman and Adams (1995) Australian survey measured employees' perceptions and attitudes towards the social and organizational environment in clerical and service organizations. Coyle, Sleeman and Adams (1995) results demonstrate findings contrary to Zohar (1980) and Glennon's (1982) results owing to methodological matters. They consequently concluded that there are no universal dimensions of safety climate; however, it ought to be designed for specific industrial contexts.

Guldenmund (2007) notes a distinction was between safety climate scales that measure perception and attitudes in literature. Cooper (2001) notes that many safety climate studies combine attitudes, perception and behavioural scales in the safety climate constructs. He opines that combining these different climate scales will affect the climate constructs itself. Similarly, Glendon and Stanton (2000) identified inherent limitations in safety climate measures, previous measures inclined to gauge global features of safety climate by integrating perceptions, attitudes and behaviour. Glendon and Stanton (2000) proposed an approach that separates attitude and perception from behaviour, to gauge global and contextual features of safety climate. Glendon and Stanton (2000) recognized safety climate scales that measure perceptions, attitudes and behaviour are exceedingly similar; they contend that measuring relationships among the constructs will be unnoticed if they have coalesced into a single global measure. Dynamics that enable the creation and maintenance of a safe climate, including how environmental dynamics interact with individual differences are significant (Schatka, Hecker and Goldenhar, 2016; Kim and Cho, 2017; Lyu, Hun, Chan, Wong and Javed, 2018).

Guldenmuld (2007) differs on the view that safety climate should not combine perceptions scales, attitudes and behavioural scales in a single global safety climate measure. He contends that the distinction is problematic as "*perception reflects attitudes and safety climate research is attitude research"* (Guldenmuld, 2007:726). Moreover, *"using questionnaires enables us to know what is happening in the organization, but we do not know why it is happening, it enables us to* *decipher the artefact (behaviour) or at best-espoused values (perception and attitude), but we do not know the shared assumptions or the reasons for the artefact" (Guldenmuld, 2007:726).* The authors support Guldenmund's (2007) view on the safety climate questionnaire by combining three different scales in a single global measure. The distinction is not helpful because it will be difficult to measure how people think separately from how they feel at any time. However, the authors believe that the behavioural scale should be separated from the safety climate scales that measure employees' perceptions and attitudes. The level of aggregation of safety climate has equally drawn the attention of many scholars (Flin, Mearns, O'Connor and Bryden, 2000). Flin et al. (2000) believe that most safety climates are an attitudinal survey of employees' evaluation of management at the organizational level of aggregation. However, they acknowledge that most questionnaires applied in safety climate research defined at the individual or group level. These are primary factors in aggregated data sets. Zohar (2008:378) proposes that a safety climate should now be a multi-level construct distinguishing between the priorities of senior management and those of the individual supervisor. Zohar (2008) distinguished between the role of senior management and their supervision of safety management. This distinction is rooted in two management layers of policies, procedures and practices. Zohar (2008), established that while policies define strategic goals and their attainment, involving procedures that translate policies into calculated guidelines. Practices related to the execution of policies by supervisors throughout the organization. Senior management is liable for the espoused policies, the organization's strategic goals and established implementation procedures. Together, individual supervisors are responsible for enacting and implementing safety policies. Since Zohar (2000) argued that other constructs in the safety climate take second place to management's commitment to safety, the level of aggregation of the safety climate is probably at the top level of management and the workgroup or supervisor level. His basic assumption is that employees will develop *"concurrent or co-existing climate perception"* (Zohar, 2008:378). He claims that one set of perceptions draws on the company-level emphasis of safety as the referent object, whereas, the other uses supervisory emphasis and the resultant group practices as its referent group (Zohar, 2008).

Different dimensions of safety climate have been reported in the literature (William, et al. 1997; Guldenmuld, 2000). William *et al.* (1997) attempted to measure the dimensions of safety climate. Their findings reveal the following factors: *"personal motivation for safety, risk justification and positive practices"* (William *et al.*, 1997:22). Heyes, Perander, Smecko and Trask (1998) conducted a series of studies to establish the factors of safety climate. The five factors found across three studies using factorial analytics include job safety, co-employee safety, supervisor safety, management safety practices and satisfaction with the safety programme. They concluded that management practices and supervisor safety sub-scales were the best predictors of accidents, job satisfaction and compliance with safety behaviour (Heyes, et al., 1998:156). Their findings are align with previous studies that report that management's commitment to safety is the best predictor of accident variables (Zohar, 1980). Zohar (1980:101) reporting his findings on the safety climate in an industrial organization in Israel concluded that "*a genuine change in management attitudes and increased commitment are prerequisites for any successful attempt at improving the safety level in industrial organizations"*. Furthermore, Mearn and Flin (1999) identified eight dimensions of safety climate, which they linked to an organization's safety performance measured in terms of the safety inspector's rating. According to them *"the dimensions identified from studies of safety climate seem to be concerned with employees' perceptions of the prevailing conditions that impact upon safety"* (Mearn and Flin, 1999:12). Neal, Griffin and Hart (2000:100) identified the following dimensions of safety climate: *"management values, management and organization practices, communications and employees' involvement in the workplace health and safety"*.

The Concept of Industrial Accidents

As the term suggests, industrial accidents can be coceived as unplanned events with dangerous consequences to human lives and properties that occur within and outside the work environment (Yusuf, Ismailia, Kuye and Samuel, 2015). The operations of industrial machinery and the interface between man and machine suggests the probability of risk or harm occurring in a work situation. The level of risk in any industrial setup depends on several factors such as work conditions; location or site of the organization; dangerous or hazardous substance handling; source of energy supply and the type of machinery in place. The organizations with the highest or most severe level of risk are described as High-Risk Organizations-HRO. These organizations are prominent in the nuclear, aviation, oil and gas, and construction sectors. The concepts of safety, risks, incidents, near misses and accidents, have been utilized in safety research with different interpretations (Korvers, 2004). Identifying the various definitions of these concepts is essential to avoid confusion.

Safety is the absence of risks or potential harm in a specific context. Risks are the existence of dangerous or hazardous conditions that could have negative consequences on human health, lives and properties. The Centre for Chemical Process Safety -CCPS in (Hyatt, 2006:35) states that incidents can be considered *"to be unusual or unexpected occurrences that have the potential for adverse consequences, such as serious injury, significant property damage, impacts to the environment or major interruptions to process operations."* Accidents are very similar to incidents but the difference between the two concepts "*is that accidents are the outcome of an incident or series of incidents having 'high' consequences*" (Hyatt, 2006:36). According to Neal and Griffin (2006:949), *"accidents are low-frequency events and are typically triggered by unintentional errors, such as slips, lapses, or mistakes"*. They believe that accidents are made possible because of the pre-existing hazards or pathogens that have made the system vulnerable to failure. Probst and Brubaker (2001:143) define accidents *"to include actual reported accidents, unreported accidents, and near misses (incidents that could have caused an injury but did not)"*.

Accidents do not occur frequently; they manifest latent events or pathogens that are eventually triggered by a proximal act with extreme consequences. However, if these events were prevented or failed to lead to any dangerous consequences, then it can be said to be a near miss (Hyatt, 2006). Near misses are events that occur between incidents and accidents which provide ample room for management to take corrective measures. Hyatt (2006:35) writes, *"incidents are accidents which include the adverse effects indicated, near misses, and operational interruptions where production is seriously impacted"*. He indicates that near misses are a series of ongoing events that could result in severe consequences, but that did not materialize. Correspondingly, *"there are usually far more near misses than accidents, such near misses can be the learning curve by which accidents are both avoided and prevented"* (Hyatt 2006: 36). Korvers (2004) argues that organizations should be able to identify safety indicators to mitigate the possibility of high occurrences of incidents proactively. Accidents, near misses, and injuries are the traditional indicators used to measure the health of an organization. These indicators have been described as reactive, downstream, lagged and unreasonable measures or indicators of an organization's safety performance (Cox and Flin, 1998; Mearns and Flin, 1999; Zohar 2000; Flin *et al.*, 2004; Korvers, 2004; Clarke, 2006).

Two safety indicators have been identified, firstly, the reactive or lagged indicators and the second is proactive or leading indicators. The reactive indicators measure organizations' safety performance which includes accidents, incidents, injuries and near misses. Secondly, the practical indicators of organizations' safety performance are self-reports of safety behaviour (Thompson Hilton and Witt, 1998), benchmarking with companies with proven records in health and safety (Mearns and Flin, 1999), and micro accidents (Zohar, 2000). Finally, safety climate, hazard identification and or the observed percentage of safety behaviour (Cooper and Phillips, 2004).

Relationship Between Employees' Safety Climate and Accident Rates

Efforts to establish the determinants of safety behaviour and accident rates progressed slowly since 1980 majorly due to the issue of validity and reliability of safety performance criteria (Coyle, Sleeman and Adam, 1995; Zohar, 2000). The majority of research findings report an inverse relationship between employee safety climate and industrial accidents (Probst and Brubaker, 2001; Neal and Griffin, 2002; Schwatka, Hecker and Gildenhar, 2016). Zohar (1980) found out that in industrial organizations with low accident rates, the employees' perception of management attitude to safety has the highest scores. However, due to the infrequent nature of accident data, it was challenging to measure the accident rate in industrial organizations. Therefore, Coyle, Sleeman and Adams (1995) suggested that employee (safety) behaviour was an equally important determinant of safety performance.

Zacharatos Barking and Inverson (2005) found out that employees' safety climate is negatively associated with lost-time injuries. Similar studies reported the negative relationships between employee safety climate and industrial accidents (Neal and Griffin, 2002; Johnson 2007). Finally, studies report that employees' perception of management attitudes or commitment to safety was the lead predictor of organization safety performance, safety behaviour and accidents (Zohar, 1980; Choudhry, Fang and Lingard, 2009; Adeyemo and Smallwood, 2017).

Theoretical Framework

The theoretical underpinning of this study is dominated by the reciprocal safety culture model. Cooper (2000) proposed a reciprocal safety culture model to elucidate accident causation in the workplace. Bleweth (2011) contends that attempts to develop theoretical models were based on the instrumental view that safety is a mechanism that an organization has. It can be manipulated by management, an idea he viewed to be an exercise in futility. Bleweth (2011) observed that existing models focus exclusively on behavioural contingency and ignore salient aspects of safety culture. He records two perspectives of safety culture models that are discovered in safety literature. The shared views established an explanation of accident causation that are instrumental to the functionalist and interpretative approaches.

The reciprocal safety culture model is aligned with a functionalist approach. This model suggests that there is a relationship between employees' perception and the organization's environment and behaviour, which in turn influences the organization's safety performance. The model indicates that there are reciprocal relationships between the three dimensions of safety culture and industrial accidents. The three dimensions include safety climate, employee behaviour and safety management system.

Methodology

This study concentrated on the quantitative aspect of mixed methodology research that explored the various dimensions of the reciprocal safety culture model. The study employed a survey research design through the administration of a structured questionnaire. The population of the study consisted of the employees of Sintus (name of the company changed to protect identity) Food Limited. The organization has a total of 768 employees. A stratified sampling technique was used to select the respondents. According to Sakaran and Bougie (2013:249), stratified random sampling *"involves a process of stratification or segregation, followed by a random selection of subjects from each stratum"*. The criterion for stratifying the population in Lagos State was based on the location of the respondents at two factories in different areas.

Location of the study: The location of the study is Sintus Food Limited, a food manufacturing company located in the western region of Lagos State. The company operates from the commercial and industrial hub of Nigeria. Lagos State is home to extreme industrial clusters in distinctive areas within the metropolis. Sintus food limited constitutes three factories in two distinct locations in Lagos State.

Sampling Technique: The information on the population of the company employees was obtained from the Safety Manager. The information included the total number of employees in the organization and the location of the company, as well as the number of employees in each of the two sites of the company, and the various departments in the organization. The population element for the study constituted the total number of employees present at the time that the fieldwork was conducted in 2019. The stratified sampling strategy was used to select the respondents since it allowed the researcher to stratify the respondents on a location basis so that the ultimate findings of the research are a representation of the views of all employees in the company. The sample size was selected from the two work locations. The sample size was determined by Sakaran and Bougie (2013:268), which specified instructions for appropriate sample size and selection. A total of 374 respondents constituted the sample size of the study.

Measurement: The structured questionnaires were used to obtain data from the respondents. The perceptions of the respondents were measured with a Safety Climate Questionnaire. The demographical information of respondents such as gender, age, department, educational qualification, years of experience and work location was measured on nominal and continuous scales. Respondents' experience of accidents was also measured on a dichotomous scale of yes or no. Six dimensions of safety climate were measured that included communicating safety, leading safety, knowing safety, resourcing safety, reporting and learning safety, and involving safety.

Validity Tests: The construct and content validity of the research instruments were tested. The researcher consulted two senior academics in industrial psychology and labour studies to ensure that the instruments capture all the concepts under investigation. The instruments were modified based on the inputs of these academics. The contents of the instruments were thus validated on their face value of it. The researcher also conducted a pilot survey by administering the questionnaire to ten respondents. The language style and general structure of the instruments were modified following the initial observations of the respondents.

The principal component analysis with varimax rotation was conducted to check the construct validity of the 24 items of employees' perceptions on the safety scale. The assumptions of the principal component factor analysis were checked. The KMO=0.94 (0.6 and above is the accepted standard) and Bartlett's test of significance, p=0.000 shows that the assumptions were met (Pallant, 2007:187). Six factors were requested based on the dimensions of the scale that was designed. After the rotation, the first factor accounted for 18.2 % of the variance, the second factor accounted for 15.4 % of the variance, the third factor accounted for 15.3 % of the variance, the fourth factor accounted for 11.0 % of the variance, the fifth factor accounted for 8.4 % of the variance while the sixth factor accounted for the 4.6 % of the variance. *Appendix 1* displays the items and the factor loading for the rotated factor with loading less than 0.30 omitted.

Reliability Test: The reliability of the research instrument was tested using Cronbach's Alpha Test. The research instrument had six factors on 24-item scales. The employees' perceptions of safety have suitable internal consistency with a Cronbach Alpha of 0.95. Table 1 displays the reliability test of the employees' perceptions of safety scales.

Table 1: Reliability Test of Employees' Perceptions of Safety Scales

Cronbach's alpha	*Cronbach's alpha based on standardized items 90*	*N o. of items*
0.953	0.954	24

Source: Fieldwork (2019)

Findings and Discussion

Descriptive Statistics: This section presents the summary of the respondents' biographical information and other data relating to the causes of accidents. The respondents' perceptions of safety in the company were assessed and summarized. Table 2 displays respondents' biological data.

Table 2 reflects 69.9% male and 30.1% female respondents. Respondents between 20-29 years 47.4%, followed by 30-39 years 40.3%, followed by 40-49 years 10.1% and those aged 50+ years represented 2.2% of the sample. The occupational experience and duration of service of employees were measured. Most of the respondents have worked for 1-3 years (45.7%), followed by 4-6 years (20.4%), 7-10 years (15.6%), less than a year (8.9%) and then above 10 years (7.1%). With regards to the respondents' educational qualifications, the majority of the respondents possessed a Senior Secondary Certificate (53.2%), followed by an Ordinary National Diploma (18.6%), a Bachelor of Science (11.2%), a Higher National Diploma (6.7%), others (4.8%) and then a Bachelor of Engineering (1.9%). The majority of the respondents worked in the Biscuit Production Department (60.8%), followed by the Confectionery Department (15.6%), Quality Control (8.6%), Human Resources Department (5.2%), Engineering/Maintenance Department

Table 2: Descriptive Statistics: Biographical Data of the Respondents

Biographical variable	*Category*	*N*	*%*
Gender	Female	81	30.1
	Male	188	69.9
	Total	269	100.0
Age	20-29	127	47.4
	30-39	108	40.3
	40-49	27	10.1
	50 & above	6	2.2
	Total	268	100.0
Work experience	Less than a year	24	9.1
	1-3	123	46.8
	4-6	55	20.9
	7-10	42	16.0
	Above 10	19	7.2
	Total	263	100.0
Department	Biscuit	161	60.8
	Confectionery	42	15.8
	Quality Control	23	8.7
	Engineering/Maintenance	9	3.4
	Sales/Marketing	8	3.0
	Raw Materials	5	1.9
	Human Resources	14	5.3
	Accounts/Administration	3	1.1
	Total	265	100.0
Education Qualification	Senior School Certificate (SSCE)	143	55.2
	Ordinary National Diploma (O.N.D.)	50	19.3
	Higher National Diploma (HND)	18	6.9
	Bachelor of Science (B.S.C.)	30	11.6
	Bachelor of Engineering (BENG.)	5	1.9
	Others	13	5.0
	Total	259	100.0
Work Location	Ikeja	129	48.0
	Dopemu	140	52.0
	Total	269	100.0

Source: Fieldwork (2019)

(3.3%), Sales/Marketing Department (3%), Raw Materials Department (1.9%) and then the Accounts/Administration Department (1.1%). The majority (52%) of the respondents worked in the Dopemu factory while 48 % of the respondents worked in the Ikeja factory.

Table 3: Descriptive Statistics: Respondents' Experience of Accidents in the Last Five Years

		Frequency	*Per cent*	*Valid Percent*	*Cumulative Percent*
Valid	**Yes**	53	19.7	20.2	20.2
	No	210	78.1	79.8	100.0
	Total	263	97.8	100.0	
Missing System		6	2.2		
Total		269	100.0		

Source: Fieldwork (2019)

Table 3 shows respondents' experience of accidents in the organization in the last five years preceding the study. Table 3 shows that the majority of the respondents (78.1%) have not experienced accidents during the previous five years while only 20.2 % of the respondents have experienced accidents in the last five years in the organization.

Relationship between Employees' Safety Climate and Accident Rates: The correlation between safety climate and self-reported accident rates was tested with the logistic regression statistics test. There is a correlation between employees' safety climate (or perception of safety) and accident rates in the organization.

Table 4: Logistics Regression: Employees' Perceptions of Safety and Self-Reported Accident Rate

Omnibus Tests of Model Coefficients

		CHI-SQUARE	*DF*	*SIG.*
Step 1	**Step**	59.286	24	0.000
	Block	59.286	24	0.000
	Model			
	R^2=0.365	59.286	24	0.000

Source: Fieldwork (2019)

A logistic regression test was carried out to assess the relationship between employees' perceptions of safety and the self-reported accident rates in the organization. Table 4 shows that the omnibus tests of co-efficient model are significant (X^2= 59.286, df=24, N=221, p< 0.001). Table 4 shows that the coefficient of the model is R^2=0.365. Since the p-value is less than the cut-off alpha value (p=0.05) it indicates that the model is rejected, and the alternative hypothesis is established. This demonstrates the existence of a significant positive relationship between employee perceptions of safety and self-reported accident rates.

Conversely, the co-efficient of the model R^2 proves that the relationship is weak. The findings indicated that 36.5% of the cases that reported that they were not involved in accidents were correctly predicted by the model. The variables with a p-value <0.05 that predict the variation in accident rates (20.2%)as depicted in Table 3 and appendix 2 include: Managers' encouragement to report unsafe behaviour., Managers to halt hazardous operations, Managers comply with safety protocols, Sufficient time apportioned to work safely, adequate safety resources, adequate employees to ensure safe manufacturing, mandate the reporting of the near-missed accident, identification and report all potential hazards, and promote a reporting culture among employees to flag safety concerns, (*See Appendix 2*).

Coyle, Sleeman and Adams (1995) and Neal, Griffin and Hart (2000) have established a relationship between safety climate and industrial accidents. However, there are wide-ranging differences reported on the nature of the relationship between safety climate and industrial accidents. Moreover, scholars agree on the record significant predictor of industrial accidents in organizations is management commitment to safety whereas other influences take second place (Zohar, 1980; Choudhry, Fang and Lingard, 2009).

Conclusion and Recommendations

The study demonstrates the existence of a weak positive relationship between employees' perceptions of safety and self-reported accident rates. Extant literature documents a negative relationship between employees' safety climate and self-reported accident rates (O'Toole, 2002, Cooper and Phillips, 2004; Neal and Griffin, 2006). The current findings of this study diverge from the results reported. Desai and Roberts (2006) established a positive relationship between recent accidents and safety climate perceptions. They argue that recent accidents influence the safety climate scores positively. Therefore, recent accidents in an organization will increase the employees' safety climate scores. Accident rates have been described as lagged, reactive and therefore not a suitable measure of an organization's safety performance (Thompson Hilton and Witt, 1998; Cox and Flin, 1998; Mearn and Flin, 1999; Cooper, 2000). Accidents are mostly infrequent and usually under-reported in organizations. The self-reported accident rate is not an accurate measure of safety performance. Most researchers now turn to alternative outcome measures of safety performance (Thompson, Hiltin and With, 1998; Zohar, 2000). Finally, the implication of the study indicates that senior managers, line supervisors and employees ought to be trained frequently in the areas of communication and leadership to advance safety proficiencies and dexterities in the food manufacturing sector in Nigeria.

References

Abdulrauf, E.E and Elsayad, H. (2020). Implementing the safety culture improves the autonomous ships' prosperity. *Journal of Shipping and Ocean Engineering*, 10: 5-20.

Adelaja, B. (2020). Safety professionals decry incessant industrial accidents. Vanguard newspaper. [Online] Available at: http:/vangaurdngr.com.

Adeyemo, O. and Smallwood, J. (2017). Impacts of occupational health and safety legislation on performance improvement in the Nigerian construction industry. *Procedia Engineering Science Direct*, 196: 785-791.

Blewett, V. (2011). *Clarifying Culture*, Australia: Safe Work.

Choudhry, R.M. Fang, D and Lingard, H. (2009). Measuring safety climate of a construction company. *Journal of Construction Engineering and Management*, pp. 890-899.

Cooper, M.D. (2000). Towards a model of safety culture. *Safety Science*, 36: 111-136.

Cooper. M.D. and Phillips, R.A. (2004). Exploratory analysis of the safety climate and safety behaviour relationship. *Journal of Safety Research*, 35: 497-512.

Cox, S. and Flin, R. (1998). Safety culture: Philosopher's stone or man of straw? *work and stress*, 12(93): 189-201.

Coyle, I.R. Sleeman, S.D. and Adams, N. (1995). Safety climate. *Journal of Safety Research,* 26(4): 247-254.

Desai, V.M and Roberts, K.H. (2006). The relationship between safety climate and recent accidents. *Behavioural learning and cognitive attributions: human factors,* 48(4): 639-650.

ESAW, European Statistics on Accidents at Work. (2013). Summary methodology. [Online] Available at: https:// Europa.eu.

Eurostat, European Statistics on Accidents at Work. (2019). [Online] Available at: https://ec.europa.eu/index.php.

Flin, R. Mearns, K. O'Connor, P. and Bryden, R. (2000). Measuring safety climate: identifying the common features. *Safety Science*, 34:177-192.

Glendon, A.I. and Stanton, N.A. (2000). Perspectives on safety culture. *Safety Science*, 34: 193-214.

Glennon, D.P. (1982). Measuring organizational safety climate. *Australian Safety News*. pp.23-28.

Guldenmuld, F.W. (2007). The use of questionnaires in safety culture research - an evaluation. *Safety Science*, 45: 723-743.

Heyes, B.E. Perander, J. Smecko, T. and Trask, J. (1998). Measuring perceptions of workplace Safety: Development and validation of the work safety scale. *Journal of Safety Research*, 29(3):145-161.

Hyatt, N. (2006). *Incident investigation and accident prevention in the process and allied industries.* Canada: Dyadem Engineering Corporation.

ILO, (2006). International Labour Organization. C187- Promotional framework for occupational safety and health convention (No.187). Available at: *http://www.ilo.org/dyn/normlex.*

ILO, International Labour Organization. (2020). Report on decent work to the 12th world congress on safety statistics and health at work. [Online] *Available at: //www.ilo.org/ dyn/nirmlex/en/.*

Khan, F.I and Abbasi, S.A. (1999). Major accidents in process industries and analysis of causes and consequences. *Journal of Loss Prevention in the Process Industries*, 12: 361-378.

Kim, K.W and Cho, H.H. (2017). Safety climate and occupational stress according to occupational Accidents experience and employment types in shipbuilding industry of Korea. *Safety and Health at work,* 8(3): 290-295.

Korvers, P.M.W. (2004). *Accident precursors: pro-active identification of safety risks in the chemical Process*. Technishe Universiteit-Eindhoven: Unpublished.

Lyu, S. Hun, K.H. Chan, P.C. Wong, K.W and Javed, A.A. (2018). Relationships among safety Climate, safety behaviour and safety outcomes for ethnic minority construction workers. *International Journal of Environmental Research and Public Health*, 15: 484.

Machida, S. (2009). System for collection and analysis of occupational accidents. *Joronem, M.Ed. African Newsletter on Occupational Health and Safety,* (19):1.

Mearns, K.J and Flin, R. (1999). Assessing the state of organizational safety culture or climate? *Current Psychology*, 18(1): 5-12.

Michaels, D. (2016). Year one of OSHA severe injury reporting program: An impact evaluation. [Online] Available at: *http://www.osha.gov/*

N.B.S., National Bureau of Statistics. (2014). Nigerian Manufacturing Sector: Summary Report 2010-2012. [Online] Available at: *http.//www.nigerianstat.gov.ng/report/260.*

N.B.S., National Bureau of Statistics. (2019). Nigerian Gross Domestic Product Report. [Online] Available at: *http://Nigerian stay.gov.ng.*

Neal, A; Griffin, M.A and Hart, P.M. (2000). The impact of organizational climate on safety climate and individual behaviour. *Safety Science*, 34: 99-109.

Neal, A. and Griffin, M.A. (2006). A study of the lagged relationships among safety climate, Safety motivation, safety behaviour, and accidents at the individual and group levels. *Journal of Applied Psychology*, 91(4): 946-953.

O'Toole, M. (2002). The relationship between employees' perceptions of safety and organizational culture. *Journal of Safety Research*, 33: 231-243.

Pallant, J. (2007). SPSS survival manual a step-by-step guide to data analysis: using SPSS for Windows. U.S.A.: McGraw Hill.

Probst, T.M. and Brubaker, T.L. (2001). The effects of job insecurity on employee safety outcomes: Cross-sectional and longitudinal explorations. *Journal of Occupational Health Psychology*, 6(2):139-159.

Schatka, N. Hecker, S. and Goldenhar, L.M. (2016). Defining and measuring safety climate: A review of the construction industry literature. *Annals of Occupational Hygiene.*

Sakaran, U. and Bougie, R. (2013). *Research methods for business: A skill building approach*, sixth edition. United Kingdom: John Wiley and Son Ltd.

Silbey, S.S. (2009). Taming Prometheus: Talk about safety and culture. *The Annual Review of Sociology,* 35: 341-369.

Smith, M. (2012). Working in the grave: mining accidents on Witwatersrand gold mines, c1900-1940, *Seventh Biennial Conference of the Economic Society of Southern Africa,* Pietermaritzburg: Unpublished.

Thompson, R.C. Hiltin, T.F. and With, L.A. (1998). Where the safety rubber meets the shop floor: A Confirmatory model of management influence on workplace safety. *Journal of Safety Research,* 29(1):15-24.

Umeokafor, N. Evaggelinos, K. Lundy, S. Isaac, D. Allan, S. Igwegbe, O. Umeokafor, K. and Umeadi, B. (2014). The pattern of occupational accidents, injuries, accident causal factors and intervention in Nigerian factories. *Developing Countries Studies,* 4(151): 119-127.

Victor, A.Y. (2013). Workplace in Umeadi, B. and Jones, R. Nigeria unsafe, Labour lament. Vanguard Newspaper. [Online] Available at: http//wwe.vangaurd.com/2013/06/workplace.

William, A.M. Feyer, A. Caurns, D. and Biancotti, D. (1997). The development of a measure of safety climate: The role of safety perceptions and attitudes. *Safety Science*, 25(13): 15-27.

Yusuf, T.A. Ismailia, S.O. Kuye, S.I, and Samuel, O.D. (2015). Evaluation of the cost and effect of industrial accidents. *European Journal of Scientific Research*, 132(2): 184-190.

Zacharatos, A. Barking, J and Inverson, R.D. (2005). High-performance work systems and occupational safety. *Journal of Applied Psychology*, 90(1): 77-93.

Zohar, D. (1980). Safety climate in industrial organizations: theoretical and applied implications. *Journal of Applied Psychology*, 65(1): 96-102.

Zohar, D. (2000). A group-level model of safety climate: testing the effects of group climate on micro-accidents in manufacturing jobs. *Journal of Applied Psychology*, 85(4): 587-596.

Zohar, D. (2008). Safety climate and beyond. A multi-level multi-climate framework. *Safety Science*, 46: 376-387.

Appendix 1
Factor Loading for the Rotated Factors of Employees' Perceptions of Safety

Items	*1*	*2*	*3*	*4*	*5*	*6*	*Commonality*
Enough time is given to fixing health and safety issues.	0.79						0.72
Near misses are reported.	0.79				0.39		0.81
Managers try to resolve the health and safety issues raised by employees.	0.78						0.71
Employees are provided with ongoing training to do their job safely.	0.77						0.71
Employees participate in safety discussions at meetings.	0.76		0.32				0.72
Hazards are identified and reported.	0.75				0.37		0.72
Incidents and accidents are reported, including minor accidents.	0.73				0.44		0.79
Employees in this organization have the skills to do their job safely.	0.73	-0.34					0.76
Employees get a full induction on health and safety.	0.73						0.62
Managers encourage employees to report unsafe behaviour.	0.73	0.36					0.68
Employees are encouraged to raise safety concerns.	0.72		0.38				0.73
Employees understand the rules and the systems for working safely.	.072	-0.34	-0.31				0.77
Managers follow through on their commitments to safety.	0.71	0.42					0.73
Meetings are held to discuss safety with operation employees.	0.71		0.36				0.71
Managers stop work if job is unsafe.	0.71						0.69
Safety is openly discussed at departmental meetings.	0.70	0.41					0.67
Managers take the opportunity to communicate the importance of working safely.	0.69	0.39					0.76
There are enough resources to work safely.	0.69	-0.44					0.73
There are enough employees to do the work safely.	0.69	-0.33					.067

contd. appendix 1

Items	*1*	*2*	*3*	*4*	*5*	*6*	*Commonality*
Managers follow the safety rules.	0.65	0.34		0.38			0.73
Enough time is allocated for work to be done safely.	0.65	-0.35					0.67
Managers enforce the safety rules.	0.65	0.38					0.73
Health and safety information is communicated in ways that are easily understandable to the employees.	0.59			-0.39		0.45	0.75
Accidents are used as learning opportunities.	0.33		0.44	0.61		0.47	0.93
Eigen value	4.4	3.7	3.7	2.6	2.0	1.1	
% of variance	18.2	15.4	15.3	11.0	8.4	4.6	

NB: Loading <0.30 are omitted

Source: Fieldwork, 2019.

Appendix 2
Logistics Regression: Employees' Perceptions of Safety and Self-Reported Accident Rates

		B	*S.E.*	*WALD*	*DF*	*SIG.*	*EXP(B)*
Step 1[a]	Comsafety1P	-0.022	0.310	0.005	1	0.944	0.978
	Comsafety2P	1.084	0.380	8.152	1	0.004	2.956
	Comsafety3P	0.504	0.317	2.523	1	0.112	1.655
	Comsafety4P	-0.816	0.422	3.749	1	0.053	0.442
	Leadsafety1P	-1.398	0.456	9.411	1	0.002	0.247
	Leadsafety2P	-0.442	0.310	2.032	1	0.154	0.643
	Leadsafety3P	0.992	0.353	7.912	1	0.005	2.698
	Leadsafety4P	0.576	0.392	2.154	1	0.142	1.779
	Knowsafety1P	-0.291	0.468	0.386	1	0.534	0.747
	Knowsafety2P	0.676	0.498	1.847	1	0.174	1.967
	Knowsafety3P	-0.122	0.368	0.111	1	0.739	0.885
	Knowsafety4P	-0.062	0.341	0.033	1	0.856	0.940
	Re.safety1P	-0.862	0.359	5.777	1	0.016	0.422
	Re.safety2P	0.816	0.382	4.559	1	0.033	2.261
	Re.safety3P	-0.370	0.400	0.856	1	0.355	0.691
	Re.safety4P	0.685	0.341	4.025	1	0.045	1.983
	Repsafety1P	-0.019	0.357	0.003	1	0.957	0.981
	Repsafety2P	0.727	0.352	4.260	1	0.039	2.069

	B	*S.E.*	*WALD*	*DF*	*SIG.*	*EXP(B)*
Repsafety3P	-1.300	0.459	8.040	1	0.005	0.272
Repsafety4P	-0.254	0.196	1.679	1	0.195	0.775
Involsafety1P	0.646	0.339	3.633	1	0.057	1.908
Involsafety2P	-1.291	0.434	8.853	1	0.003	0.275
Involsafety3P	0.651	0.383	2.882	1	0.090	1.917
Involsafety4P	-0.212	0.315	0.455	1	0.500	0.809
Constant	2.264	1.599	2.006	1	0.157	9.623

Source: Fieldwork, 2019.