THE MEDIATING EFFECT OF SAFETY MANAGEMENT SYSTEM ON THE RELATIONSHIP BETWEEN SAFETY CULTURE AND SAFETY PERFORMANCE IN LAGOS FOOD AND BEVERAGE MANUFACTURING INDUSTRIES

VICTOR OLABODE OTITOLAIYE

MASTERS OF SCIENCE
UNIVERSITI UTARA MALAYSIA
2016

THE MEDIATING EFFECT OF SAFETY MANAGEMENT SYSTEM ON THE RELATIONSHIP BETWEEN SAFETY CULTURE AND SAFETY PERFORMANCE IN LAGOS STATE FOOD AND BEVERAGE MANUFACTURIG INDUSTRIES

By

VICTOR OLABODE OTITOLAIYE

Thesis Submitted to
School of Business Management,
Universiti Utara Malaysia,
In Fulfilment of the Requirements for the Masters of Science

Permission to Use

In presenting this thesis in fulfilment of the requirements for a postgraduate degree from Universiti Utara Malaysia, I agree that the Universiti Library may make it freely available for inspection. I further agree that permission for the copying of this thesis in any manner, in whole or in part, for scholarly purpose may be granted by my supervisor(s) or, in their absence, by the Dean of School of business management. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to Universiti Utara Malaysia for any scholarly use which may be made of any material from my thesis.

Requests for permission to copy or to make other use of materials in this thesis, in whole or in part, should be addressed to:

Dean of School of Business Management
Universiti Utara Malaysia
06010 UUM Sintok

ABSTRACT

Occupational safety in organizations is essential for continuous existence and sustainable growth of a nation. The continuous high frequency of occupational accidents in Nigerian Food & Beverage (F&B) industries calls for a new approach to stem the tide. In order to cope with the challenges and achieve superior performance, organizations need to develop a positive safety culture (SC). Furthermore, the organizations need to implement an appropriate safety management system (SMS). This issue has motivated the embarkment of this study to investigate the mediating effect of safety management system on the relationship between safety culture and safety performance of F&B industries in Lagos, Nigeria. Data was collected from 126 head of safety managers through self-reported questionnaires and data analysis was done using the SmartPLS 2.0. Findings reveal that safety culture and safety management system are significantly and positively related to safety performance. Further analysis indicates that safety management system mediates the relationship between safety culture and safety performance. Thus it is concluded that although safety culture is positively and significantly related to safety performance, however the effect of safety culture on safety performance will be greater if the organizations develop and continuously implement a strong safety management system.

Keywords: Safety culture, safety management system, safety performance

ABSTRAK

Keselamatan pekerjaan dalam organisasi adalah penting bagi kestabilan dan pertumbuhan yang mapan sesebuah negara. Kekerapan berlakunya kemalangan ketika bekerja dalam industri makanan dan minuman yang tinggi dan berterusan di Nigeria memerlukan pendekatan baharu untuk membendung masalah ini. Dalam usaha untuk menghadapi cabaran dan mencapai prestasi unggul, organisasi perlu membangunkan budaya keselamatan yang positif. Malahan organisasi juga perlu melaksanakan sistem pengurusan keselamatan yang sesuai. Isu ini telah mendorong usaha untuk memulakan sebuah kajian bagi menyelidik kesan pengantara sistem pengurusan keselamatan dalam hubungan antara budaya keselamatan dan prestasi keselamatan dalam industri makanan dan minuman di Lagos, Nigeria. Data telah dikumpulkan daripada 126 orang Ketua Pengurus Keselamatan melalui soal selidik yang dilaporkan sendiri dan analisis data dilaksanakan dengan menggunakan SmartPLS 2.0. Dapatan kajian menunjukkan bahawa budaya keselamatan dan sistem pengurusan keselamatan adalah signifikan dan positif terhadap prestasi keselamatan. Analisis selanjutnya menunjukkan bahawa sistem pengurusan keselamatan berperanan sebagai pengantara dalam hubungan antara budaya keselamatan dan prestasi keselamatan. Oleh itu, dapat disimpulkan bahawa walaupun budaya keselamatan adalah positif dan signifikan dengan prestasi keselamatan, kesan budaya keselamatan terhadap prestasi keselamatan akan lebih besar jika organisasi membangunkan sistem pengurusan keselamatan yang kukuh dan melaksanakannya secara berterusan.

Kata kunci: Budaya keselamatan, sistem pengurusan keselamatan, prestasi keselamatan

ACKNOWLEDGEMENT

First and foremost, I would like to dedicate this thesis to the Almighty God for His faithfulness. He guided, preserved, and granted me journey mercies throughout the Masters Journey at the Universiti Utara Malaysia - *The Eminent Management University*. He never allowed me to be starved of knowledge, inspiration, wisdom, and understanding. To Him alone be all the glory.

I am grateful to my supervisors, Dr Fadzli Shah Abd Aziz and Dr Munauwar Bin Mustafa. Their professional, constructive, and valuable criticisms and contributions contributed in no small measure to the timely and successful completion of the programme. It was indeed a great privilege and experience to have had them as supervisors. To the Management of the Universiti Utara Malaysia (UUM), I am highly grateful for making resources available at the UUM Library for me to access throughout the programme.

To my lovely Parents Mr and Mrs Otitolaiye, and my beloved siblings: Donald, Evelyn, Stanley, Jennifer, Arnold and Nelson, I am indebted to you for the sacrifices you made throughout my Masters Journey. May God grant you long life to reap the fruits of the sacrifices you have made. I am indeed thankful to my friends Solomon, Vandi, Peter and Bara who all stood by me throughout the programme. I cannot forget to thank Chidi A. Okeke for the moral support and encouragement he gave me. To all my friends and well-wishers, I am grateful for all your prayers and well-wishes.

"I do not ascribe the success of the journey to myself; for GOD is the fountain of all inspiration, knowledge, wisdom, and understanding"

Table of Contents

TITLE PAGE **i**

CERTIFICATION OF THESIS WORK **ii**

PERMISSION TO USE **iv**

ABSTRACT **v**

ABSTRAK **vi**

ACKNOWLEDGEMENT **vii**

Table of Contents

viii

List of Tables xii

List of Figures

xiii

List of Appendices xiv

List of Abbreviations xv

CHAPTER ONE INTRODUCTION **1**

1.1 Background of the study 1

1.2 Problem Statement 8

1.3 Research Question 11

1.4 Research Objectives 11

1.5 Scope of the study 12

1.6 Significance of the study 13

1.7 Definition of key terms 14

1.8 Organization of the thesis 16

CHAPTER TWO LITERATURE REVIEW **18**

2.1 Introduction 18

2.2 Safety Performance 18

2.2.1 Dimensions and Measures of Safety Performance 22

2.2.2 Instruments Used to Measure Safety Performance 24

2.2.3 Prior Studies on Antecedents of Safety Performance 26

2.3 Safety Culture 33

2.3.1 Safety Climate 38
2.3.2 Dimensions of Safety Culture 39
2.3.3 Management Commitment to Safety 43
2.3.4 Employee Involvement 47
2.3.5 Instruments Used to Measure Safety Culture 49
2.3.6 Results from Previous Studies on Safety Culture 52
2.4 Mediator 58
2.4.1 Safety Management System 59
2.4.1.1 Fernandez-muniz. Safety Management System Scale 62
2.4.1.2 Safety Culture and Safety Management System 63
2.4.1.3 Safety Management System and Safety Performance 66
2.5 Underpinning Theory 67
2.5.1 Resource Base View (RBV) 68
2.5.2 Contingency Theory (CT) 69
2.5.3 The Connection of RBV, CT and this Study 70
2.6 Summary 72
CHAPTER THREE METHODOLOGY 73
3.1 Introduction 73
3.2 Research Framework 73
3.3 Hypothesis Statement 75
3.4 Research Design 77
3.5 Population and Sampling 78
3.6 Sample Size 79
3.7 Sampling Technique 81
3.8 Data Collection Procedure 84
3.9 Unit of Analysis 85
3.10 Instrumentation 86
3.11 Research Questionnaire 86
3.11.1 Scale of the Questionnaire 87
3.11.2 Layout of the Questionnaire 88
3.12 Measurement of variables 89

3.12.1 Operationalization of Safety Culture 89
3.12.2 Operationalization of Safety Management System 90
3.12.3 Operationalization of Safety Performance 92
3.13 Content and Face Validity 93
3.14 Pilot Test 94
3.15 Data Analysis 95
3.15.1 Goodness of Measure 96
3.15.2 Convergent Validity 97
3.15.3 Discriminant Validity 97
3.16 Summary 97
CHAPTER FOUR ANALYSIS AND RESULTS 99
4.1 Introduction 99
4.2 Survey Response Analyses 99
4.2.1 Measurement of Response Rate 100
4.3 Preliminary Analysis 101
4.3.1 Data Screening 101
4.3.2 Missing Data 102
4.3.3 Test for Non Response Bias 102
4.3.4 Data Coding 104
4.4 Descriptive Statistics of Demographic Characteristics of Participants 105
4.4.1 Descriptive Analysis 107
4.5 Multicolinearity Test 108
4.6 Data Analysis 109
4.6.1 Measurement Model (Outer Model) Evaluation 110
4.6.1.1 Content Validity 110
4.6.2 Convergent Validity 114
4.6.3 Discriminant Validity 115
4.6.4 Establishment of second order-construct 117
4.6.5 Structural Model 119
4.7 Mediating Effect Hypothesis 121
4.8 R-Square 123

4.8.1 Determining Effect Size 123
4.9 Determining the Predictive Relevance 124
4.10 Summary 125
CHAPTER FIVE DISCUSSION AND CONCLUSIONS 127
5.1 Introduction 127
5.1.1 Executive Summary 127
5.2 Discussions 127
5.2.1 Relationship between Safety Culture and Safety Performance 128
5.2.2 Relationship between Safety Culture and Safety Management System 130
5.2.3 Relationship between Safety Management System and Safety Performance 131
5.2.4 Safety Management System Mediates the Relationship between Safety Culture and Safety Performance 133
5.3 Implications 134
5.3.1 Managerial Implication 134
5.3.2 Theoretical Implication 135
5.4 Limitation of the Study and Future Studies 137
5.5 Conclusion 138
REFERENCES 139

List of Tables

Table 1.0: Comparison between the number of occupational accidents in the F&B industry and those in other manufacturing industry from 2012 to 2014 in Nigeria 5
Table 1.1: Comparison between employee compensation paid by various manufacturing sector in Nigeria from 2010-2012. 7
Table 3.1 Disproportionately Drawn Samples 83
Table 3.2 Summary of measurement and scale 92
Table 3.3 Reliability Test Results of the Measurement Instrument 95
Table 4.1 Response Rate of the Questionnaire 100
Table 4.2 Test of Non Response Bias 104
Table 4.3 Variable Coding 105
Table 4.4 Descriptive Statistics of Participants' Demographic Factors 106
Table 4.5 Descriptive Statistics of the Study Variables 107
Table 4.6 Multicolinearity Test 109
Table 4.7 Cross Loadings of the Items 112
Table 4.7 Cross loading of the Items (Cont'd) 113
Table 4.8 Convergent validity Analysis 115
Table 4.9 Discriminants Validity of the Constructs 116
Table 4.10 Second-order Construct Establishment 119
Table 4.11 Paths Coefficients 120
Table 4.12 Test of mediation of SMS 123
Table 4.13 Relationship Effect Size and Rating 124
Table 4.14 Construct Cross validated redundancy value 125
Table 4.15 Summary of the Results 126

List of Figures

Figure 3.1 Research framework 75
Figure 3.2 Power analysis for medium effect 81
Figure 4.1 Hypothesized Model 117
Figure 4.2 Result of the Path Analysis 121

List of Appendices

Appendix A 174

List of Abbreviations

BLS Bureau of Labour and Statistics

EU European Union

F&B Food and Beverage

GDP Gross Domestics Product

GNP Gross National Product

HSE Health Safety and Environment

ILO International Labour Organization

MAN Manufacturers Association of Nigeria

NAFDAC National Agency for Food and Drug Administration and Control

NISP National Institute of Safety Professionals

OHS Occupational Safety and Health

PCA Principal Component Analysis

PLS Partial Least Square

SC Safety Culture

SMS Safety Management System

SP Safety Performance

SPSS Statistical Package for Social Science

UK United Kingdom

US United States

WHO World Health Organization

CHAPTER ONE
INTRODUCTION

A healthy work environment is an asset to organizations. As such organizations now show interest towards keeping their workplace safe. The quest for good safety outcome was influenced by the craving to reduce the number of occupational accidents as well as human sufferings of employees. Nonetheless, this focus need not be exclusive as organizations now realise that good safety also pays financially. In light of the above, the need to evaluate safety performance in organizations has been noted by researches This chapter presents the background of the study, next the problem statement is presented in this chapter then subsequent sections provides the research questions and research objectives respectively, followed by the research scope, research significance, definition of key terms then organization of thesis.

1.1 Background of the study

Manufacturing firms are considered vital to economic growth and are increasingly important for sustainable development of any nation (Sangosanya & Awoyemi, 2011). On the basis of the enumerated roles played by manufacturing firms in fostering growth as evidenced in developed and few emerging economies, one can clearly posit that manufacturing firms are one of the major source of economic propeller through the production and export contribution. The Nigerian manufacturing industry holds much significance for the social and economic development of Nigeria as reports from Nigerian National Bureau of Statistics (2014) revealed that the sector contributed about 7% of the total GDP in 2013. But, the growth, performance and productivity of Nigeria's manufacturing firms have deteriorated at present (Sangosanya & Awoyemi, 2011). In 2009, the Manufacturers

Association of Nigeria (MAN) declared that 820 manufacturing companies have closed down in the past nine years (between 2000 and 2008) of civilian rule and rendered thousands of people jobless, even as the Federal Government said the solution may not be very quick in coming. The high exit rate were blamed on quite a number of factors among which workplace accidents and injuries was given immense prominence (The Nigerian Voice, 2011). This implies that safety is one growth propelling resources lacking at the disposal of manufacturing firms in Nigeria over the years and tends to deteriorate their growth and performance mechanisms (Africa Vanguard, 2009).

Accidents in manufacturing industries are of grievous concerns to any nation, relating to this Adebiyi and Charles-Owoba (2009) reported that the Nigerian Institute of safety Professionals in 2015 revealed that over 11, 0000 people die from workplace accidents in Nigerian manufacturing firms. They further reiterated that this accidents has affected the growth and development of the nation. Though plagued with poor statistics and records of industrial accident and with a bid to industrialize, work place accidents has weighed down various manufacturing industries in Nigeria (Abubakar, 2015). According to Ezenwa (2001) about 3183 accident occurred across Nigerian manufacturing industries from 1987 to 1996. Also, Hämäläinen, Saarela and Takala (2009) using statistics from 2003 reported that in Nigeria out of every 100, 000 employee, 24 work related death occur in Nigerian manufacturing sites. Furthermore, another study by Umeokafor, Isaac, Jones and Umeadi (2014) though constrained with data suggested that work related accident suffered by employees in Nigerian manufacturing industries from 2003 to 2012 were still increasing. Hence, this has impacted on the nation's economy indirectly

(Awodele *et al*., 2014). In addition with the introduction of high technology equipment and processes of work, employees in most Nigerian manufacturing sectors are exposed to a number of occupational hazards such as extreme heat, highly reactive chemicals this has led to increasing number of occupational injuries and a deficit in the health status of workers (Bankole & Ibrahim 2012). As a result of the exposures motioned earlier, workers' productivity and health is hampered.

The Nigerian manufacturing industry is composed of nine sectors (MAN, 2011), of all the nine sectors the Food and Beverage manufacturing industry has been the dominant in terms of size, population and also in its contribution to the nations GDP over the years (NBS, 2014). Food and beverages manufacturing industry refers to all companies involved in processing raw food material packaging and distributing them. This includes packaged foods and beverages of all sorts and product meant for human consumption (Nigerian Stock Exchange Fact Book, 2014). F&B manufacturing industry contribution stood at ₦ 3, 814.50 billion or 52.74% of the total contribution to the manufacturing sector as compared to other sectors in the manufacturing industry. Next was Textiles Apparel and Footwear industry at ₦ 1, 303.68 billion or 18.02% of the manufacturing sector total. The activities from the old classification of Cement and Oil refining follow, at ₦450.75 billion or 6.23% and ₦ 412.30 billion or 5.70% of the manufacturing sector total in 2013 respectively.

Moreover, this industry offers a large number of employment opportunities for Nigerian people (Nigerian Manufacturing report, 2010) with about 511,150 people engaged in this sector, it ranks second only to the Chemical and Pharmaceutical Manufacturing industry which was at 1,153,756 (Nigerian Manufacturing report,

2010). Bearing in mind the number of employees in the F&B industry, a comparatively higher number of accidents and injuries take place in the industrial sites (Ministry of labour Report, 2013).

Lately in Nigeria, manufacturing industry contributes the highest number of workplace accidents. Relating to that fact the food and beverage manufacturing industry a sub sector of the manufacturing industry had reported an increasing number of workplace accident from 2012 to 2014 (Nigerian Institute of Safety Professionals (NISP), 2015). In 2012 there were 13 accidents that occurred everyday this amounted to an estimation of one accident in every 2 hours in the sector (NISP, 2015). This occurrence had degenerated in 2014 when 17 cases happened every day with at least one case reported every hour (NISP, 2015). Similarly, researchers like Bankole and Ibrahim (2012) stated that workers in the food and beverage industries are mostly prone to industrial accidents.

Though there are no regulatory agencies or organizations charged with the responsibility of keeping statistics and data of occupational accidents, newspaper reports exists of occupational accidents occurring in Nigerian manufacturing industries (Omokhodion, 2009). Based on a personal communication with the Director of Occupational Safety and Health Division at the Ministry of Labour and Productivity Nigeria, the F&B industry recorded 6205 accidents in 2014, of which 80 were fatal work injuries and 576 non-fatal work injuries. Fatal injuries refer to deaths resulting from traumatic injuries or other external causes in the workplace (Governor, Gittens, Koh, Friedman, & Davis, 2002). Meanwhile, non-fatal injuries refer to injuries that result in physical or emotional damage. These injuries can be

relieved by medical aid within a certain time period and do not usually result in death (Cryer, Samaranayaka, Russell, Davie & Langley, 2008). Table 1.0 shows a comparison between the number of occupational accidents in the F&B industry and those in other manufacturing industries from 2012 to 2014 in Nigeria.

Table 1.0: Comparison between the number of occupational accidents in the F&B industry and those in other manufacturing industry from 2012 to 2014 in Nigeria

Sector	**2012**	**2013**	**2014**
Chemical and pharmaceutical	2110	2035	1893
Food and beverage	**4745**	**4886**	**6205**
Textile and Apparels	1353	988	1567
Wood and wood products	3037	2378	2594
Plastic and rubber products	1456	1698	1703
Pulp paper and paper products	1203	1324	1564

Source: Director of Occupational Safety and Health Division at the Ministry of Labour and Productivity (2015).

Table 1.0 clearly shows that the F&B industry has almost two times more occupational accidents than other manufacturing industry, justifying the need to study this phenomenon. These increased accidents recorded by F&B industries in Nigeria as revealed in the Table 1.0 has also resulted to high records of lost time injuries. Lost time injuries refers to production days that are lost as a result of occupational injuries and accidents sustained by an organizations employee (Samajdar, 2014). From an interview with the Director of Occupational Safety and Health Division at the Ministry of Labour and Productivity Headquarters Nigeria, an average of two and half days were lost as a result of work related injuries by F&B

industries in Nigeria, in comparative terms he stated that other manufacturing sectors reported less than one and half days lost from injury.

Manufacturing company also pay huge amount on employee compensation (Ajakaye, 2010). Employee compensation refers to amount paid to employees or their families as a result of work place accidents by an organization. In 1997 and 1998 an estimated sum total of ₦ 47,832,536 million and ₦ 40,836,676 million claims were paid as workmen's compensation and employers' liability by the insurance company in Nigeria as a result of occupational accident suffered by manufacturing employees (Ajakaye, 2010).

Recently, reports from Nigeria National Bureau of Statistics, (2014) revealed that employee compensation paid as a result of occupational accidents from 2010-2012 by Nigerian manufacturing industries rose from ₦ 732, 200. 00 to ₦ 1,723,777.12, in addition further reports from the Nigerian National Bureau of Statistics (NBS), (2014) revealed that about 66.36 % of these compensations were paid by employers in the food and beverage manufacturing industries. Supporting reports from NBS (2014), the Nigerian voice (2011) revealed that several billions of capital losses were recorded in Nigeria daily, between the periods of April 2009 to April 2010 due to compensations paid from accidents in F&B manufacturing industries. Table 1.1 shows a comparison between employee compensations paid by various manufacturing sectors in Nigeria from 2010-2012.

Table 1.1: Comparison between employee compensation paid by various manufacturing sector in Nigeria from 2010-2012.

Sector	Total amount Paid on employee compensation(₦)	Percentage (%)
Food and beverage	**1,245,895.75**	**66.36**
Chemical and pharmaceutical	25,112.53	1.34
Textile and Apparels	400,453.70	21.33
Others	52,315.14	13.00

Source: Nigerian manufacturing sector summary report: 2010-2012

Table 1.1 clearly shows that the F&B industry paid the largest amount on employee compensation resulting from occupational accident thus further strengthening a need for this study.

Employees are asserts to organizations (Voon, Lo, Ngui & Ayob, 2012), as such organizations have to constantly look after their safety and wellbeing so as to achieve superior goals. Putting this into perspectives and looking at the deplorable state of safety in Nigerian F&B Manufacturing industries, it becomes necessary to look into preventive strategies in safety matters as it might likely pose a threat to the existence of many organizations. The increase rate of accidents as shown in the earlier part of this section suggests that recent safety performance level in Nigeria's F&B manufacturing organizations is not at a desirable state as safety measures might not have been carried out in the best manner. This motivates the researcher to research on safety performance.

1.2 Problem Statement

Food and Beverage manufacturing industries contributes immensely to the growth and development of the economy of a nation. However the sectors contribution to the growth and development of a nation's economy depends on its safety performance. This study derived the problem statement from both the practical and theoretical perspectives, from the practical level as pointed out in the background section, Nigeria F&B manufacturing industry perform poorly with regard to safety due to the recurring number of occupational accidents that occur in their work environments. Recent statistics from NISP (2014) revealed that about 6205 occupational accidents had occurred in F&B industries in 2014 representing 40% of the total accidents which occur in the manufacturing sector. Furthermore Nigerian F&B industries had reported huge sum of amount paid as a result of employee compensation from occupational accidents (MAN, 2010). All these suggests that safety performance in Nigerian F&B manufacturing industries is low.

Generally organizations safety performance is lowered by occupational accidents (Tharaldsen, Mearns & Knudsen, 2010). In order to reduce accidents in organisations, the concept of safety culture has frequently been studied. Safety culture scholars have theorized that safety culture inclined organizations outperform organizations without safety culture (Boughaba, Hassane & Roukia, 2014; Hajmohammad & Vacchon, 2014; McFadden, Henagan & Gowen, 2009). Thus there is a need to investigate the influence of safety culture in Nigerian F&B industries with a view to relating it to their safety performance. The field of safety culture has received much attention from scholars over the years, this is because the concept of safety culture is where activities and beliefs of management with regards to safety

are positive resulting to a decreased chances of mishaps in an organization (Reader, Noort, Shorrock & Kirwan, 2015). Hence the present study employs safety culture in its attempt to explain organizational safety performance.

From the theoretical perspective, few empirical studies have been conducted on the relationship between safety culture and safety performance (Cole, Stevens-Adams & Wenner, 2013; Guldenmund, 2000), substantial amount of the extant literature shows that many of the researches were carried out in western countries (Guldenmund, 2000), little is known when leaving the western settings which has been studied in detail (Hudson, 2007) as such this study addresses that gap.

Again a lot of researchers that connect safety culture to organizational safety performance such as (Mearns, Whitaker & Flin, 2003; Morrow, Koves & Barnes, 2014) have only focused on confirming that there is a link between safety culture and organization safety performance through reduction in accidents, decreased material damages, employee motivation and reduced absenteeism, without addressing how and why this relationship exist. For instance management commitment to safety has been said to be positively related with organizational safety performance (Hajmohammad & Vachon, 2014) and employee involvement a pre requisite to better safety outcome in an organization (Vecchio-Sadus & Griffiths, 2004) without telling how and why. As a result of that this study used safety management system as a mediator to address how and why the relationships exists between the study variables. The reason why safety management system was used as a mediator is because findings from previous researchers revealed that firms with a positive safety culture have been known to implement an adequate safety management system (von

Thaden & Gibbons, 2008; Mitchel et al., 2002). More so, existing amount of research suggest that management practices can serve as mechanism to explain the relationship between an organizations safety culture and its safety outcome (McFadden et al., 2009). Hence the selection of safety management system because safety management system comprises of groups of management practices that work together to achieve an organizations safety goal (Kirwan & Kennedy, 1998). However before such practices are implemented firms need to have a positive safety culture as it is a pre requisite to the achievement of a safety management system (Stolzer, Halford & Goglia, 2008).

The underpinning theory for this study is the Resource Base View (Barney, 1997). This theory is of the opinion that effective deployment and implementation of firm's intangible resources that are inimitable and rare enhances the firm's competitive advantage, thus resulting to superior performance. An example of such resources is the culture of an organization. Relating the above position to the present study, it is theoretically correct to posit that safety culture elicits high safety performance outcomes. On a related note the contingency theory can also be introduced within the context of the present study. This is because some scholars and researchers have proposed that the relationship between culture-performance is not direct but depends on certain factors (Sorensen, 2002; Wu, Lin, & Shiau, 2009). From the perspective of contingency theory, it can be argued that culture-performance relationship depends on organizational factors (mediators) such as safety initiatives and safety practices (Hajmohammad & Vachon, 2014; McFadden *et al*., 2009). Thus, it can be deduced that safety culture-performance relationship is more complex than a simple direct relationship. Hence, this study looks into safety management system as a

mediator to explain the relationship between safety culture and safety performance at the organizational level.

From the above mentioned problems to the researcher's knowledge no study was found in the literature that provided an understanding of the mediating role of safety management system on the relationship between safety culture and safety performance. This is evidence that a gap exists for this study to re-examine, particularly within the context of F&B manufacturing industries in Nigeria which are likely to differ from manufacturing industries in developed nations due to cultural differences. Therefore, the study seeks to address the gap. Referring to the aforesaid problems, the present study will address the following questions.

1.3 Research Question

1) Is there a relationship between safety culture and safety performance?
2) Is there a relationship between safety culture and safety management system?
3) Is there a relationship between safety management system and safety performance?
4) Does safety management system mediate the relationship of safety culture on safety performance?

1.4 Research Objectives

Based on the above research questions, this study aims to achieve the following objectives:

1) To analyze the relationship between safety culture on safety performance.

2) To analyze the relationship between safety culture and safety management system.
3) To analyze the relationship between safety management system and safety performance.
4) To analyze the mediating effect of safety management system on the relationship of safety culture on safety performance.

1.5 Scope of the study

This research is centered on examining the mediating effect of safety management system on the relationship between safety culture and safety performance in Lagos F&B manufacturing industries. This study was conducted in food and beverages manufacturing industries in Lagos Nigeria. This is due to Lagos position of having the highest number of manufacturing industries in Nigeria (MAN, 2015; Lagos state Government, 2010). There are six industrial zones in Nigeria namely (North East, North Central, North West, South East, South West and South South) out of these zones which make up 37 states, Lagos state has over 60% of the total industrial value way above the combination of other states (Lagos State business directory, 2010). Also the focus on food and beverage industries stems from the fact that of all sectors in the manufacturing industries, the food and beverage industry contributed 52.74% to the manufacturing sectors contribution to the nations GDP (Rencap, 2013). Furthermore, the respondents of this study are head of safety officers (HSO). Head of safety officers were preferred because of the fact that they are expected to have insight about specific practices and procedures that are been carried out in their organisations (Fernandez-Muniz *et al*., 2007a). Additionally, the safety officers are

also likely to have access to every kinds of facts in regards to potential dangers to health and safety of the staffs.

1.6 Significance of the study

Organizations are striving hard to find ways to lessen occupational accidents for human and financial reasons and to stay competitive, few of them might have implemented good safety programs but failed to reduce accident while some might have implemented successful safety programs but intend to improve further. At the practical level, this study will help the organizations in Nigeria to learn more about safety culture and how it can help to reduce accidents in the workplace. This is important because implementing safety culture is the way to achieve the organizational safety goals. In addition, the outcomes of this study could assist managers and practitioners in the food and beverage industry, as well as policymakers, in designing and employing important measures to improve workplace safety, specifically by looking into existing safety culture and by considering their safety management system when implementing safety interventions.

This study has a significant value at the theoretical level since it examines the mediating effect of safety management system on relationship between safety culture and safety performance in Food and beverage manufacturing industries. At the theoretical level, there is a paucity of empirical research on safety performance in the Nigerian food and beverage industry. This study is an empirical effort to investigate the influence of safety culture on safety performance in food and beverage industries in Lagos. Unlike other studies that give emphasis on human factors, this study views

safety performance from the organization culture perspective. In addition the study also expands to the body of knowledge by applying Resource Base View in understanding organizations safety performance. Contingency theory is supported by this study, by showing that superior safety performance in an organization does not depend on one factor alone but is contingent upon the safety management system employed by the organization as such this study empirically demonstrate that organization variables (SMS) determine the impact of safety culture on safety performance. Furthermore, it adds to the existing literature by providing an empirical understanding of the mediating role of safety management system on the relationship between safety culture and safety performance. Lastly very few studies have focused on factors that drive organizational safety performance as such this study has significance because unlike other studies which focus on individual safety performance, it focuses on safety performance at the organizational level.

1.7 Definition of key terms

Food and Beverages Manufacturing Industries

In this study, food and beverages manufacturing industry is all companies involved in processing raw food material packaging and distributing them. This includes packaged foods and beverages of all sorts and product meant for human consumption (Nigerian Stock Exchange Fact Book, 2014).

Head of safety officer

In this study, a head of safety officer refers to qualified and competent employee who is responsible for the preparation, execution and continuous improvement of the

safety management system (SMS) within an organization. This individual is the prime mover of all safety related issues in the organization (NISP, 2015).

Safety culture

Safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to and the style and proficiency of an organisation health and safety programme (Health and Safety Executives, 1993).

Safety management system

Refers to group of activities that demonstrates the organization's strategies and tactics for attaining its safety objectives (Fang & Wu, 2013). These activities include safety policy, communication, training, planning,

a. **Policy**. A health and safety policy is a written statement by an employer stating the company's commitment for the protection of the health and safety of employees and to the public. It is an endorsed commitment by management to its employees regarding their health and safety (Santos-Reyes & Beard, 2002).
b. **Safety incentives**: is defined as rewards given to the employees for their achievements in reporting injuries, newly detected potential safety hazards and recommendations or suggestions for safety improvements in the workplace and workplace procedures (Teo, Ling & Chong, 2005).
c. **Training**: involves the use of aids to improve the skill and attitude of workers when embarking on risk prevention (Robson et al., 2012).

d. **Communication**: this involves the use of information transfer about possible risk and how they can be combated within the organization (Cigularov & Chen, 2010).
e. **Planning**: A safety planning are practical plan put up by an organization to help avoid dangerous situations and know the best way to react when in danger (Fernandez-Muniz et al., 2007a).
f. **Control**: this is defined as the analysis of conditions of work as well as event taking place in a firm and subsequently comparing them with those of other firms (Fernandez-Muniz et al., 2007a).

Safety performance

Safety performance is defined as an effort taken by an organization with the ultimate goal of reducing workplace accidents and injuries in a bid to minimize cost. It refers to how organizations make good utilization of its constrained assets to accomplish safety goals of the organization (He, Xu & Fu, 2012).

1.8 Organization of the thesis

This thesis has 5 chapters, chapter 1 presents the introduction and background also it presents the problem statement, research questions, research objectives, scope of study as well as the significance of the study. Chapter 2 discusses past literatures on the variables of the study as well as how these factors affect safety performance. Chapter 3, however explains the methods used for the research such as research design and sampling techniques, in addition this chapter also highlights the hypothesis of this study and reported the statistical techniques employed in this study. Chapter 4 presents the result of the study based on the data collected. Finally,

Chapter 5 offers a detailed discussion of the findings, recommendations for future research, implications and limitations of the study, and concluding remarks.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This section discusses reviews of literatures regarding safety culture, safety performance, safety management system which are the main focus of the recent study. It also critically examines empirical studies on antecedents of organizational safety performance conducted across a stratum of work settings. Additionally, this chapter reviews the past literature related to the relationship among these variables and highlights the gap that this study tries to bridge in the literature. The chapter begins by describing safety performance followed by the explanation of safety culture. The final part discusses safety management system as a mediating variable.

2.2 Safety Performance

Performance in organizations refers to how organizations make good utilization of constrained assets or resource to accomplish goals of the organizations, along this line, organization safety performance refers to how organizations make good utilization of its constrained assets to accomplish safety goals of the organization (He, Xu & Fu, 2012). At the organizational level, various views and definitions for safety performance have emerged as the scope remains a challenge to the assessment of safety. Generally, safety performance is used to describe the level of safety in an organization. Sawacha, Naoum and Fong (1999) defined safety performance as accident occurrence to a person which results to various degree of injury within an organization. A number of researchers have also employed accident statistics for safety performance in an organization (Akson & Hadikusumo, 2007; Clarke, 2006).

Similarly, Siu *et al*. (2004), Huang, Smith, and Chen (2006) defined safety performance as self-reported accidents involvement and occupational injuries. Also, Vinodkumar and Bhasi (2010) had opined that the best gauge of safety performance is the organization's accident rate and injury level as well as entire discipline in the organization and perception of risk at work. All these definitions emphasises on safety performance as a measure that proceeds after an event (accident, injury) has occurred thus depicting a failure in an organization.

Still emphasizing on accident rate, Chang and Yeh (2005) avowed that safety performance is the number of fatal and injury accident that has occurred in a firm it also includes property damage in a particular year. Also, Huang *et al*. (2006) stated that safety performance is safety control of employee. Stricoff (2000) stated that safety performance can be measured as a process of evaluation of safety at both organisational and individual level, he further avowed that safety performance is used to measure an organization's development in competence and helps organizations evaluate effectiveness of management with regards to safety. Measurement of safety performance helps organizations ensure that they achieve policy, objectives and targets regarding to safety (Lingard, Wakefield & Cashin, 2011), and is one of the significant measures for organizations to maintain the protection of their workers (McDonald, Corrigan, Daly & Cromie, 2000).

Another view of safety performance is offered by Mearns *et al*. (2003) who opined that safety performance is defined as "an assembly of attitudes and characteristics in organisations and individuals, which establishes that, as an over-riding priority, plant safety issues receive the attention warranted by their significance". In the same vein,

Grabowski *et al*. (2007) avowed that safety performance refers to an element which is measured with an organisations perception of safety in work environment. According to Dal-Corso (2008), safety performance is as a basic element for cultural change which involves promoting activities that are able to change habits, values, actions at both individual and organizational level, such can be achieved when workers are made to be responsible by management and also participate in the process.

From another point of view, Wu (2001) stated that organizational safety performance is "an overall performance of the organisations safety management system in safety operations". Similarly, Wu *et al*. (2008) referred to safety performance as a subsystem of the performance of organisation's safety management system in safety operations. On the other hand, Nevhage and Lindahl (2008) referred to safety performance as a quality of work that are safety related such safety related work is referred to as attempts made to accomplish safety by organizations and does not include financial risk.

According to De Koster, Stam and Balk (2011) safety performance as the degree to which industries are able to avert incidents and accidents or reduce their unfortunate impact. Shang, Yang, and Lu (2011) refers to safety performance as that "which is achieved when safety manager's safety management behaviour creates a work and organizational environment where occupational risks are minimised". They emphasized that these behaviours are related to resource allocation, communications about the worth of safety and senior managers' management behaviour in the context of safety. Holistically, Morrow *et al*. (2014) had stated that safety performance is an

umbrella term used to depict numerous types of consequences of safety stretching from observed reported safety behaviour of employee like adhering to procedures, putting on personal protective equipment (PPE) engaging in safety meetings and outcomes in the organisational level such as accidents and injury rates.

The above definitions of safety performance emphasizes the need for organizations to prevent their workers from accidents and injuries (Kelloway, Stinson, & MacLean, 2004). Maintaining safety performance is a task for organizations (Wu, 2000; Yang *et al.*, 2010), and should be the primary determinant of an organization's performance irrespective of other indicators (Hughes, Tippett, & Thomas, 2004). In the same way, others researchers even contend that, for some organizations, safety performance should be the primary measure of organization performance, regardless of the outcome of the other classical measures (Wu, 2009), in which safety performance is usually evaluated by the accident rate in the workplace. Indeed some scholars maintain that a key element in the success of any organization is the effective prevention of accidents (Huang *et al.*, 2006; Wu, Chen, & Lu, 2008).

Based on the literatures above, the concept of safety performance differs but is mainly focused on organizations behaviour with regards to safety. However, most common definition of safety performance at the organizational level relates to accidents statistics and injury rates. In light of the above, the present study defines safety performance as an effort taken by an organization with the crucial aim of stemming down workplace accidents and injuries.

2.2.1 Dimensions and Measures of Safety Performance

Based on the review of the past relevant literature, many dimensions and measures can be identified as important dimensions of safety performance. Safety literature has revealed that many methods exists for measuring safety performance in organizations (Cooper, 1998; Cox & Flin 1998; Flin, Mearns, O'Connor & Bryden 2000). However, there are no specific measures or indicators to explain safety performance of organizations (Glendon & Stanton, 2000; Glendon & Litherland, 2001). A suitable criteria list for safety effectiveness and method of measures was the main problem in safety assessment (Tarrants, 1970). Several techniques have been applied for safety performance assessment and safety goals.

Safety performance in organizations has been measured via both objective (Mearns *et al*., 2003; Shannon, Mayr & Haines, 1997) and subjective (Huang, Chen, DeArmond, Cigularov & Chen, 2007) measures. For objective measures of safety performance, the use of incidents and accidents as measures of safety performance can be found in many industries like the offshore industry (Mearns *et al*., 2003), underground mines (Paul & Maiti, 2007), and the nuclear power industry (Lee & Harrison, 2000). Other researchers have also employed objective measures (accidents and injury data) to capture safety performance in organizations for example, O'Toole (2002), Vrendenburgh (2002) who both reported safety performance as injury data across industries.

Mearns *et al*. (2003) studied safety performance in an offshore environment, his measures of safety performance included fatality frequencies, major injuries, lost time injuries that lasted more than three days, dangerous occurrences. Shannon *et al*.

(1997) used injury rates, lost-time injuries or other reporting work-related injuries as an outcome measure of safety performance. However, Cooper and Philips (1994) argue that objective measures of safety performance which include injury and accident rates are notoriously problematic because they are not sufficiently sensitive, are dubiously precise, retrospective and pays no attention to exposure to risk (Glendon & Litherland, 2001) and are not stable (Dejoy, Schaffer & Wilson, 2004). For this reason other researchers now advocate for the use of subjective measures, this is done to measures psychological perception of safety for example, Huang *et al*., (2007) used perception of injury risk to report safety performance among companies.

Some researchers have however viewed safety performance dimensionally. For instance, Sui *et al*. (2004) studied safety performance in construction company their dimension for safety performance included self-reported accident involvement and occupational injuries. Yang *et al*. (2009) studied safety performance in a health care industry in Taiwan he adopted three safety performance dimensions which include; safety audit assessment, investigation of accident management, and safety system. In another study done in Taiwan by Kao, Stewart and Lee (2009) among airlines, dimensions of safety performance included injury rate of crew members, rule compliance and participation and just accident investigation.

Wu and Li (2006) and Wu *et al*. (2008), both studied safety performance in universities located in Taiwan, they both adopted similar dimensions that included safety organization and management, accident statistics, safety equipment and measures, accident investigations, safety training evaluation, safety training. However, another study by Wu, Chang, Shu, Chen and Wang (2011) in

petrochemical industry had similar dimensions but included safety inspection, safety training, safety motivation and safety training as their safety performance dimensions. Hajmohammad & Vacchon, (2014) as well as McFadden *et al*. (2009) reported safety performance as organizational outcomes in respect to safety in this case safety performance was viewed as one-dimensional at the organizational level of analysis, similar measures of safety performance were employed by Lu and Shang (2005), Fernandez-Muniz *et al*. (2007b), (2009a, 2009b).

In summary, at the organization level there have been many measures and dimensions of safety performance. Feng, Teo, Ling and Low (2014) however, noted that by and large, no solitary measures of safety performance is superior to others, the choice depends on the purpose of evaluating or the resource available. Furthermore, organizational safety performance has mostly been measured with accident rates and injuries (objective measures) by earlier mentioned studies, however as stated earlier use of objective measures like accident rates and injuries to capture safety performance has some inherent drawbacks as such the present study measures safety performance using subjective measures of organizational safety outcome, prior researchers have employed this means to capture organizational safety performance like (McFadden *et al*., 2009; Fernandez-muniz *et al*., 2007, 2009; Hajmohammad & Vachon, 2014; Lu & Shang, 2005) following this line, safety performance is a uni-dimensional variable.

2.2.2 Instruments Used to Measure Safety Performance

This section looks into the various instrument used to measure safety performance in past studies. Mearns *et al*. (2003) conducted a study on safety climate, management

safety practice and safety performance in an offshore environment using off shore safety questionnaire, safety management questionnaires statistics of accident and self- reported accident involvement were collected and association was found between some safety climate and official statistics of accident statistics of accident, proficiency in some safety management practices were found to be linked with fewer accident rates. Furthermore, Wu and Li (2006) studied safety performance in university Laboratories using survey questionnaire. The questionnaire incorporated four parts which includes General information, safety leadership, safety climate scale, safety performance scale. Results from his study showed that safety performance was best predicted by manager's commitment and action towards safety.

Also Yang *et al*. (2009) conducted a cross sectional study in a healthcare industry on the relationship among behaviour of leaders, safety culture and safety performance using 350 questionnaire mailed to hospital workers, results revealed that leadership behaviour affected safety culture and also safety performance. Furthermore Wu *et al*. (2008) conducted a research on safety leadership, safety climate and safety performance using self-administered questionnaires which was divided into four parts namely General information as well as safety climate, safety leadership and safety performance, Similarly Wu *et al*. (2011) administered questionnaires to 23 employees of several petroleum plants in Taiwan to study how safety leadership and safety climate impacted safety performance.

Singer *et al*. (2009) carried out a study on safety performance in hospitals using questionnaire survey which included questions of safety climate and demographic

questions. Kao *et al*. (2009) used questionnaire to capture safety performance factors in a study among cabin crew members in Taiwan. In addition, Shang *et al*. (2011) used questionnaire to investigate how safety management affects perceived safety performance in a container Stevedoring operations. Morrow *et al*. (2014) studied safety performance and its relationship with safety culture using questionnaires which included demographic questions and safety culture scores.

McFadden *et al*. (2009) employed questionnaires to collect data from directors of nursing, quality as well as risk officers within 200 hospitals in a bid to study drivers of safety performance at the organizational level. Taking a leaf from the study of MacFadden *et al*. (2009), Hajmohammad and Vachon (2014) also employed questionnaires administered to human resource managers in 251 Canadian manufacturing plants to ascertain how safety culture could propel firms' safety performance within the context. Similar instrument has been employed by Fernandez-muniz *et al*. (2007; 2009; 2014).

In conclusion it suffice to say that prior studies have employed questionnaire to capture safety performance at the organizational level. As such this study takes a leaf from prior studies.

2.2.3 Prior Studies on Antecedents of Safety Performance

This section discusses past literature on antecedents of safety performance at the organizational level. At the organizational level, various literatures discuss safety performance as a dependent variable measured by an array of safety outcomes, including accident rates (e.g. Mearns *et al*., 2003; Nahmens & Ikuma 2009), injuries

(e.g. Fabiano, Curro, & Pastorino, 2004; Murray, Fitzpatrick, & O'Connell,1997). Literatures have in one way or the other noted drivers of safety in firms across various context. Such drivers include High performance work system (Barling & Kelloway, 2003), firm size (Lin & Mills 2001), Lean production (Nahmens & Ikuma, 2009), quality management (Pekovic, 2015), and leadership style (McFadden *et al*. (2009).

Organizations outcome have been known to be influenced by high performance work system, more so organization's safety performance. High performance work system (HPWS) is defined as different but connected human resource practices which in conjunction hires, select, motivates, develops and retains employees (Wood & Wall, 2002). The view of High performance work system is that employees are vital to an organization and when properly cared for the resulting effect is a better performance in the firm with respect to decreased absenteeism, more motivated employees and less injuries (Zacharatos, Barling & Iverson, 2005). Empirical evidence from Barling and Kelloway (2003) in Australia had found High performance work system to had significantly improved organizations safety this was reflected in the firms reduction in injury rates and more job satisfaction of employees.

Taking a leaf from Barling and Kelloway (2003), Zachoratos, Barling and Iverson (2005) conducted a study among 138 organizations in Canada, with data collected from human resource managers and safety directors to investigate how high performance work system (HPWS) will impact on occupational safety performance, findings revealed that High performance work system was clearly positively related to occupational safety performance among organizations studied. Similarly, findings

from Camuffo, De Stefano and Paolino (2015) among tyre production firms located in Italy also revealed the important role played by High performance work system in driving safety performance of the work environment, they concluded that firms striving to achieve lower rates of accidents and improved quality should imbibe practices that motivates employees so as to decrease the number of days lost by employee injury. Further findings from Tregaskis, Daniel, Glover, Butler and Meyer (2012) using interviews and survey from longitudinal data collected from managers, leaders and shop floor workers revealed that High performance work system implementations were beneficial to safety performance reflected in accident rates and times lost from accidents of organizations.

Another antecedent of safety performance across firms as indicated from existing literature is lean production of firms, proponents of lean manufacturing have unearthed that safety in terms of reduction in accidents, higher motivation of employees in organizations is enhanced as a result of lean manufacturing adoption (Longoni, Pagell, Johnston & Veltri, 2013). Lean production is a situation where manufacturing system's goal is to reduce production flow while trying to seek a reduction in resources (labour, space, material or equipment) needed to manufacture a required set of item (Shah & Ward, 2003). It pays emphasis on removing waste and activities that are non-value adding in an entire system (Dobrzykowski, MacFadden & Vonderembse, 2015). Collecting data through interviews from safety managers, production managers and supervisors, Longoni *et al*. (2013) found safety performance of production firms to have been improved due to lean manufacturing adoption, on a similar note, he argued that lean production improves the safety conditions thus leading to better safety outcomes.

Camuffo *et al*. (2015) also supports the view that safety of the work environments is improved as a result of lean manufacturing adoption in production firms, in their study among Italian tire manufacturing firms, their findings showed that lean manufacturing improved safety performance. Nahmens and Ikuma (2009) also found safety performance measured through accident rates, total day lost, injury incidence of construction firms to have been significantly improved due to lean manufacturing adoption. In a recent study, Dobrzykowski *et al*. (2015) found safety performance of organizations to have been enhanced due to adoption of lean manufacturing adoption within hospital organizations in the US.

Organization safety literature has also indicated that safety performance across firms is affected by size of the firm. Firm size is reflected by the number of employees in firms (Leigh, 1989; Fabiano *et al*. 2004). Though arguments exist to which extent firm size influence safety, there are empirical evidence to support that firms with lower or high employees' reports more accidents, frequent loss time injury. Fabiano *et al*. (2004) argues that firms with fewer employees have low technology, poor economy as such there is great interaction between employees and machine resulting to injuries, more so employees in smaller firms are poorly trained as such lack experience hence such firms are prone to reporting poor safety outcome.

A study by Lin and Mills (2001) in Australia revealed that larger firms experienced better safety performance than smaller firms. They argue that smaller firms lack financial resources to implement safety procedures hence experience more occupational accident thus hampering there safety performance. This supports evidence from Jannadi and Al-Sudairi (1995) conducted in Saudi-Arabia which

found out that frequency of injury and number of times lost due to injury was significantly higher for smaller firms compared to larger firms. They concluded that the level of safety is determined by the size of the company.

Furthermore, Yorio and Watchter (2014) also found size of firms to have influenced how safety practices had influenced accident rates among manufacturing establishments. Contrastingly, Leigh (1989) reported that though size of firms play a significant role in determining safety performance in firms he found out that larger firms and smaller firms experienced better safety performance however firms with medium amount of employees experience have lower safety performance.

Leadership has been identified as an important factor in predicting organizational outcomes (Mumford & Hunter, 2005). Two leadership styles has been identified by Burns (1978). However, a third leadership style has been recently identified by Bass and Avolio (2000). They styles are transactional and transformational (Burns, 1978) and laissez-faire (Bass & Avolio, 2000). De Koster, Stam and Balk (2011) investigated the effect of safety specific transformational leadership (SSTL) on safety performance (accidents) among ware houses in the Netherlands result revealed that safety performance had been influenced directly by safety specific transformational leadership, safety specific transformational leadership also indirectly influenced warehouse safety performance through the mediating role of hazard reducing system

Further studies by Yang *et al*. (2009) among healthcare organizations in Taiwan also found safety performance to have been influenced by leadership behaviour.

Similarly, McFadden *et al*. (2009) investigated how transformational leadership specifically (TL) can predict safety outcomes among US hospitals results showed that safety outcomes was significantly predicted by such leadership style within hospital organizations. Furthermore, MacFadden, Stock and Gowen (2015) after collecting data from senior directors across 204 hospitals organizations in the US found hospital safety outcome to had improved as a result of hospitals transformational leadership style.

Safety performance across organizations has also been influenced by safety leadership, safety leadership is specific to safety, it is defined as an interaction between leaders and their subordinates, in that leaders exert their influence on their subordinates so as to achieve safety-related goal of the organization (Wu, 2005). In a study among Taiwan universities, Wu *et al*. (2008) found out that safety performance had been influenced by safety leadership, in a similar study but among petrochemical industries situated in Taiwan Wu *et al*. (2009) also found safety performance to have been significantly influenced by safety leadership. To further buttress the influence of safety leadership on safety performance, Fernandez muniz *et al*. (2014) studied the influence of safety leadership on safety performance with the mediating effect of proactive risk management among 455 Spanish firms, results indicated that safety performance of the firms was influenced directly and indirectly by safety leadership.

Researchers have indicated that quality management implementation by organization influences their safety performance (Gowen, Henegan & McFadden, 2009, Pekovic, 2015). Quality management practice are method employed by firms in order to guarantee continuous improvement of quality of goods and services delivered by the

involvement of the workforce at all levels and in all functions within a firm (Pekovic, 2015). Some researchers are of the view that the influence of quality management practices benefits organizations safety performance positively because they increase the motivation and interest of workers by identifying and eliminating potential hazardous practices thus benefiting the firm (Naveh & Erez, 2004). In contrast researchers like Askenazy and Caroli (2010), Brenner, Fairris and Ruser (2004) are of the view that quality management practices result to an intensification of work due to increased surveillance by employers, job rotation which lead to increase slack time hence they have a negative consequence to safety of employees.

Empirically, Pekovic (2015) found correlation between quality management and safety performance measured through accident occurrence within firms studied in France, she concluded that safety performance in companies is dependent on ways by which quality practices are implemented by firms. Another study by Naveh and Marcus (2007) revealed that firms who were quality certified experienced better safety performance than those who were not. Supporting this claim, Levine and Toffel (2010) found the rate of injury to have declined after ISO 9001 certification in a study carried out among 1000 companies in California.

Furthermore findings from Gowen, Henegan and McFadden (2009) using data from 370 hospital organizations revealed that hospitals who experienced lower medical errors, less cost savings and reduced frequency of accident was due to quality management adoption. Also, Arocena, Nunez and Villanueva (2008) affirms that the use of quality management tools by the organization helped in reducing injury rate among the industries, also when flexible processes of manufacturing was

implemented, the rate of accidents was increased in a study carried out to investigate how prevention of risk and organizational factors impacted on occupational injuries among 213 industries in Spain.

In summary, the aforementioned studies found safety performance to be related to accidents, injuries and absenteeism at the workplace. Additionally, safety performance was revealed to play an important role in the success of organizations. Numerous studies indicated a positive relationship between safety performance measures and other variables and found good and sustainable organization practices to be beneficial to a firm's safety. The next chapter discuses on safety culture as an antecedent of safety performance, first it offers a conceptualization and then discusses its dimensions and prior studies.

2.3 Safety Culture

In other to improve organizations safety, the concept of safety culture has been readily adopted by researchers (Choudry, Fang & Mohammed, 2007; Flin, 2007; Lee & Harrison, 2000). The basic concept of safety culture emerged from the realm of organizational culture (Guldenmund, 2000) which has been seen as a prerequisite for organizational performance (Vredenburgh, 2000). In the present study safety culture is seen as an antecedent of safety performance because it reflects how committed an organization is towards safety which influences the attitude of an employee in engaging in unsafe acts (Reason, 1997) which is the primary cause of accident (Prussia, Brown & Willis, 2000), these unsafe acts can mar the safety of the organization (Morrow *et al*., 2014). The objective of an organizations safety culture is to create a norm whereby employees are mindful of the risk within their

environment and are persistently looking out for hazards (Ostrom, Wilhelmsen & Kaplan 1993).

In a nutshell, a positive culture of safety is formed when management espoused values are in line with employees behaviours (Vrendeburgh, 2002) and when safety is seen by everyone as an issue that concerns every member of the organization (Choudry *et al*., 2007). Many studies on safety culture have found out that safety culture plays a countless role in promoting safety performance and noteworthy safety culture constructs have been examined as principal indicators of safety performance (Cooper & Phillips, 2004; Glendon & Litherland, 2001; Thompson, Hilton & Witt, 1998). Generally, Culture plays a significant role in an organization. Researchers have opined that safety culture like organization culture has impact on employee motivation and organizational performance (Fernandez-Muniz et al., 2014). From resource based view perspective, culture serve as a source of competitive advantage to an organization, which, in turn, enhances organizational performance and effectiveness (Nazir & Lone, 2008).

The concept of safety culture is traced from the 1986 Chernobyl nuclear explosion (Weigmann *et al*., 2002) in which two explosions resulted to the discharge of core molten fragments of the Chernobyl-4 nuclear reactor and also products of fission into the air. The International Safety Advisory Group (INSAG) charged with the duty of examining the Chernobyl accident, coined the term "poor safety culture" to pinpoint factors that led to the Chernobyl accident.

INSAG referred to Safety culture as "that assembly of characteristics and attitudes in organizations and individuals, which establishes that as an overriding priority, safety issues receive the attention warranted by their significance". However, numerous definition has been used to refer to safety culture by various researchers, the concept is recognized as an important contributor to improve safety performance.

Cox and Cox (1991) defined safety culture as "employee attitudes, beliefs, and perceptions and values that employees share in relation to safety". Furthermore, Pidgeon (1991) refers to safety culture as sets of belief, norms attitudes, roles, technical and social practice concerned with curtailing the exposure of customers, employees, managers and members of the public to situations considered to be injurious or dangerous. Also Ostrom *et al*. (1993) posited that safety culture is a notion that organizations belief and attitudes, which reveals in actions, procedures and policies, affect its safety performance. In addition, Lee (1996) defined an organisation safety culture as the product of group and individual values, perception, attitudes, competencies and behavioural patterns which determine the commitment to, and the style and proficiency of the organizations health and safety management.

Hale (2000) defined safety culture as attitudes, beliefs, and perception shared by natural groups as defining norms and values, which determines the way they act and react in relation to risks and control system of risk. Cox and Cheyne (2000) argues that safety culture is characterised as an enduring feature of organization with trait like properties and not changed simply. They defined safety culture as part of culture of an organization which impacts attitude of members and behaviour it also relates to performance of the organization.

Furthermore, Guldenmund (2000) posited that safety culture refers to aspects of culture of an organization which impacts on behaviour and attitudes related to decreasing or increasing risk. Cooper (2000) referred to safety culture "as the product of multiple goal directed interactions between people, jobs, and the organizational; while safety culture is that observable degree of effort by which all organizational members directs their attention and actions towards improving safety on a daily basis". Mohamed (2003) defined safety culture "as a sub facet of organizational culture which affects workers attitude and behaviour in relation to an organization going safety performance". Mearns *et al*. (2003) opined that safety culture denotes the assembly of organizations and individual's characteristics and attitudes which establishes that safety issues receive attention as an overriding priority warranted by their significance. In addition, Richter and Koch (2004) posited that safety culture is a learned and shared meanings, experiences, and interpretations of work and safety expressed partially which guide people's actions symbolically towards accidents and prevention as well as risk. Fang, Chen and Wong (2006) referred to safety culture as "a set of prevailing indicators, beliefs and values that the organization, owns in safety".

Fernandez-muniz *et al*. (2007b) stated that Safety culture can be referred to as element of organizational culture which refers to jobs, individuals and organizational characteristics which affects health and safety of employees. They stated that Safety culture refers to sets of values, perceptions attitudes and patterns of behaviour with regard to safety shared by members of the organization and also policies, practise and procedure which relates to decrease of exposure to occupational risks by

employees implemented at all organizational level and also mirrors a high level of commitment and concern to avoidance of illnesses and accidents.

On the other hand Diaz-Cabrera, Hernandez-Fernaud and Isla-Diaz (2007) defined safety culture as one which is construed to manifest in meanings and values that are shared in an organizational process and structure, safety policies, practices strategies, goals and leadership styles associated to safety management system, in such way it implies values and meaning system that is linked to safety developed via negotiations among members, that could lead in subcultures. However, Singer *et al*. (2009) reasoned that safety culture of an organization are shared values within members of an organisation on things that are important, beliefs on how issues are operated within the organisation and its relationship with unit of work and structures of the organisation as well as its system that combines to yield behavioural norms within the organisation which fosters safety.

Wu, Lin and Shiau (2010) defined safety culture as scores evaluated from scales of safety culture, which aggregates three subscales these include participation of safety by employees, emergency response, risk perceived. Also, He, Xu and Fu (2012) after reviewing several definitions of safety culture, referred to safety culture as a sum of series of concepts that is safety culture is the ideas of safety management. Mannan, Mentzer and Zhang (2013) stated that safety culture is the shared attitude of an organization, values, beliefs and norms about safety, together with attitudes about danger, risk as well as conducts during operations that are hazardous. Morrow *et al*. (2014) argues that beliefs of employees about how important safety is shaped up by safety culture of an organization this in turn impacts on the attitudes of the

employees towards safety, perceived norms over safe working behaviours for working in a safe manner and perceptions of control over safe working behaviour.

In a literature review by Wiegmann *et al*. (2002) on safety culture, they stated the following as shared qualities of safety culture from various definitions as seen in several literatures; it refers shared values among groups or organizations, it is concerned with issues that are formal, and closely connected to but not confined to supervisory and management systems, it stresses the input of everyone in every levels of the organization, influences on how individuals of an organization act during work, reflects in contingency between system of rewards and safety performance, shows in the will of organization to learn from errors, accidents and incidents, it is enduring relatively, unvarying and resists change.

In a nutshell, most of the definition are alike in viewpoint of beliefs, with each centring on ways by which organizations think and act in alliance to safety. More so it can be concluded organizations with strong safety culture value safety, and they make every effort to make it their utmost priority. All definitions focus on what the organization "is" rather than what the organization "has".

2.3.1 Safety Climate

Similar to safety culture, the concept of safety climate has commonly been discussed in the safety literature as a driver of safety performance and sometimes used interchangeably with safety culture (Wu *et al*., 2008). More specifically, safety climate is derived from organizational climate (Coyle, Sleeman & Adams, 1995; Zohar, 1980). Guldenmund (2000) opined that safety climate is expressed in the

attitude of employees with regards to safety in an organization. However, safety culture refers to underlying beliefs and convictions of those attitude of employees (Guldenmund, 2000). Although Schein (2000) emphasized that these beliefs are not easily seen and are engraved in an organizational life but are expressed in the attitude of employees, for this reason, Flin *et al*. (2000) stated that safety climate reflects safety culture.

Several studies on safety climate and safety culture have also given support to safety climate been a manifestation of safety culture in an organization (Mearns *et al*., 2003). Zohar (1980) further argues that the culture of an organization cannot be easily measured rather a more feasible concept which is reflected in the employees perception and attitude of safety is used to proxy safety culture in an organization. Also, Zhang, Wiegman, von Thaden, Sharma and Mitchell (2002) noted that safety climate is a time-based measure of safety culture which is focused on individual perception of the organization. Based on opinion that safety climate is reflected in safety culture, it is imaginable to measure safety climate so as to capture a snap shot of an organizations safety culture. As such safety climate and safety culture will be used interchangeably in this study. Several studies in occupational literature have used both terms interchangeably for example (Hajmohammed & Vachon, 2014; Singer *et al.*, 2009; Wu *et al*., 2008).

2.3.2 Dimensions of Safety Culture

Several dimensions of safety culture has been used by several authors. Cox and Cox (1991) after examining the structure of employee attitudes on safety acknowledged five dimensions of safety culture which comprises safety attitude, responsibility, and

efficacy of management on safety, environmental safety, and personal exemption. Their study offered a model of safety which differentiates four objects namely – hardware, software (procedures and rules, policy and safety management), people/live ware (i.e. workers, management, authorities, supervisors, specialists, safety committees, unions and risks (i.e. work environment's safeness, risky behaviour and its regulation).

Pidgeon (1998) argues that a decent safety culture relates to four features namely commitment to safety by senior management, flexible and realistic practices for managing both ill-defined and well-defined hazards, organizational learning that is continues, and care and concern for hazards shared by the work force. Contrastingly, Guldenmund (2000) argues that management commitment to safety is a prime factor of safety culture however Cox and Cheyne (2000) posited that management commitment, management actions concerning safety employee involvement and physical environment were key components of safety culture. Meanwhile, Lee and Harrison (2000) argues that employee's norms, attitude and behaviour are the key elements of safety culture because the elements are controlled by the norms of the group within the organization.

O' Toole (2002) examined the correlation between perception of safety of employees and organizational culture and found out that safety management and commitment, involvement of employees, communication and training, emergency response to be the indicators of safety culture. Arboleda, Morrow, Crum and Shelley (2003) found safety input feedback, safety training, and management commitment to safety are perceived to be indicators of safety culture for the three levels of management in a

study involving drivers , dispatchers, and safety directors in the trucking industry. Vecchio-Sadus and Griffiths (2004) emphasized that in fostering an organizational safety culture elements of management commitment to safety and employee involvement are essential.

Fernandez-Muniz *et al*. (2007b) investigated the relationship between dimensions of safety culture and established adequate commitment of managers and involvement of employee as determinants of safety culture. Furthermore, Diaz-Cabrera *et al*. (2007) found seven dimensions of safety culture worthwhile namely; training , accident and incident reporting system, appraisal of performance and promotion of safety, standard operating procedures and rules, motivation, communication and information system and styles of leadership in their study to evaluate device to assess safety culture values and practices.

Also Ek, Akselsson, Arvidsson and Johnson (2007) incorporated nine different dimension of safety culture in assessment of safety culture of air traffic control in Sweden the dimensions included work situation, learning, communication, justness, reporting, flexibility, safety related behaviours, attitude towards safety, risk perception. Also Choudhry *et al*. (2007) states that a positive safety culture should incorporate five aspects which includes: commitment to safety by management, concerns of management for the workforce; credibility and mutual trust amongst employees and management; empowerment of workforce; and continuous monitoring, corrective actions, review of the system and continual improvements to reflect the safety at work.

In addition Yang *et al*. (2009) investigated the behaviour of leaders on safety culture and safety performance in a health industry and posited that SC had the following dimensions in his study; organization system, safety communication and managers commitment. Wu *et al*. (2010) suggested three dimensions of safety culture which includes employee participation, perceived risk and emergency response.

Meanwhile, Fraizer, Ludwig, Whitaker and Roberts (2013) recognised three safety culture dimensions namely personal responsibility, management concern and peer support for safety. Furthermore, in a case study to create the best in class safety culture, Mannan *et al*. (2013) identified four dimensions of safety culture namely leadership, initiatives and policies, culture and values, organisation and structure and goals.

Recently, the debate on the dimensions of safety culture is still on going, while Feng *et al*., (2013) suggested that safety culture comprised of 10 indicators namely; management commitment, involvement of employees, supervisory environment, feedback and communication, supportive environment, appreciation for risk, work pressure, competence level and training, work hazards appraisal, safety procedures and rules. Dos Santos Grecco, Vidal, Cosenza, dos Santos and de Carvalho (2014) purported that safety culture has six dimensions which includes top level commitment to safety, emergency preparedness, awareness, organisational flexibility, just culture, organisational learning. Also, Morrow *et al*. (2014) studied safety culture in US nuclear power operations and had the following dimensions of safety culture commitment to safety by management, quality of training, willingness to raise concern, making of decision, responsibility of supervisors on safety,

questioning of attitude, communication of safety, personal responsibility for safety, safety prioritizing.

In summary, lots of dimensions have been found to be the basis of safety culture, yet differences remain as to which indicator makes up a positive safety culture. However, literature has revealed that the most consistent measured dimensions are management commitment, and employee involvement (Choudry *et al*., 2007; Cox & Cheyne, 2000; Fernandez-Muniz *et al*., 2007b; Hajmohammed & Vachon, 2014; McFadden *et al*., 2009; Mearns *et al*., 2003; Vecchio-Sadus & Griffiths, 2004). The next section explains the two indicators that makes up a positive organizational safety culture and has been used across various work settings as key constituents of safety culture as earlier described.

2.3.3 Management Commitment to Safety

Perception of employees on management commitment to safety are recognised to stimulate substantial safety outcomes (Micheal, Evans, Jansen & Haight, 2005). Management commitment to safety refers to insistence by organizations on a commitment to safety programs as well as to occupational accidents prevention through training of employees and management participation in safety outcomes and follow up safety designs of work (Arbeleda *et al*., 2003). Also management commitment safety is referred to as the perception of employees towards management attitude to safety (Zohar, 1988) and organisation safety system (Chenye *et al*., 1998; Cox & Flin, 1998).

Commitment to safety by management identifies with senior management and in addition line management leadership style and resources to accomplish the objectives of organizational safety (Cooper, 1998). Besides, Management commitment to safety is a crucial component that impacts the achievement of organizations safety programs (Choudhry, Fang & Ahmed, 2008; Zohar 1980). Basically, Management commitment is essential for organizations to support and create attitudes and behaviours at work environment (Angle & Perry, 1981; Koch & Steers, 1978).

Commitment to safety by management deals with undertakings that are set up by top management to ensure that all parts of operations like training, procedures, selection, equipment and work projects are evaluated administratively and changed to enhance safety (Wiegmann *et al*., 2002). When management is focused on safety, it creates support and resources for safety accomplishments (Hsu, Lee, Wu and Takano, 2008). Undeniably, organizations commitment at upper level has been seen to take up a key part in the increase of safety culture of an organization (Dedobbeleer and Beland, 1998; Fleming, Flin, Mearns and Gordon, 1996; Flin *et al*., 2000; Yule *et al*., 2007; Zohar, 2000).

Empirical link between Management commitment to safety and safety outcomes have been unearthed by researchers. For instance, Cox, Tomas, Chenye and Oliver, (1998) concerned in safety culture studied the commitment of safety in UK manufacturing commercial enterprises and discovered management commitment to safety as huge in anticipating safety behaviour. Sawacha *et al*. (1999) discovered

attitude of management towards safety as a huge component that emphatically impacts safety performance among construction organizations in the UK.

Micheal *et al*. (2006) investigated safety climate out comes which were non- safety related and discovered that a good perception of management commitment towards safety by employees enhanced safety performance as well as influence satisfaction in terms of jobs commitment of organization and absenteeism. O'Toole (2002) revealed commitment to safety by management impacts employee perception towards safety issues.

Cox, Jones and Rycraft (2004) in a study to assess behavioural approach to safety management in UK reactor plants utilizing semi structured interviews, observations and questionnaires revealed that a positive relationship existed between management commitment to safety and behavioural safety at all levels in the organization. Abudayyeh, Fredricks, Butt and Shaar (2006) in a study conducted to determine the relationship between commitment to safety by management and the recurrence of related illness and injuries in a construction organization in the US utilizing questionnaires found that statistical link existed between commitment of Management and illness and injury rates. Likewise Huang *et al*. (2006) observed management commitment to be associated to self-reported injury.

In another study, Fernandez-Muniz *et al*. (2007b) examined the relationship between safety culture measurements and found management commitment through their positive attitude to avert accidents at work and their behaviours positively impacts

employee's involvement and active participation in safety exercises which impacts on safety performance.

Ali, Abdullah, and Subramaniam (2009) discovered management commitment to safety on safety culture that decreases rates of injury in Malaysian industries. Mearns and Yule (2009) studied how the procedure of globalization can impact beliefs, attitudes and behaviour of divergent national workforces working for the same multinational organization over the globe they discovered proximal impact like management commitment to safety affect workforce behaviour and rates of accident as opposed to national values.

Geldart *et al*. (2010) keen on determining organizational practices and work place safety and health in manufacturing organizations in Canada, utilizing questionnaires figured out that Management commitment to safety impacts on injury occurrences significantly at the work place. In a related study, Huang *et al*. (2012) examined the relationship between commitment to safety by management and safety training and future injury outcome in restaurants utilizing surveys results revealed that individual perception of management commitment towards safety was a huge indicator of future outcome of injury, they inferred that when workers see their management has a high state of commitment to safety they will perceive that the safety training of the organization is great which will then predict future injury. Refaie (2013) studied the impact of organization, safety management and work group level components on safety, self-efficacy, safety awareness and safe behaviour in Jordanian organizations results from structural equation modelling uncovered that management commitment fundamentally influenced safety performance to safety.

In summary it can be seen from the literature above that management commitment to safety is a key part of on an organizations safety culture and positively influences safety issues. It can be said that when management is committed to safety in an organization safety performance is increased because employee awareness is raised about the importance for safety.

2.3.4 Employee Involvement

Employee involvement or Employee participation refers to circumstance where by employee takes part in decision making and also activities related to safety. (Seo *et al*., 2004). Employee involvement is a practise that is behavioural focused on, which gathers individuals and groups in an upward flow of communication and decision making process in the organization (Vinodkumar & Bhasi, 2010). Employee participation, is important in an organization since it plays a part in achieving success in the organization. Employee safety participation can be defined as behaviours of employee which helps in creating a safe workplace. It includes employees taking part in policy setting and making of decisions to foster safety, attending safety training and accepting health checks (Wu *et al*., 2010).

Previous empirical studies in occupational safety shows that employee involvement is very paramount to realizing organizational goal. For instance, O'Toole (1999) discovered that government objective of taming occupational injuries in manufacturing firms in the UK can be achieved when firms are stirred to increase employee participation in the process of safety. Similarly, Vassie and Lucas (2001) investigated how UK manufacturing companies address safety management issues

using semi structured interview their findings showed that employee involvement was a key safety management factor with team leaders and self-managed groups.

Furthermore Seo, *et al*., (2004) found a negative correlation between accident, near miss experience and employee participation. Similarly, Hahn and Murphy (2006) found employee job involvement to be related with better adherence of safe work practices, reduced exposure to environmental stressors, presence of more safety policies and procedures and decreased accident rates.

In another study, Fernandez-Muniz *et al*., (2007b) found employee behaviour and involvement in safety to positively influence manager's commitment in safety which in turn influences safety performance. Aksorn and Hadiksumo, (2008) using questionnaire administered to construction workers in Thailand found worker involvement as one critical success factor that affects safety program implementation in Thai construction industry. Furthermore, Ali *et al*. (2009) found a positive relationship between employee participation and injury rate in Malaysian industries.

Vinodkumar *et al*. (2010) using structural equation modelling found worker involvement in safety a safety climate factor to be negatively correlated with self-reported accident rate in Indian chemical industry. Also Boughaba, Hassane and Roukia (2014) found employee involvement as a key indicator of safety culture which determine safety performance of a workplace.

In summary it can be deduced that an organizations safety culture is reflected in terms of management commitment to safety and employee involvement as such this

study defines an organization's safety culture as a situation where managers show commitment to safety, reinforce safety as a priority of the organization and safety rules and procedures are adhered to by the employees who in turn partake in improvement and establishment of these rules (Hajmohammed & Vachon, 2014). In light of the above definition, the present study views safety culture as uni-dimensional, various studies on organizational safety culture have viewed the concept of safety culture in this regard (for example Hajmohammed & Vachon, 2014; McFadden *et al*., 2009).

2.3.5 Instruments Used to Measure Safety Culture

Numerous instruments have been used by researchers to measure safety culture. Generally most commonly used includes observations, surveys or interviews (Cole *et al*., 2013). According to (Cox & Flin, 1998) there are no standard tool that can be used to measure safety culture within a single domain. However, several methods or tools have been proposed. They are classified as quantitative and qualitative methods. In a review of literature by Choudhry *et al*. (2007), they posited that culture of an organization is measured by the application of qualitative methods like interviews and observations, however Cooper (2000) opined that the three major aspects of safety culture which are psychological, situational and behavioural dimensions can be measured by a combination of quantitative and qualitative methods. He argued that the situational dimensions of safety culture is perceived in the organisation structure, procedures of working, management systems, and policies. Behavioural dimensions of safety culture is measured via self-reporting and measures of outcome, and also peer observations.

Cooper (2000) avowed that the safe behaviours are placed on observational checklists then observation is regularly taken by trained observers which then translates into percentage of safe scores providing information to those being observed. However the psychological facets are observed through safety climate questionnaires which measures people's perceptions of safety. Wiegmann, Thaden and Gibbons (2007) posited that quantitative method statistically measures culture by means of systems that are very calibrated and standardized example of such include structured interview, surveys and questionnaire and Q-sorts. In quantitative method people within the organizations generally serve as respondents who respond to normal questions or sets of us from the researcher (Rousseau 1990).

However, some researchers claim that safety culture cannot be assumed totally through traditional quantitative means that attempts to disrupt down a phenomenon so as to study individual components, instead it is assumed better by the use of means that capture the nature or root of the happenings that are being studied (Wiegmann *et al*., 2007).

Cox and Cheyne (2000) in a study to assess safety culture in offshore environment used questionnaire, focus group, behavioural observations and situational audits, focus group discussion were conducted using both onshore and offshore personnel in three separate organization at a total of sixteen various locations. Also O'Toole (2002) administered a total of 3116 questionnaire which includes 41 items on safety perception survey to all employees in his study to investigate the correlation between perception of employees of safety and organizational culture, each item presented the employee a choice of responding either yes or no. In addition, Fernandez-Muniz *et*

al. (2007b) used questionnaires to study the dimensions of safety culture. Furthermore Diaz-cabrera *et al*. (2007) used questionnaires administered to 299 workers in a study to estimate instrument to measure safety culture of organizations.

Ek *et al*. (2007) used both questionnaires including of safety culture scales administered to 391 respondents and also semi structured interview in his study to obtain baseline data of safety culture and relationship between safety culture and organizational climate. In addition, Yang *et al*. (2009) administered questionnaires which included 20 items of safety culture to study leadership behaviour, safety culture and safety performance of the health care industry. Similarly, Wu (2010) administered questionnaires in predicting safety culture employers' safety leadership scale, operation managers' safety leadership scale, safety professional safety leadership scale. Wang and Liu (2012) employed questionnaire composed of 18 safety dimensions to evaluate safety culture in a railway industry, the questionnaires were reviewed by focus group of employees with various background.

Morrow *et al*. (2014) also used questionnaire also to investigate the relationship between safety culture and safety performance in a nuclear operations. On the other hand, Biggs, Banks, Davey and Freeman (2013) in a study to assess safety leaders perception of safety culture in an Australian construction company, used both semi structured interview on safety leaders in the organization and also questionnaires on perception surveys on safety leaders.

It can be concluded that questionnaires and surveys have been used generally to measure safety culture within various industries, which include nuclear power,

chemical processing, construction, aviation, transportation and manufacturing industry. However, what is key in safety culture improvement program is the development of an effective measure that can evaluate the current state of safety culture, and also to determine if interventions have been effective in achieving the desired change in culture. As such both qualitative and quantitative approach can contribute to achieve this goal.

2.3.6 Results from Previous Studies on Safety Culture

Several studies from previous research has revealed safety culture as key to the development of positive outcomes during work process. For example, Havey *et al*. (2002) in a bid to determine safety culture components among nuclear plants using questionnaires administered to 1550 employees in two plants revealed after analysis that six factors common to shop floor and management groups of both plants were related to management style and communication, responsibility and commitment, risk taking, job satisfaction complacency and risk awareness. They argued that variations existed in culture across different plants in a single organization.

In another study, Havold (2005) probed into safety culture among shipping companies in Norway, results from factor analysis of the safety culture of company and perceptions of safety by employees revealed four factors namely; management and employee attitude towards safety and quality, knowledge, attitudes towards safety rules/instructions and quality and safety experience. He concluded that a countless degree of accord existed between respondents as regards to safety culture regardless of their nationality, vessel or occupation. However, it did not implement

any kind of intervention on training and did not reveal any refinement in safety behaviour quantitavely.

Fernandez-muniz *et al*. (2007b) suggested that safety culture is shown in an organization if it has implemented a safety management system, in this case strong commitment to safety is exhibited by managers, also they show interest in the conditions of work of the employees, and are involved in the safety associated events. Findings suggested that firm managers play a vital role in decreasing the number of acts that are unsafe by employees, hence decreasing the rate of accidents. Results from O'Toole (2002) suggests that the reduction in the company's injury rate was intensely influenced by the positive employee perceptions on several vital factors. He opined that management commitment to safety was the factor with the greatest positive perception by employee involved in the survey.

Ek *et al*. (2007) conducted a study in two Swedish air operating units on safety culture, results revealed that a relationship existed between climate of the organisation and safety culture of the two air operating units, also the examined safety culture features were related to higher degree of support on ideas and low degree of conflicts. They concluded that aircraft operating unit had better safety culture score than those of shipping and airport handling of prior studies.

Ali *et al.* (2009) in a similar study to Vredenburgh (2002) used questionnaire to collect data for six management practices on safety culture, found out that rewards, management commitment, feedback and selection were found to reduce the rate of injury. Furthermore feedback and employee participation significantly predicted

injury rate. However, Vredenburgh opined that when an organization use proactive measures to protect their employees, they drive financial benefit in reducing lost time expenses paid on workers compensations. They opined that implementing good management practices reduces the rate of injury.

Also Wu *et al*. (2010) in a study to explore the predictive factor of safety culture using stepwise regression found out that of all the factors which had significant impact on safety culture (safety informing by operations managers, safety caring by employees and safety coordination and safety regulations by safety professional), safety informing by operation managers had the most significant predictive factor on safety culture. Wang and Liu (2012) studied safety culture in a railway company, results revealed that association existed between several dimensions of safety culture namely safety commitment and safety training, safety training and contractor management, safety system and management of change and risk management. However, after analysis of dimensions of safety culture it was discovered that in safety awareness, attitudes and safe behaviours, employees attach importance to safety however employees believe that procurements management, safety encouragement and punishment and safety rules have more room to play.

Biggs *et al*. (2013) after using qualitative thematic analysis to analyse information from interviews and descriptive statistics to analyse information gotten from data survey for both safety leadership and their perception of safety culture respectively found that leadership is a vital feature for a positive safety culture in the organization. They opined that there was an emphasis on leaders demonstrating commitment to safety and also being visible to the project based work. Their study

also identified barriers of safety culture improvement. Furthermore their findings suggests that safety culture is a complex construct that is difficult to define by even experts in the organization.

Several literatures indicated that culture of an organization is usually associated with desirable outcome of performance (Nahm, Vonderembse & Koufteros, 2004) however, based on the safety performance literature, there have been few research that investigated the relationship between organizational safety culture and safety performance (Boughaba, Hassane & Roukia, 2014). Edkins (1998) applied airline safety culture as one of the five evaluation criteria to determine whether safety programme would have positive impact on airline safety performance, results from his study showed that improving organizational safety culture has a positive influence on airline safety performance. In a similar sector, Kao *et al*. (2009) found safety culture to had significantly improved safety performance, they concluded that in order for organizations to achieve desirable standard, safety culture improvement is essential.

Yang *et al*. (2009) conducted a sudy in healthcare industry among 350 participants, their study revealed that safety culture significantly mediated the relationship between leadership behaviour and safety performance. Findings from their study also revealed that safety performance was predicted by safety culture. In a related sector to Yang *et al*. (2009), Singer *et al*. (2009) concerned in safety culture examined the relationship between safety climate and safety performance in the US hospitals. Data on safety culture perception were collected from senior managers and frontline personnel of 91 hospitals using questionnaires, the study found a significant link

between organization safety culture and safety performance. Within the same sector and in a similar context, McFadden *et al*. (2009) studied the influence of patient safety culture on safety outcomes within 200 hospital organizations in the US, results indicated an improvement on safety outcomes through frequency of medical errors reduction, decrease in severity of errors, as a result of an increase in patient safety culture.

Taken a leaf from the study of Mcfadden *et al*. (2009), Hajmohammed and Vachon (2014) investigated how safety culture influenced some organizational performance indicators which include organizational safety performance among 251 manufacturing plants in Canada, they found out that the organizations safety performance had been bolstered significantly by the safety culture of the organization. They opined that firms where safety culture is given utmost concern have sustained edge than firms without safety culture concern by management.

Wadsworth and Smith (2009) carried out a study on various industrial sectors in the UK measured safety climate through safety culture and studied the effect of occupational safety and health practitioners' experiences on safety performance. The findings indicated that the perception of organizational safety culture was consistently and independently linked with corporate safety performance. Furthermore, this influence was apparent among organizations in numerous industrial sectors.

He *et al*. (2012) revealed a link among safety culture and safety performance, they also emphasized that quantitative link between safety culture and safety performance

has not been confirmed. In another context, Morrow *et al*. (2014) studied how safety culture influenced safety performance in US nuclear power plants their study found out that after exploratory and confirmatory analysis on data for each nuclear plant, the mean score of the total survey results and factor means of safety culture were correlated with indicators of organizational level of performance for concurrent and the next year following the administration of survey. Correlation results revealed a statistical relationship between safety culture and plant performance. They concluded that safety culture is empirically related with safety performance. Giving credence to safety culture importance, Wu *et al*. (2008) also found safety performance to be significantly enhanced by safety climate among universities located in Taiwan. Safety climate was measured with employee's perception of safety culture.

Chib and Kanetkar (2014) posited that cooperate safety culture has a strong influence over workplace accidents and injuries after assessing and comparing the relative contribution of cooperate safety culture and component occupational health and safety advice to safety performance, Similarly, Boughaba *et al*. (2014) assessed the relationship between safety culture maturity and safety performance of two petrochemical companies in Algeria, results showed that managers commitment, training, incentives, communication and employee involvement were the priority domain to stress the effort to improve. They concluded that company A was more successful because it had a good safety culture as compared to company B in terms of accident rates.

From the review of safety literature, it has revealed that safety culture is crucial to ensure the safety of industrial operations, systems and the public (HSE 2003).

However, the definition of safety culture has still not been fully established (Cox & Flin, 1998; Clarke, 2000; Guldenmund, 2000).

2.4 Mediator

The idea behind a mediating variable is to further explain the relationship between the independent variable and the dependent variable (Baron & Kenny, 1986). Also mediators are introduced when the relationship between the independent and dependent variables have been found to be statistically significant in numerous studies and there is a need for additional explanations or other avenues through which this relationship occurs. Several variables have been used in as mediators in safety performance literature like safety initiatives, safety investment, safety practices, (Hajmohammed & Vachon 2014; McFadden et al., 2009; Feng & Teo, 2014) however this study makes use of safety management system as the mediating variable. Numerous reasons exist for selecting safety management system as the mediating variable firstly, Researchers have indicated that a firm's safety management system is a manifestation of a firm's safety culture (Cooper, 2000; Gordon, Kirwan & Perrin, 2007; Guldenmund, 2007).

Secondly, authors (for example, Caririllo *et al*., 2012; Ek *et al*., 2014) have indicated that organizations that have low accident rates and better safety performance (Vinodkumar & Bhasi, 2010) are characterised with the existence of a safety management system in place, these management system however can be implemented only if an organization has a strong oriented safety culture (McCune, Lewis & Arendt, 2011; Stolzer *et al*., 2008) which supports and flourishes the SMS to grow (Hudson, 2001). Finally, the organizational safety culture reflects shared

values, beliefs and norms which impacts on how its members behave as such it makes sense to say that the implementation of an SMS in an organization is a manifestation of an organizations safety culture (Woo, 2015).

2.4.1 Safety Management System

Safety management system are management tools for managing safety by organizations. (Chang, Shao & Chen, 2015). They include set of policies, practices, roles, procedures and functions that relates to safety (Kirwan, 1998). Also, safety management system can be referred to as mechanisms incorporated in organizations (Labodova, 2004) planned to curb hazards which affect safety and health of workers (Fernandez-muniz *et al*., 2007a). In the same vein safety management system lets a firms to easily act in accord with current legislations (Fernandez-muniz *et al*., 2007a) and also plays a crucial role in the implementation of occupational safety and health at workplace (Cooper, 1998), and for preventing the organisational accidents (Hale, 2003). Safety management system are frequently employed with the goal to lessen indirect and direct incidents costs, thus reducing the financial effect of safety on organizations (Cox and Vassie, 1998).

A safety management systems profits organizations by understanding, knowing and controlling hazards in the business (Gordon *et al*., 2007) and reflects on how competent an organization is to safety (Wang, 2011) as well as being an important ingredient on the perception of employees on how important safety is in their organizations (Fernandez-Muniz *et al*., 2007a). An SMS of an organization is a part of a bigger management system. A management system, comprising a safety management system, is a link of related components. These components consist of

authorities, responsibilities, functions, relationships, processes, activities, practices, resources and procedures. These components are used by a management system to create policies, programs, plans and aims to develop ways of employing these policies, programs, plans and accomplishing these aims (Carrillo *et al*., 2009).

Occupational safety literature has revealed that despite the significant role of safety management system in fostering safety in an organization, there has been a negligence on the contents that makes up the safety management system (Cooper, 2000; Fernandez-muniz *et al*., 2007a; Santos-Reyes & Beard, 2003). There are no well-defined and agreed measures that may create an efficient safety management system (Santos-Reyes & Beard, 2003). Undertakings made to identify the content of a safety management system have resulted to contrasting views, for example, Clarke (1998), stated that safety audit and safety management system are important elements in railway organisational safety, communication also plays a vital role in a successful safety management system implementation. Vassie and Lucas (2001) found open communication essential for safety management improvement in a study among manufacturing industries in the UK. Another view on what constitute a safety management system was brought up by Santos-Reyes and Beard (2003). They positioned that an effective safety management system is made up of policies, implementation operations, planning, measurement and evaluation, improvement and reviews.

Hale (2003) listed five important elements for safety management system structure in production, which are primary organisations operation process, life cycle of safety management, the implementation of safety practices as problem solving, feedback

and monitoring an integrated safety management information system. However, Fernandez-muniz *et al*. (2007a) emphasised that safety management system for organisations encompasses six elements namely; planning, training of employees, communication, control, incentives for employees and policy of safety. These elements were empirically seen to have elicited safety performance and organizations performance of firms by Fernandez-muniz *et al*. (2007b) (2009a). On the other hand, Fraizer *et al*. (2013) argued that the safety management system developed by Fernandez-muniz *et al*. (2007a) did not incorporate potential safety management sub factors as such he opined that safety management system should also include; safety audits, engagement of employees, discipline. In contrast, Chen and Chen (2012) indicated that safety management system should sum up the following factors; hands-on collection of data, analyse information, identification of hazard, management of risk, auditing and training, investigation and analysis of accident.

In conclusion, it can be said that a good safety management system in an organisation is effective to preventing accident in the work place and also to avoid employees in indulging in acts that are unsafe. Though there are no common terminologies and definition of an effective safety management system, for the purpose of this study, safety management system will be defined as, resources, set of people, procedures and policies which act reciprocally in a structured way to ease destruction and loses prompted in the process and in the place of work (Fernandez-muniz *et al*., 2007a).

2.4.1.1 Fernandez-muniz. Safety Management System Scale

Despite the significance of SMS in achieving organizational goals, there have not been consistent definitions of SMS (Fernandez-muniz *et al.,* 2007a; Hale, 2003). Hence rendering its assessment difficult. Fernandez-muniz *et al*. (2007a) reiterated that a more refined concept of SMS would offer a consistent assessment and definition. Fernandez-muniz et al. (2007a) significantly extended the concept in recent years, proposing an effective SMS should contain six key dimensions namely: Safety policy, Safety policy involves detailing and ratifying the organisation's Occupational Health and Safety policy (Santos-reyes & Beard, 2002). It consists of an organisation's commitment to safety and objectives, it also includes the guidelines and principles to adhere in issues of safety and health at workplace.

Incentives for employee refers to the use of punishment, rewards or talks on features concerning wellbeing of employees at workplace. They are designed to promote safe behaviours among employees. Training, this involves the use aids to improve the skill and attitude of workers when embarking on prevention of risk. Communication, this involves the use of information transfer about possible risk and how they can be combated within an organization to employees, Planning consist of two elements which are preventive planning and emergency planning. The former involves setting up practices, actions and policies needed to circumvent accidents while the latter involves programmes and action to be taken in order to provide an immediate and effective response to incident, so as to reduce the effects in a possibly quick time. The last element embedded in the safety management system is control. Control involves the analysis of conditions of work as well as event taking place in a firm

and subsequently comparing them with those of other firms. Control is made up of two dimensions namely benchmarking and internal control.

2.4.1.2 Safety Culture and Safety Management System

Peoples matter is addressed by culture, and therefore come to be an important factor in effective management system implementation (Corbett & Rastrick, 2000; Yong & Pheng, 2008). This implies that, with identifiable adaptable profiles of strong culture, a company's management system can be effectively and efficiently implemented and improved continually, to provide a planned management system that increases an organization's performance (Cameron & Quinn, 2011). A number of research have been carried out in examining how a management system can be implemented successfully and finding the possible benefits to be gained by organizations that achieves effective implementation of such kind of system. Yong and Pheng (2008) have stated the relationship between culture and management system as "mutually reinforcing", and by this they positioned that if the culture of an organization is good, the management system will be properly applied, which leads to desired outcome of the organization. Building up the concept of culture within an organisation impacts on management practices and vice versa (Noronha, 2002), it requires that all the practices organisation be in congruence for good practices to function (Yong & Pheng, 2008). This implies, that if management of an organization applies an approach that emphases on internalising values (Bright & Cooper, 1993), then the culture of organisation creates a climate within the organisation, which supports improvement, and also allows the climate to grow. This, in turn, impacts the management processes (and implementation) that achieve results (Noronha, 2002).

In the OHS literature, empirical undertakings have not really explored the influence of safety culture on safety management system. However, organizational behaviourists postulates that an organizations SMS was as a result of a positive organizations safety culture (Helmrich & Merit 2005; Reason, 2000). Furthermore, some researchers have noted that organizations with a positive safety culture implement a sustainable SMS more often than do organizations without a positive safety culture (von Thaden & Gibbons, 2008; Mitchel *et al*., 2002 as cited in McNeely, 2012). The essence of safety culture is the capability and desire of an organization to perceive the significant of safety, hazards and ways to avoid them. Kennedy and Kirwan (1998) defined a safety management system as practices, procedures, activities and policies employed or followed by an organization's management aimed at safety of its employees. Empirically, these practices and procedures were seen to have been enhanced due to the implementation of an organizations safety culture by Hajmohammad and Vachon (2014). Consequently, Diaz-Cabrera *et al*. (2007) opined that when an organization buoys up its safety culture, it offers the organization a holistic and full vision to bolster its SMS. On a related note, Gerede (2015) stated that a positive safety culture is a prerequisite to the success of an SMS in any organization.

The organizations safety culture creates cognizance and understanding of hazards of an organizations operations, which in turn shapes an organizations attitude to managing safety (SMS) as well as behaviours towards safety (Wang, 2011). Furthermore, Kennedy and Kirwan (1998) had referred to an organizations SMS as a method in which safety is ran or handled in an organization and how the procedures and policies that encompasses the SMS are implemented in the organization. They

further stated that these methods by which safety is ran is influenced by the safety culture of the organization. In addition, according to Stolzer et al. (2008) a resilient safety-focused culture is a basic requisite for the execution of a safety management system. Consequently, developing and sustaining a strong safety culture is a vital precondition for organizations bearing in mind the implementation of an SMS.

The view of Kennedy and Kirwan (1998) is supported by Choudhry *et al*. (2007) who argues that the effectiveness and success of an SMS is due to a positive safety culture development because management and employees become aware of their role in accident prevention hence they exhibit interest in keeping the work environment safe. Indeed Hudson (2001) argues that in order for organizations to realize their objectives of achieving safety, it is apparent that it implements a true safety culture which supports and flourishes the SMS which in turn allows the organization to reach its goal.

Woo (2015) empirically found out that the organizations safety culture was a crucial precondition when implementing SMS, in the same way, Lin (2012) found safety culture to had significantly affected SMS performance among airline organizations in Taiwan, this view is supported by Stolzer *et al*. (2008) who argues that in developing an SMS it is very critical for organizations to first develop its culture which will shape up the SMS of the organization. It is believed that the safety culture of an organisation will improve the SMS of an organisation as such a safety culture level relates to a good safety management system of an organisation (Helmriech & Merit, 2005). In light of the argument above it becomes apparent that the safety culture of an organization is an influence on the SMS of the organization.

2.4.1.3 Safety Management System and Safety Performance

Several studies have linked the concept of safety management system with safety performance, safety behaviour and several related safety outcomes. For example, (Fernandez-muniz *et al*., 2007b; Chang *et al*., 2015; Yoon *et al*., 2013; Fraizer *et al*., 2013; Fernandez-Muniz *et al*., 2009) and have found results that supports safety management system to have elicited performance outcomes. For instance, Wacher and Yorio (2014) found significant negative relationship between safety management system and accident rates through the mediating role of employee emotional and cognitive engagement. They avowed that to achieve and effective safety performance, organisations should be concerned in ways of winning the hearts and minds of their employees through a safety management system that are human performance based made to foster the engagement of workers. Naveh, Katz-navon and Stern (2011) carried out a study among hospital organizations to determine how patient safety had been improved by SMS implementation, questionnaires was distributed among 241 doctors and nurses, result revealed that higher scores of patient safety was as a result of safety management system implementation.

In a bid to develop a scale for safety management system among 455 Spanish manufacturing firms, Fernandez-muniz *et al*. (2007b) found safety management system to have significantly predicted safety performance, data was collected using questionnaires administered to safety personals in the organization. In a much related study, Fernandez-muniz *et al*. (2009) found out among 455 Spanish firms with data gotten from safety officers that high score of safety management system had improved the safety performance of the organization by reducing the material damages in equipment, reduction in the number of absenteeism, reduction in

personal injuries. Similarly, Carrillo *et al*. (2009) carried out a study on the effect of SMS on injury rates among Spanish manufacturing industries, results indicated that company's injury rate has been reduced when safety management system was implemented by the firms. In a related study carried out in Spain but among SME's, Arocena and Núñez (2010) investigated how effective SMS was among 193 SME'S results unearthed that SMS does affect injury rates significantly and prevents accidents at the work place.

Bottani *et al*. (2009) found out that out of 116 organizations studied, organizations that adopted safety management system showed a better safety performance than organizations without safety management system in place. On a similar note, Yoon *et al*. (2013) found out that accident rates and fatality rates among construction companies reduced when safety management system was adopted by construction industries in South Korea. In another study Rzepecki (2012) investigated the benefits of safety management system implementation among 20 Polish enterprises the results opened up that SMS implementation was very essential as accidents rate among enterprise reduced due to an implementation of SMS, also premiums paid for accident insurance was lowered due to SMS implementation by the enterprises. According to Fraizer et al., (2013) when SMS are engraved with safety within an organizations the effect is a resulting financial benefit stemming from less cost spent on accidents of employees or other resulting effect of accidents.

2.5 Underpinning Theory

This study looks into the influence of safety culture on safety performance. This relationship can best be described by the Resource Based View theory (RBV). In

addition, it also looks into the mediating effect of safety management system on the relationship, hence this study is supported by the contingency theory. Detailed explanation of these theories is given below and subsequently its application is further explained.

2.5.1 Resource Base View (RBV)

This study is underpinned by the Resource Based View (RBV), the theory is mostly cited in reference to organizational performance (Newbert, 2007; Wernerfelt, 1995). Central to this theory is that some organizations are different from others because they strive to gain competitive edge over their rivals and consequently improving their performance within the global market.

Resource Base View postulates that in order for an organization to gain competitive advantage over others and achieve superior performance, it must own and control resources which it is able to use to create value (Newbert, 2007; Wernerfelt, 1995). The theory is of the view that organizational resources which allows firms to achieve competitive edge and superior performance must be well valued and not easily possessed by other organizations, in addition these resources must not be easily imitated and substituted by other organizations (Barney, 1991). Organizations resources referred to in this context include, employees, culture, financial assets, physical and technological resources used for provision of goods and services for customers (Barney, 1991).

The ability for the organizations to efficiently and effectively deploy and make use of the available resources to achieve stated goals are referred to as capabilities or

competencies. These resources are either tangible or intangible (Newbert, 2007; Werenfelt, 1995). Tangible resources include finance and machinery, intangible resources include knowledge, goodwill, culture, and skills of employees. The organizational resources and capabilities are necessary for competitive advantage to organizations which in turn offers organizations superior performance (Barney, 1991). Proponents of organization performance have employed organization culture as a source of competitive advantage to enhance superior organization performance (Barney, 1991). Safety culture being a subset of organization culture which is related to the style, norms and attitude of an organization can also be viewed as an organizations rare and inimitable resources when properly employed can enhance an organizations competitive advantage hence achieving desirable safety performance.

2.5.2 Contingency Theory (CT)

One drawback of RBV is that separate resources hardly fit adequately to yield performance. Hence collaboration with other resources to achieve mutual benefit becomes very imperative (Choi, Poon & Davie, 2008). This is where the Contingency theory comes in. Contingency theory (CT) is also another popular theory that has been extensively used by researchers or scholars in management disciplines, in fact it has been mostly used in social and behavioural sciences to explain the relationships that exist among certain variables. Many models developed in social and behavioural sciences apply contingency theory. Contingency theory holds that there is no single best way to doing things such as organizing, leading and decision making (Luthans & Stewart, 1977).

At organizational level, the theory holds that the performance or effectiveness of an organization depends on both internal organizational and external environmental contingencies (Rauch *et al*., 2009; Wang, 2008). This implies that the favourableness or unfavourableness of these organizational factors determines whether or not an organization will perform well. The theory states that there is no best way in determining organizational effectiveness. The best way or style depends on the situational variables (Hopfe, 1970; Da Cruz, Pires, Nunes, & Pinheiro, 2011). Available research findings confirm that organizational performance can be enhanced when important variables are properly aligned, and that is the basic assumption underlying contingency theory (Rauch *et al***.,** 2009).

Contingency theory is about congruence among important variables. It stipulates that the relationship between one variable and another variable depends on the third variable (Rauch *et al*., 2009). In the context of this study, this assumption applies. In this study, the impact of safety culture on organizational safety performance is said to be dependent on the implementation of safety management by the organization. It can therefore be said that the relationship between safety culture and safety performance is contingent upon the implementation of a firm's safety management system. Haven explained what both RBV and CT is, the next section explains how this theory relates to this study.

2.5.3 The Connection of RBV, CT and this Study

This study was built on Barney (1991) `s Resource-based View (RBV) of a firm which explains that the added value that organization can contribute to its self is emphasized by organization capital theory. Barney's theory becomes appropriate for

this work because it has viewed organization capital as sensitive. It regards safety culture as assets and stresses that investment by organizations in safety culture will generate worthwhile returns. The conception of competitive advantage was coined by Ankili (1999) who asserts that competitive advantage is born out of the organizations ability to create value. It can be deduced that safety culture of an organization applies to the organization as a whole, in the way that it sets organization apart from others and also binds its member together with respect to safety. Therefore, in order to be a contributor to the competitive advantage, the culture of the organization requires a higher quality standard, and a high level of abilities to change (Hall, 1993).

This study is also supported by the contingency theory, this theory is of the view that in order to achieve superior performance there must be a congruence between organization variables, This perhaps is true in the sense that resources in an organization are mutually complementing one another and becomes stronger as a result of the synergy among them i.e. mutually beneficial (Fiske, 2000). In this regard the influence between one organizational variable and another depends on other factors like a firm's management systems. This study focuses on the relationship safety culture and safety performance of F&B manufacturing industries in Lagos Nigeria using safety management system as the mediator. Relating the above theories to this study, the safety culture is seen as the intangible resources which can result to superior performance in F&B manufacturing industries. However this influence is contingent on the safety management system implemented in the F&B firms in Lagos.

2.6 Summary

The recent chapter discusses the literature review related to safety culture, safety performance and safety management system. Also it reviews literature concerning relationship between the variables of the study and how the gap of the study was established. In addition the underpinning theory of the study was discussed and it was highlighted why Resource Base View theory and Contingency theory were suitable for the study. However the next chapter describes the methodological aspect of the study and the development of the hypothesis that is meant to be tested.

CHAPTER THREE
METHODOLOGY

3.1 Introduction

This chapter will describe the methodology for the study, including the development of hypothesis, research design, a description of the population and sample, the survey instruments, operationalization of the research variables, validity and reliability tests, and data collection and analysis.

3.2 Research Framework

Review of literature within the OSH domain indicates that organization's safety culture explain organization's safety performance. Fernandez-Muniz *et al*. (2007a), Hajmohammad and Vacchon (2014), McFadden *et al*. (2009) have made submissions in this respect. In line with their studies done at organizational level basis, this study also follows suit in that respect. But the focus will be in a different setting the F&B industries.

In addition to studying the relationship between organizational safety culture and organizational safety performance, this study also investigate the mediating role of safety management system on safety culture-safety performance. Prior researchers have indicated that safety management system development in an organization was as a result of the existence of a strong safety culture (Gibbons *et al*., 2005; Stolzer *et al*., 2008). Furthermore, empirically, safety management system has been noted to have prompted safety performance at the organizational level (Carrillo *et al*., 2009; Naveh, Katz-navon & Stern, 2011; Fernandez-muniz *et al*., 2007a, 2007b, 2009a).

To corroborate the above argument, Resource Based View (RBV) theory proposes that successful implementation of organizational resources which are rare, valuable and inimitable are capable of giving organizations competitive edge over their competitors thus enhancing superior performance an example of such resources is the culture of an organization (Barney, 1991), additionally Contingency theory (CT) stipulates that there must be congruency between organizational variables in order to achieve superior performance in this sense the influence of safety culture on safety performance depends on the safety management system employed by the organization. Putting the above argument into this study, it can be explained that F&B industries that implement a strong safety culture as its organization resource will result to a positive organization's safety performance. However, the influence of a firm's safety culture on its safety performance is contingent upon the implementation of a firm's safety management system.

Based on the review of literature and research problem and towards achieving the objectives of the study, the following research framework was developed. However, the research framework of this study is illustrated in figure 3.1. The framework illustrates that a positive safety culture which is the independent variable which refers to as the product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to and the style and proficiency of an organisation health and safety programme would result to a high safety performance outcome (dependent variable) in the organisation, which is an effort taken by an organization with the ultimate goal of reducing workplace accidents and injuries in a bid to minimize cost and how organizations make good utilization of its constrained assets to accomplish safety goals of the organization

(He, Xu & Fu, 2012). However, the study is of the view that a positive safety culture of an organisation can result to the implementation of a safety management system (mediating variable) which refers to group of activities that demonstrates the organization's strategies and tactics for attaining its safety objectives (Fang & Wu, 2013) which in turn result to a positive safety performance of the organisations.

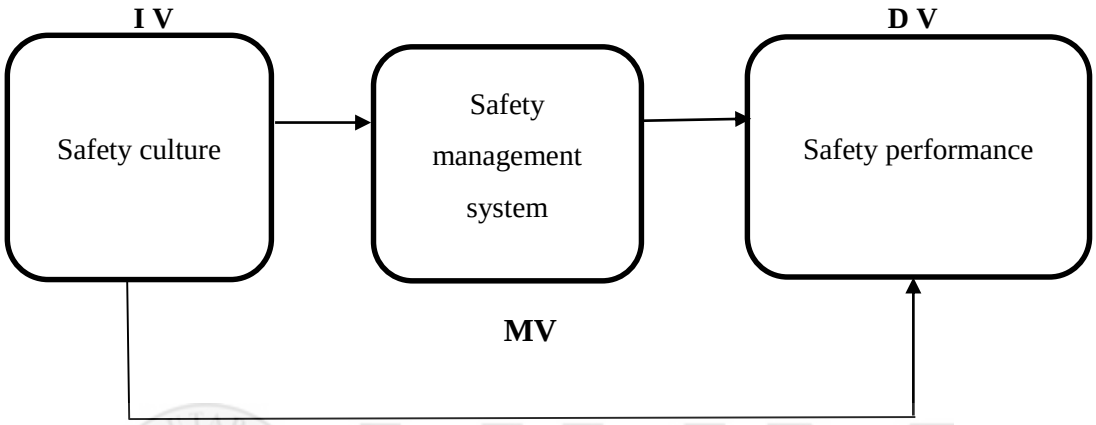

Figure 3.1
Research framework

3.3 Hypothesis Statement

This section presents the hypothesis of the study. Hypothesis is a formal proposition of an assumed logical relationship between two or more variables based on empirical testable theoretical frame work to find the expected solution to the problem statement (Sekaran & Bougie, 2010; Zikmund, Babin, Carr & Griffin, 2010). The hypothesis were formed from extant literature review above and based on research question and objective of this study.

Hypothesis 1: safety culture will have a positive relationship with safety performance.

Hypothesis 2: safety culture will have a positive relationship with safety management system.

Hypothesis 3: safety management system will have a positive relationship with safety performance**.**

A culture that encourages shared vision of an action, generally results to an internal urge and desire to initiate new ideas and accept change (Hamel and Prahalad, 2005), As posited in the literature review, it can be hypothetically presumed that high safety culture can result to an organization to implement a safety management system which can in turn improve the safety performance of the organization. To buttress this claim, researchers have acknowledged to it. For example, Wu *et al*. (2009) had identified that safety culture establishment is a key requisite in developing an SMS in an organization which consequently result to an increase in safety performance. Empirically, Hajmohammad and Vachon (2014) found practices and procedures that are embedded in the safety management system to have mediated the relationship between safety culture and safety performance at the organization level of analysis. Similarly, Fernandez-muniz *et al*. (2007b) found an SMS to have mediated the relationship between management commitment to safety and safety performance among firms in Spain. More so, McFadden *et al*. (2009) proposed a chain for safety outcome achievement by safety culture in health care organizations through safety initiative implementation, they emphasized that other management practices can serve as a mechanism between safety culture and safety outcome achievement in view of this and based on the earlier argument, the following hypotheses will be proposed:

Hypothesis 4: safety management system mediates the relationship between safety culture and safety performance.

3.4 Research Design

This study identified the degree to which safety management system influence the relationship between safety culture and safety performance of F & B Manufacturing organizations in Lagos state Nigeria. Since the hope from the industry is high that such a study can resolve the issue of the work place injuries, every step in the process is crucial to ensure the study is complete, reliable and more importantly applicable. In this case the general pattern in the research design, planning a sample, collecting data, analysing data and formulating the conclusions and preparing report (Zikmund, 2003).

This study employs quantitative, cross sectional survey due to the fact that it is economical and possesses a rapid turnaround in collection of data (Creswell, 2003). Anderson, Sweeney and Williams (2000) stated that a research approach that is quantitative can deduce reliability if one concept or idea is effective than the other alternative. In addition, quantitative multivariate methods allows researchers to control and measure variable. Leedy and Ormord (2005) posited that a research that is quantitative based is used to answer questions regarding relationship among measured variables with the aim of predicting, explaining and controlling phenomena. Thus a research design that is quantitative meets the need of this study as the research aims to provide valid and reliable outcomes. The settings for this study will be non-contrived. No manipulation of variables and outcomes. The study occurred in a real life setting and was conducted in the field with individuals responding to a questionnaire that asked participants to respond to the questions from their own personal experience.

3.5 Population and Sampling

A research population is a defined collection of individuals or objects known to have related characteristics (Zikmund, 2003). Population describes the total number of people, events or things of significance that the researcher wants to examine (Sekaran & Bougie, 2010). All individuals or objects within a certain population usually have a common, requisite characteristic or peculiarity (Sekaran & Bougie, 2010). Population has been regarded as one of the most important element in research. Castillo (2009) pointed out that; population could be categorized into two: target population and accessible population. Target population refers to the whole group of individuals or objects to which researchers are interested in generalizing the conclusions (it is also called theoretical population).

The accessible population on the other hand is the population in which the researchers can apply their conclusions. In other words, is a subset of the target population and is also known as the study population. It is from the accessible population that researchers draw their samples. Based on the above foundation, the target population for this study is all the F&B industries in Nigeria and the accessible population are the F&B industries in Lagos state Nigeria. F&B industries in Lagos were selected because Lagos has the largest number of F&B industries in Nigeria (Nwagu & Oni, 2015). Also with a population of over 24 million people, Lagos is the most highly populated and commercial region in the country with a total of 350 F&B manufacturing industry (African Business Seminar Report, 2014; Rasheed, Olanipekun & Adetunji, 2015). As such a total of 350 F&B manufacturing industries comprises the population of the research. These industries are situated across 7 major industrial estates in 7 Local government areas in Lagos state. The industrial estate

are; Ilupeju industrial estate, Epe industrial estate, Apapa industrial estate, Yaba industrial estate, Amuwo odofin industrial estate, Ibeji Lekki industrial estate, Ijanikin industrial estate.

3.6 Sample Size

Because it is basically impossible to collect all data from a population, selecting who partakes in a survey is an essential issue (Gill & Johnson, 2010). Subsequently, Sekaran (2003) stressed that a sample size between thirty (30) and fifty (50) is effective subject to the type of sampling design employed by the researcher and the research question being examined. In a similar vein, Hair, Black, Babin and Anderson (2010) argued that as a rule of thumb, with structural equation modelling (SEM), fifteen (15) respondents for each variable or dimension are sufficient to achieve normality in a model. Fink (2002) also noted that it is the number of unit required to get accurate findings. Additionally, Gay and Diehl (2002) suggested that the choosing of a suitable sample is a basic requirement for generalizability of findings. However, Pallant (2007) is of the opinion that the larger the sample size, the better the generalizability and that if the sample size is increased, errors are reduced (Zikmund *et al*., 2010). On a relational note, there exists some kind of consensus about what should constitute a sample size.

However, for the purpose of the present study the G* Power software analysis was used to determine the sample size since the sample frame might be indeterminate by the researcher. Based on this, and upon analysis of the G* Power, using the number of predictors of the study framework, the sample size for the study was 107. Consistent with Cohen (1977) recommendation, the following were used to

determine the sample size used for this study; effect size (f^2=0.15), significance alpha level ($\propto = 0.05$) desired statistical power (1-β=0.95) and total number of two predictors (SC & SMS) as seen in fig 3.2 results of the statistical test revealed that a sample size of 107 was appropriate for this study. In support of this, Roscoe (1975) is of the opinion that a sample size between 30 and 500 could be considered effective depending on the sampling design and research questions to be investigated. However, in multivariate researches, the sample size should be several times larger, preferably 10 times, than the variables of the study (Tabachnick, Fidell & Osterlind, 2001).

As mentioned before, in a multivariate analysis, the sample size should be several times larger than the number of variables. Because there are 3 variables in the present study, the required sample size should be at least 30 or more, and hence 107 subjects are considered. However, to be able to achieve an appreciable level of response rate, scholars suggested that the size of the population be added by at least 50% of the required sample this was suggested to be added by Bartlett, Kotrilik and Higgins (2001), Based on this argument, a sample size of 71 was added to the required sample frame of 107 which equalled 178. The next section reports the sampling technique employed in this study.

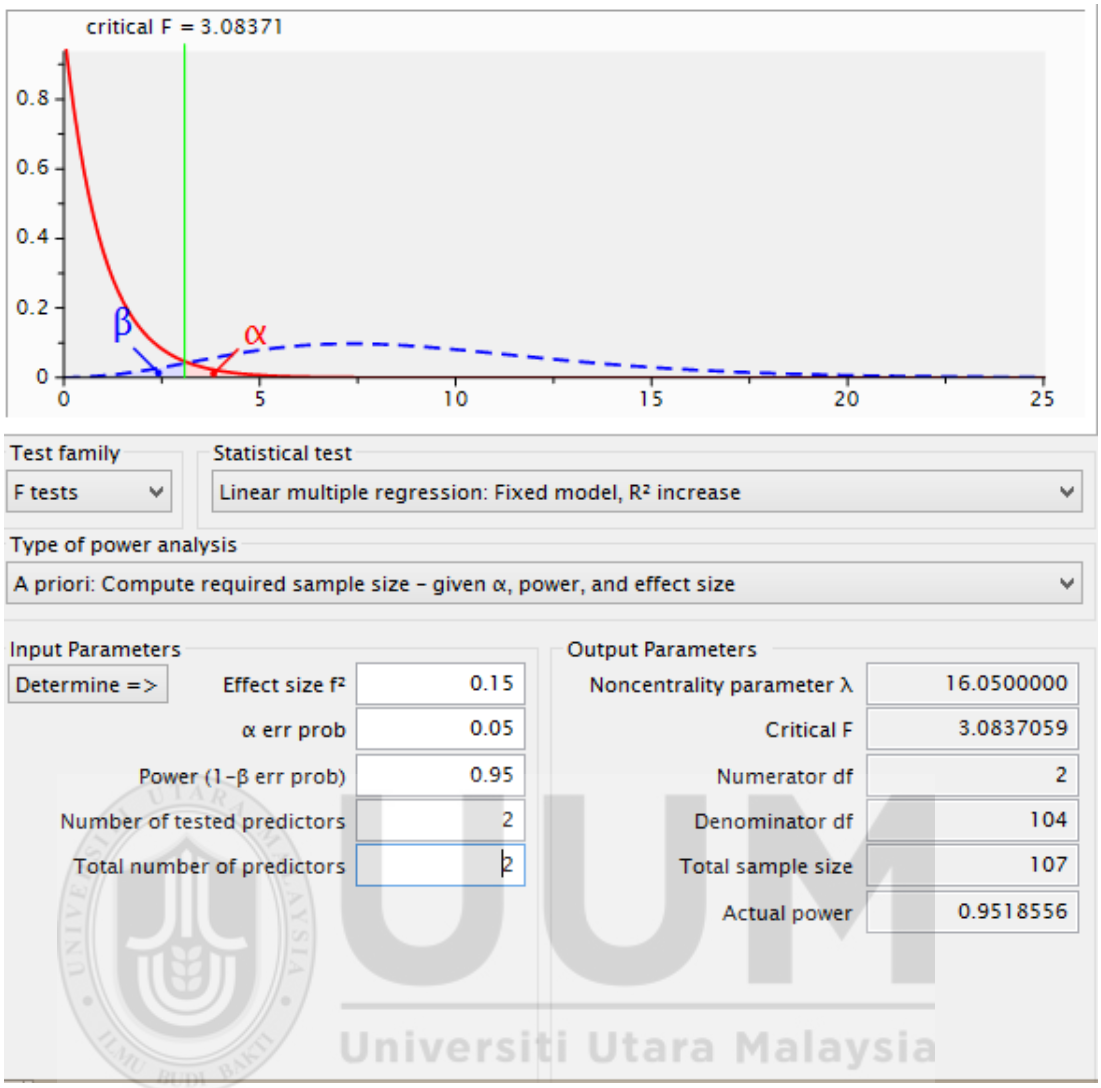

Figure 3.2 Power analysis for medium effect

3.7 **Sampling Technique**

Probability sampling technique was used in this research. The technique provides every individual an equal opportunity/chance of being selected as the sample object (Sekaran, 2003). One of the major benefits of this sampling technique is that there is no bias of the researcher against the choice of sample objects (Salkind, 2003). The technique is also regarded for high generalizability (Cavana, Dalahaye, & Sekaran, 2001). This study was aimed at drawing samples from seven various industrial estates, located in seven Local government area in Lagos hence, the need for

stratified random sampling. Stratified random sampling as the name implies, involves classifying sample elements into strata followed by selecting the elements from each stratum using simple random sampling procedure (Sekaran, 2003). Stratified random sampling involves categorizing research subjects into strata and selecting from each stratum using a simple random sampling procedure (Sekaran, 2003). Simple random sampling entails selecting a sample at random by the researcher from the sampling frame (Saunders *et al*., 2009). The random selection is achieved manually using random number table, or by computer, or through online number generator.

Stratified random sampling can either be proportionate or disproportionate. It is proportionate when the subjects are drawn from each stratum according to a specific percentage. It is disproportionate when the subjects are drawn from each stratum without regard to any specific percentage, but number of the elements contained in each stratum. This study adopted the disproportionate sampling procedure. The industrial estates were categorized into seven strata because they were located across seven different Local government areas in Lagos and also each local government is governed by different administrators. These estates are; Ilupeju industrial estate, Epe industrial estate, Apapa industrial estate, Yaba industrial estate, Amuwo odofin industrial estate, Ibeji Lekki industrial estate, Ijanikin industrial estate. Information about the population elements, and the actual sample (subjects) used in this study were provided in Table 3.1. The lists of the population of each of the seven industrial estates were obtained from the Manufacturing Association of Nigeria (MAN) zonal office in Lagos after approval was given from some top director of MAN management. The population of each industrial estate was; Ilupeju industrial estate

(97), Epe industrial estate (15), Apapa industrial estate (20), Yaba industrial estate (37), Amuwo odofin industrial estate (83), Ibeji Lekki industrial estate (70), Ijanikin industrial estate (28) respectively totalling 350 F&B manufacturing industries.

After collecting the list of the population elements, the prospective respondents (i.e., sampling frames), based on their designations, were fished out and listed down in separate places. The selection of the prospective respondents from the population frame was carefully done to ensure that only the targeted individuals (HSO) were selected. Simple random sampling was used for distribution of questionnaires to the actual subjects (sample). Random numbers were generated using the computer system. Specifically, Microsoft Excel software applying a mathematical formula {= rand ( )} was used to enable selection of the sample. The sample of each stratum was selected by dividing the total number of food and beverage industries in a particular industrial estate by the total number of F&B industry in Lagos (350), the result was then multiplied by the sample size (178).

Table 3.1 Disproportionately Drawn Samples

Industrial zones	No of F&B Industries	% of Stratum	Sample size
Ilipeju	97	27	49
Epe	15	4	8
Apapa	20	6	10
Yaba	37	9	19
Amuwo odofin	83	24	42
Ibeji	70	22	36
Ijanikin	28	8	14
Total	**350**	**100**	**178**

Source: MAN, (2015)

Stratified random sampling is appropriate for a study when a researcher is having a subdivided population that demands treating each subdivision as a stratum in order

to obtain estimates of known precision (Biemer & Lyberg, 2003; Sekaran, 2003). Furthermore, disproportionate stratified random sampling was used in this study because the technique is more suitable for situations where unequal variability is expected from some strata; where a stratum or some strata appear to be too small or too large (Cavana *et al*., 2001). It is observable from Table 3.1 that unequal variability is expected from; Ilupeju industrial estate, Epe industrial estate, Apapa industrial estate, Yaba industrial estate, Amuwo odofin industrial estate, Ibeji Lekki industrial estate, Ijanikin industrial estate, looking at their respective sample size of 49, 8, 10, 19, 42, 36 and 14.

3.8 Data Collection Procedure

Basically there are two sources of collecting data: primary and secondary data collection (Sekaran & Bougie, 2009). Primary data are collected directly from the field as intended by the present study. Following pilot testing, the researcher commenced with the real data collection, which took place from August 2015 to November 2015. The questionnaire was personally distributed to the chosen sample. The main reason for distributing the questionnaires in this manner is to enable the researcher explain the purpose and the benefits of the study and to encourage the participants to provide honest answers (Sekaran, 2003).

The respondents had been originally informed by telephone calls following their telephone contact from the frame obtained from MAN, requesting their willingness and interest to participate in the survey in which majority showed their enthusiasm to partake. After this, daily follow up calls were made, including physical contact with telephone calls in an effort to ensure timely completion and to trim down the chances of non-response bias that may possibly occur (Bryman & Bell, 2007).

In an effort to motivate them to take part, every respondents was offered a pen and a note book. This is consistent with the theory of reciprocity by Gouldner (1960) who argued that individuals ought to respond positively to individuals that have offered help to them. It is imperative to note that it is not irritating or problematic to motivate reciprocity by offering incentive to every singular participant that succumb to participate (Smith, Loftin, Murphy-Hill, Bird & Zimmermann, 2013). Subject to the above assertion, it is not unethical if the researcher offer rewards for those who have volunteer to partake.

In the course of interacting with the respondents they were offered the assurance that all the information provided was for academic purpose and will remain confidential. Furthermore, putting into consideration differences in individual learning and the busy nature of the managers in these industries, those respondents who showed readiness to immediately fill and return the questionnaire were given adequate time between 40 to 60 minutes, while others were given longer period of four working days to fill the questionnaire subject to their approval.

3.9 Unit of Analysis

According to Sekaran and Bougie (2010) and Zikmund *et al.* (2010), researchers must explain their unit of analysis to find a solution to the problem statement. The unit of analysis refers to the level of aggregation of the data to be collected during the data analysis phase. The unit of analysis is the unit used by a researcher in the measurement of variables (Sekaran, 2003). The unit of analysis may be at the individual, group, business unit, or organizational level. This study, in an effort to understand how safety performance can be improved, investigates the role of safety

culture and safety management system as perceived by head of safety officers (HSO) of each organization. The Nigeria national policy on occupational safety and health in conjunction with both The Nigerian Agency for Food Drug Administration and Control (NAFDAC) and the Nigerian institute of safety professionals (NISP) makes it mandatory for all food and beverage manufacturing industries to have their head of quality assurance managers take up Head of safety officers positions, these personnel are trained and certified by Nigerian Institute of Safety Professionals (NISP) and represents each of their various organization for this study. Thus, the level of analysis is organizational-based, which means that the data collected from the HSO'S of each organization will represent their respective organization.

3.10 Instrumentation

This study employs survey questionnaire as the instrument of data collection. Therefore, it is important to carefully design the items of the questionnaire with due simplicity in view of reflecting the dimensions used in measuring the constructs of the research model. It should be noted that items of the questionnaires questions are designed based on conceptual explanation from the literature adapted or adopted. This is justifiable according to Zikmund, *et al*. (2010). Items addressing questions to measure the company's safety performance, safety culture, safety management system are into parts of the questionnaire. The development of the survey instruments is guided by relevant literatures.

3.11 Research Questionnaire

Using questionnaires in survey researches is one aspect while structuring the questionnaire is another important aspect (Organ *et al*., 2006). Perhaps, this is true as there are lot of challenges that may adversely tamper the validity of the data and the

rate of responses as well (Hair *et al*., 2007). In order to get rid of those challenges, this study followed the suggestions offered by Organ *et al*. (2006) and Gupta (2006) and took different precautions such as abiding by the research ethics of protecting the respondent's identity, appropriate and unambiguous scaling of items and separating items according to constructs. The following sections discuss the scales of the questionnaire.

3.11.1 Scale of the Questionnaire

There are series of patterns of designing a questionnaire but depends on why the scholars believe that patterns to be used should be common and universally acceptable. For example, statements used in the questionnaire must be easily understood by the respondents (Oppenheim, 1992; Warwick & Lininger, 1975); the statements in the questionnaire should not be misleading the respondents (Parten, 1950). Also, researchers should try the most effective way or manner to maximize the items validity, lessen the stress of answering the questions from respondents and be very economical in terms of cost of data collection. On this basis, this study therefore used Likert scale type of questionnaire.

Likert scale is a psychometric type of scale used in instruments to tap respondents extent of agreement or otherwise in a given statement. Likert scale was originally 5-point scale that ranges from strongly disagrees to strongly agree with neither disagree nor agree in between. Many researchers will prefer to use longer scales by adding options (i.e a 7 point 9-point or 10-point scales). Other researchers rather use an even number scale like 4-point and 6 point scales. According to Malhotra (2004) longer scales allows the respondents to independently choose the options without been compelled. Also Martin and Polivka, (1995) mentioned that respondents prefer

to be given a no opinion or neutral for them to feel free from been restricted to researcher's choice. From another perspective, Malhotra, and Peterson (2006) and Robert (2009) hold the opinion that a no opinion or neutral option tempers with the value of the data which is perhaps very obvious in various researches conducted across the globe. The participants are quietly stimulated to think over a given item before they finally make decisions.

In this study, the selection of an odd scale particularly the 5-point likert scale is appropriate because it increases the reliability of the data as well as lessen social desirability bias (Krosnick, 1999). Respondents were asked to respond to the items by indicating their level of agreement and satisfaction using five point Likert scale. In addition, five point scale was used because the scale can make compromise between the conflicting goals of offering enough choice since only two or three options means measuring only direction rather than also strength of opinion and making things manageable for respondents.

3.11.2 Layout of the Questionnaire

The questionnaires were prepared in a booklet-type form. The questionnaire had 46 items, which were presented in four main sections, namely, demographic information, safety culture, safety management system and safety performance. According to Sudman and Bradburn (1982), a booklet-type questionnaire prevents pages from being lost or misplaced. In addition, the respondent can easily turn the pages. The respondents were asked to tick the appropriate response for questions that are related to their profile. In a highly structured questionnaire, a cover letter must be presented on the first page (Sudman & Bradburnm, 1982). The cover letter helps ensure that the respondents provide appropriate answers by explaining the

importance and the objectives of the research, which is in the context of safety performance in Lagos F&B industry (see Appendix A)

Similarly, the questions were presented in English because it serves as the general acceptable channel of communication in Nigeria. Head of safety officers were deemed fit to answer the questionnaire. Head of safety officers were chosen because they are expected to have information about specific practices and procedures being carried out in the organisation. The safety officers are also expected to have access to all kinds' information concerning potential dangers to health and safety of the workers in the organization. Furthermore, these personnel occupy an intermediate position between management and employees as such it can be concluded that information gotten from such personnel would be less biases and more accurate.

3.12 Measurement of variables

Measurement of variables is a tool or mechanism for describing specific properties of the variables of interest in a study by assigning numbers in a reliable and valid manner (Sekaran & Bougie, 2010; Zikmund *et al*., 2010). This section presents the full detail on the measurement variable and the measurement scale.

3.12.1 Operationalization of Safety Culture

This study defines a positive organization safety culture as a situation where managers show commitment to safety, reinforce safety as a priority of the organization and safety rules and procedures are adhered to by the employees who in turn partake in improvement and establishment of these rules (Hajmohammad & Vachon, 2014). This definition is in accordance with those employed by McFadden *et al*. (2009), Hajmohammad and Vachon (20014). To measure safety culture a total

of seven items were used which was adopted from a safety climate survey by Sexton and Thomas (2003). Similar to McFadden *et al*. (2009) and Hajmohammad and Vachon (2014) approach, this study incorporated only seven out of the original 19 items which measured organizational level safety culture and were most closely associated with the definition of safety culture. A five-point Likert scale that ranged from 1 (strongly disagree) to 5 (strongly agree) was employed to measure all items. Studies like Hajmohammad and Vachon (2014) and McFadden *et al*. (2009) reported reliability of 0.89 and 0.911 which is within acceptable limits as suggested by Nunnally (1978) and Hair *et al*. (1998).

3.12.2 Operationalization of Safety Management System

In the review of literature in the previous studies, as shown in chapter 2 of this study, It was understood that there are discrepancies regarding the way the constructs of SMS is measured. Safety management system will be operationalized as sets of persons, resources, procedures and policies which act together in an organised manner so as to ease damage and losses caused in the process and in the place of work. Safety management system was measured as a second order construct using six dimensions in the first order adopted from Fernandez-Muniz *et al*. (2007a). These dimensions have 29 items which were reframed and modified so as to suit the context of this study. Items covered a wide range of safety management system dimensions which includes planning, policy, training in safety, communication, incentives, control. All dimensions were reported to have composite reliability ranging from 0.87-0.96 which is recommended by Nunnaly (1978). All of this items would be measured using a 5 point likert scale and will be coded on a scale of

1(strongly disagree) to 5(strongly agree). The details of the dimensions are discussed one after the other.

a) **Safety Policy:** This refers to the presence of a written affirmation which reflects how committed organizations are to safety and also its incorporation with the firm's policy of safety. There are three items for this measurement**.**

b) **Incentives:** This refers to the degree by which organizations and firms encourage its employees to take part in safety related activities. Four items measure this construct.

c) **Training:** This refers to the presence of training plans used to enhance the competence of employees as well as their safety skills. Five items were used to measure this concept.

d) **Communication:** This refers to how information on risk that are possible in the workplace are transferred to workers and ideal ways to fight against them. There are three items for this measurement.

e) **Planning:** Two variables measures this construct which are preventive planning and emergency response. The former refers to the presence of risk evaluating procedures and establishing the needed measures of safety to avoid accidents. Three items measure this construct. While the later refers to the presence of a plan which is organized in the event of emergency. Four items measures this concept.

f) **Control:** Two variable measures this concept, which are internal control and benchmarking. The later refers to the presence of mechanisms to substantiate the degree to which goals are achieved and also the extent to compliance with the procedures of work. Five items measures this. While benchmarking is the

degree by which firms liken its actions of safety and performance to those of other firms. There are two items for this measurement.

3.12.3 Operationalization of Safety Performance

In this research safety performance will be operationalized as an organizations level of satisfaction with; injuries of employees, materials being damaged, how motivated employees are, and absenteeism at the workplace (Fernandez-Muniz *et al*., 2007a). The level of safety performance is based on the respondent's perceptions in the organization. A high level of safety performance in an organization is believed to provide better and safer working conditions to workers. In this study safety performance was measured by using items adopted from Fernandez-muniz *et al*. (2007a). Safety performance was measured subjectively by 4 items using a 5point likert scale ranging from 1 (extremely dissatisfied) to 5 (extremely satisfied). Studies like Fernandez-Muniz *et al*. (2007) reported reliability of 0.746 which is within acceptable limits as suggested by Nunnally (1978). The scale items are listed in the Table 3.2 below.

Table 3.2 Summary of measurement and scale

Construct	Items	Scale	Sources
safety culture	7 items	5 point	Sexton and Thomas (2003)
safety management system	29 items	5 point	Fernandez-muniz *et al*. (2007a)
safety performance	4 items	5point	Fernandez-muniz *et al*. (2007a)

3.13 Content and Face Validity

Content validity is conducted to ensure that the dimensions and items under a construct are doing their job perfectly which means they measure the construct with utmost adequacy and representativeness. The researcher of this study conducting a pre-test consulted five experts from the field and sought their opinions about the measures‘ appropriateness and representativeness in line with suggestions made by Hair *et al*. (2010) and Sekaran (2003). They were also requested to check whether there is any repetition, or there is any over or under representation of measures. Some of the expert‘s remarks included focusing on wording the items in a reflective manner instead of formative. As such, the remarks offered by these experts, in alignment with the theoretical considerations were considered for improvising the instrument.

Furthermore, Sekaran (2003) had asserted, face validity indicates that the items that are intended to measure a concept, do on the face of it look like they measure the concept. Ideally, to conduct face validity, the instrument is shown to some target respondents and their opinions are sought. This study approached six potential respondents for this purpose and ask for their suggestions about appropriateness of item statements and their wordings, instructions, general formatting, understand ability of scales leading to any kind of possible difficulty in answering (as interval scales do not contain labelling throughout) and overall completeness of the instrument. Their suggestions were taken into consideration for finalizing the questionnaire for conducting the pilot test.

3.14 Pilot Test

It is important for a study to carry out a pilot test so as to uncover draw back if any and thus advance to address these problems before proceeding with larger scale study (Alam, 2009; Doug, Burton, Cuthill, Festing, Hutton & Playle, 2006). Particularly, when the instrument used has been previously used in a different context and respondents from original studies conducted (Hair, Black, Babin, Anderson & Tatham, 2006).

In lieu of the above argument, a pilot study was carried out to retest the instruments. According to Cooper and Schindler (2008) and Emory and Cooper (1991), the appropriate sample size of the pilot study is approximately 25 to 100 respondents. In the present study, before the final questionnaire was administered, a pilot test was conducted among 30 F & B manufacturing companies in Lagos state. The distribution and the collection of the questionnaires were personally administered by the researcher. All 30 questionnaires were returned, which represented a 100% response rate. The intention of the pilot study was to obtain response on the interval scale items only (safety culture, safety management system and safety performance). The interval scale measure internal consistency was done on 30 questionnaires through reliability test with the aid of cronbach alpha. The essence of the pilot test was to determine the reliability of the instrument. The internal consistency method was used to achieve reliability because it measures the extent to which the items in the scale measures a similar underlying attribute in terms of cronbach coefficient alpha which is the most accepted and most commonly known (Cavana *et al.*, 2001; Sekaran, 2003).

In addition as suggested by Nunally (1978) an internal reliability (cronbach alpha) or composite reliability of 0.70 or above is considered appropriate for showing strong internal consistency of well-known scales. Although Cronbach alpha value of 0.60 or

above can be considered as significant as suggested by Hair *et al*. (1998). Also Tuckman (1999) also noted that a Cronbach alpha value of 0.50 is also accepted when the researcher is conducting an attitudes assessment. In view of the above propositions, an internal reliability that is from 0.50 and above is acceptable in light of the present study. The Statistical Package for Social Science (SPSS) version 18 was used to test the Cronbach's alpha of the measurement instrument. Table 3.3 shows the reliability test results.

Table 3.3
Reliability Test Results of the Measurement Instrument

Variables	No. of items	Cronbach's alpha
Safety Culture	7	0.854
Safety Management System		
Policy	3	0.823
Incentives	4	0.851
Training	5	0.866
Communication	3	0.792
Preventive planning	3	0.770
Emergency response	4	0.794
Internal control	5	0.852
Benchmarking	2	0.802
Safety Performance	4	0.862

Table 3.3 shows that the reliability estimates ranged from 0.77 to 0.866, which were greater than the required 0.70 criterion that is generally regarded as sufficient for empirical research (Nunnally, 1978).Therefore, these items were summated to represent the study variable for subsequent analyses.

3.15 Data Analysis

On completion of data collection procedure, preliminary analysis were carried out. They include, data coding, missing data treatment, response bias, data cleaning and screening, and then data entering. Data was first entered in Microsoft Excel Spread

sheet and then exported to the SPSS version 19 for the preliminary analyses. The SPSS version 19 was also used to describe the sample of study (respondent's socio-demographic variables) this was succeeded by the use of the Partial Least Squares (PLS) path modelling technique for reliability and factorial validity assessment of the study variables. The PLS was used for the main data analysis phase of this study because Chin (1998a) suggested that it is a good tool for theory confirmation. A more elaborate explanation on why the PLS path modelling technique was used for this study will be further explained in the next chapter.

3.15.1 Goodness of Measure

Validity and reliability are the two foremost criteria used for testing goodness of measures. Reliability shows how consistently a measuring instrument measures whatever theory it intends to measure. Reliability represents the internal consistency which shows the homogeneity of items in the measure that is measuring the latent variable (Schindler & Cooper, 2003). Also, the Cronbach's Alpha is recommended when measuring the internal consistency of a set of items (Sekaran, 2003) and is the most frequently used reliability coefficients. A reliability analysis was conducted on the scales used to measure safety culture, safety management system. Also the scales on the dependent variable (safety performance) were also tested. Meanwhile, Nunally's (1978) suggestion of a lower Cronbach's Alpha limit of 0.70 is mostly accepted by researchers. Nonetheless, for a study that is exploratory in nature, Hair *et al* (1998) is of the position that a Cronbach Alpha value of 0.60 or above is also considered as significant. Items of each construct which were found to be reliable were used for further analysis. In addition to the above, validity is a test of how well

an instrument that is developed measures the particular concept it is intended to measure (Sekaran & Bougie, 2010).

3.15.2 Convergent Validity

After determining the construct validity of the items, next was the convergent validity. It is the degree to which several items used in measuring the same concept agrees. As suggested by Hair *et al.* (2010), factor loadings, composite reliability and average variable extracted were used to measure convergent validity. The loadings will also be as recommended by Hair *et al.* (2010).

3.15.3 Discriminant Validity

The discriminant validity is a test that measures the degree to which items differentiate among constructs or measure divergent concepts. This was measured by scrutinizing the correlations between the measures of possibly overlapping constructs. It is expected that items should load more strongly on their own constructs in the model, and the average variance shared between each construct and its measures should be greater than the variance shared between the construct and other constructs (Compeau, Higgins, & Huff, 1999). Upon completion of the above, testing of the hypotheses formulated for this study will be done. Other statistical analyses were also to be conducted thereafter.

3.16 Summary

This chapter has vividly stated the method used for this study, by presenting the research design, population and sampling design, operational definition of measurement, layout of the questionnaire and pilot testing. Similarly, this chapter outlined the procedure in the collection of data. Finally this chapter has also

explained the technique in the analysis of data. This is important in order to direct the reviewer about the progress of the study and why the researcher adopted each of the techniques listed above in analysing data. Subject to data collection, the next chapter will show the outcome of the validity and reliability test conducted on the instrument use for this study. The result of the descriptive characteristic of respondents will also be discussed in the next chapter. The test as well as the results of the hypothesis for this study will also be represented in the next chapter.

CHAPTER FOUR
ANALYSIS AND RESULTS

4.1 Introduction

Chapter three dealt with methodology and the aim of this chapter is to show a comprehensive analysis of the results of the data gathered when the responses of the respondents were compiled. The response rate was analysed i.e. the demographic report, outcome of the survey analysis, including the preliminary analysis and data screening analysis. The effectiveness of the measure that was ascertained through validity and reliability measurement analysis was presented; path relationship analyses as well as summary was also discussed in this chapter.

4.2 Survey Response Analyses

Having analysed the descriptively the demographic variables, the raw data collected for this study was subjected to an examination which was in line with opinions of Cooper and Schindler (2007) and Zikmund (2005) who believed that should be done to be able to ascertain the completeness, accuracy, consistency and eligibility of the respondents. Based on that, this study was able to discover that eight (8) questionnaires were not eligible to be considered. This was because six (6) of the questionnaires left a page or two unanswered and two (2) of the questionnaires have over 52% of their responses in multiple answers. Hence, the remaining one hundred and twenty six (126) questionnaires were certified to be complete, accurate eligible and consistent therefore included in the analysis.

4.2.1 Measurement of Response Rate

After the questionnaire checking and editing, the researcher went ahead to confirm how many of the questionnaires were returned. In conformity with the stipulated data collection procedures, 178 questionnaires were distributed to the respondents face to face and series of reminders were sent via e-mails and phone calls also, a technique which is evidently proven to be effective as discussed in Yim *et al* (2005). The respondents returned 75% of the questionnaires out of which only 126 were valid; the other 8 were rejected on grounds of one fault or the other as mentioned in the preceding section 4.2. Table 4.1 shows the distribution of the questionnaires and the total number of responses by each industrial estate.

Table 4.1
Response Rate of the Questionnaire

Response	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Frequency**
No of Questionnaire	49	8	10	19	42	36	14	178
Questionnaire returned	40	5	8	12	37	22	10	134
Questionnaires not valid	3	1	1	0	2	1	0	8
Questionnaires Valid	37	4	7	12	35	21	10	126
Questionnaires not returned	9	3	2	7	5	14	4	44
Response rate	82%	63%	80%	63%	88%	61%	71%	75%
Valid response rate	93%	50%	70%	63%	83%	58%	71%	71%

Note: Designed for this study (**A**=Ilupeju industrial estate, **B**=Epe industrial estate, **C**=Apapa industrial estate, **D**=Yaba industrial estate, **E**=Amuwo odofin industrial estate, **F**=Ibeji Lekki industrial estate, **G**=Ijanikin industrial estate.)

The data collection took up to three and half months (i.e. from August 2015 to Nov 2015). The collected data was keyed into Micro soft excel spread sheet then to SPSS version 18 for analysis and later imported into SmartPLS 2.0 M3 (Ringle *et al*., 2005) for further analysis. As earlier stated SPSS was used for the test of non-response bias, descriptive test, preliminary data screening. Validity and reliability, measurement model and structural model analysis and test of mediation were undertaken in SmartPLS 2.0 M3 (Ringle *et al*., 2005).

4.3 Preliminary Analysis

This section provides a detail discussion on the preliminary tests using SPSS before the evaluations of measurement and structural models. The preliminary analyses include data screening, missing data detection and treatment. In 4.3.1 that followed, data screening was discussed.

4.3.1 Data Screening

The importance of data screening in any form of data analysis especially quantitative research cannot be underpinned because it provides a very solid groundwork for attainment of a significant result. The quality of the output and analysis in spite of its enormous burden, as pointed out by Hair *et al.* (2010) are dependent upon the quality of preliminary data screening. Needless to say here that, ignoring the potentiality of data screening would invariably results to poor quality of output and analysis. Although, Tabachnick and Fidell (2007) argued that data quality could be ensured by mere proof reading, this approach may be very tasking when dealing with large set of data. This study began with the detection of missing data in the section 4.3.2.

4.3.2 Missing Data

Missing data has become a serious issue of concern and perhaps very popular in virtually every research. The rate at which missing data occur in a research vary so also is the magnitude of its impact; for instance if it is below 1%, there isn‘t going to be any problem, if it falls below 5% it is bearable and could be managed, but if it reaches 15%, it calls for a drastic measure using a very sophisticated technique to resolve it (Acuna & Rodriguez, 2004). Considering the argument put forward by Magnani (2004) regarding the techniques of handling missing data, they are mainly zoned into two different categories of preplacing methods and embedded methods. Pre-replacing methods as the name implies are strategies employed to tackle missing data issues at the initial stage of data preparation while the embedded methods are used much later especially at the data mining stage. Despite the fact that the methods for dealing with missing data vary, there is no one best way, they all are applicable depending on the nature of analysis, cost and perhaps time constraint. As far as this study is concerned however, the missing data was treated by replacing the values with the mean of the k nearest neighbours this was chosen because of its unique ability to replace the missing values in terms of both the quantitative and qualitative attributes (Liu, *et al*., 2004).

4.3.3 Test for Non Response Bias

Having confirmed the valid returned questionnaires, this study went ahead to check the element of non-response bias. It has been widely expressed that element of non-response are hardly avoidable in researches, they appear in different forms (such as demographic, personality, motivation and behaviour) and in varying degrees. In any form and at any degree those non response biases occur in researches as pointed out

by Malhotra *et al.* (2006) they might affect the result. The time frame within which respondents respond to questions was categorized into two groups i.e. early response and late response; this is perhaps in line with the argument posed by Churchill and Brown (2004) and Malhotra *et al.* (2004) that late response to items by respondents is an indication of their unwillingness to respond without been influenced by the researcher‘s follow up. As a result of that, this study used independent t-test analysis to examine whether any kind of discrepancy exists between the two groups by comparing the means of the two groups. Based on the returned questionnaires, this study was able to establish that one hundred and eight (108) responses were early responses and eighteen (18) responses were late. The categorization was done based on how quick the questionnaires were filled and returned, i.e. the questionnaires that were retrieved a week or ten days after they were administered were classified as late response and the ones retrieved within a week were classified as early response. The parameter used to check non response bias in this study was based on the study variables where an independent t-test conducted by the researcher revealed that there were no significant differences between the variables. The confirmation of the explanation above could be deduced from Table 4.2.

The results of t-test for equality of means presented in Table 4.2 shows that there is no significant difference (p-value at 0.05 significance level) between the two groups for all measurement variables. Based on this, this study holds that there is no non-response bias that could affect the generalization of the findings, therefore, all the one hundred and twenty six (126) responses were utilized in the data analysis.

Table 4.2
Test of Non Response Bias

	Levene's Test for equality of variances		T-test for equality of means		
Construct	**F**	**Sig.**	**t**	**df**	**Sig. (2-tailed)**
Safety Culture	0.097	0.756	1.049	124	0.296
			1.023	22.609	0.317
Safety performance	1.399	0.239	-1.04	124	0.3
			-1.275	28.15	0.213
Policy	0.242	0.623	0.543	124	0.588
			0.593	24.826	0.559
Incentive	0.089	0.766	-0.744	124	0.458
			-0.703	22.124	0.489
Training	0.893	0.347	-0.988	124	0.325
			-1.053	24.278	0.303
communication	0.355	0.552	-1.174	124	0.243
			-1.114	22.177	0.277
P planning	1.112	0.294	-1.201	124	0.232
			-1.488	28.527	0.148
E response	0.091	0.763	-0.356	124	0.722
			-0.328	21.726	0.746
Int. control	0.694	0.406	-0.81	124	0.419
			-0.869	24.406	0.394
Bench Mark	0.033	0.856	-0.593	124	0.554
			-0.569	22.356	0.575

Note: no issues of non-response bias that could affect the analysis

4.3.4 Data Coding

Having confirmed that there is no problem of non-response bias, the researcher embarked on data coding. From the opinion of Churchill (1999), categorization of data coding is mainly two. The first category assumes that the items should emerge to conform to the constructs in the study i.e. every construct should have its own different section that asks questions about it and secondly, the code number be assigned to each construct for easy identification and hitch free analysis. This study followed the argument provided by Churchill (1999) above and arranged the questions in conformity with the constructs. Again, the variables used in this study were coded as follows shown in Table 4.3

Table 4.3
Variable Coding

Variable	Code
Safety culture	SC
Safety management system	SMS
Safety performance	SP

Note: All the variables used in this research were coded as shown in this table

4.4 Descriptive Statistics of Demographic Characteristics of Participants

This section describes the demographic factors of the participants who participated in the study. Prior to reporting the main findings of the survey, the demographic characteristics of the participants must be identified. The detection of out-of-range values can be achieved using descriptive analysis and the frequency method (Dillon, Madden, & Firtle, 1990). These methods were employed to provide an overall assessment of the population of the respondents in Lagos F&B industries. Demographic characteristics include job positions, gender, number of employees of organizations, education qualification and years of experience. Table 4.4 revealed that more of the respondents were female (54%) while male had 46%.

In terms of job position, the statistics revealed that most of the respondents were senior personnel in the organization this is reflected in 91.3% of the total, while 8.7% were middle positioned staff in the organization. For years of experience, Table 4.4 revealed that respondents who had job experience between seven to nine years were more as 41.3% of the population represented this group of respondents, 34.9% had job experience between four to six years, 18.3% of the respondents had

above 10years job experience while 5.6% of the population were respondents whose years of job experience was below three.

As regards qualification, 61.1% had degree qualification which represented the most of this group, 15.9% had Masters degree qualifications, while 14.3% had Higher National Diploma (HND), and 8.7% had PhD. In terms of number of employees, 40.5% of the F&B industries had 500 to 999 employees, 34.1% had employees from 1000 and above while 25.4% had within 250 to 499 employees. As regards ownership, descriptive statistics revealed that privately owned F&B industries were 28.6% while 71.4% were multinational owned.

Table 4.4
Descriptive Statistics of Participants' Demographic Factors

Demographic	**Characteristics**	**Frequency**	**Percentage %**
Job position	Junior	0	0
	Middle	11	8.7
	Senior	115	91.3
Gender	Male	58	46
	Female	68	54
Years of experience	Below 3	7	5.6
	4 to 6	44	34.9
	7 to 9	52	41.3
	Above 10	23	18.3
No. of employees	250 to 499	32	25.4
	500 to 999	51	40.5
	1000 and above	43	34.1
Qualification	HND	18	14.3
	Degree	77	61.1
	MSc	20	15.9
	PhD	11	8.7
Ownership	Private	36	28.6
	Multinational	90	71.4

4.4.1 Descriptive Analysis

A descriptive inquiry was done in this study basically to summarize and explain the main features of the data set from the viewpoint of survey respondents on every variable/dimensions considered in the study. It was conducted mainly due to the fact that the descriptive statistics of dimensions explained through mean, standard deviation, variance, etc. collectively seek to offer a researcher a general view regarding how the survey respondents have responded to the survey instrument used in the study (Sekaran & Bougie, 2010

Table 4.5
Descriptive Statistics of the Study Variables

Construct	N	Minimum	Maximum	Mean	Std. Deviation
Safety Culture	126	1.00	5.00	3.6947	.51573
Safety Performance	126	1.00	5.00	3.8759	.90528
Policy	126	1.00	5.00	3.9492	.85279
Incentives	126	1.00	5.00	3.7978	.73467
Training	126	1.00	5.00	3.9825	.70324
Communication	126	1.00	5.00	3.9203	.74535
P. planning	126	1.00	5.00	3.8466	.71057
E. response	126	1.00	5.00	3.8828	.77709
Int. control	126	1.00	5.00	3.8903	.74476
Bench Marking	126	1.00	5.00	3.8860	.93651

The result of the descriptive statistics shows that all construct possess mean ranging from 3.69 - 3.94 which were well above the average value. The standard deviation ranged from 0.51 - 0.936 which is considered acceptable. As such, it can be established that on the basis of responses i.e. opinions of respondents collected in this study explicitly reflect to an acceptable and satisfactory level of implementation with regard to all dimensions.

4.5 Multicolinearity Test

It is highly recommended, to conduct a test of Multicolinearity among variables before the beginning of testing the proposed model (Hair el., 2010). It indicates the existence of relapse in the correlation matrix where the independent variable is high and significantly correlated with another independent variable. Also, the revelation of Multicolinearity can be revealed when the correlation value is more than 0.90 (Hair et al., 2010). The test of Multicolinearity is examined by assessing the variance inflation factor (VIF) and the tolerance value also.

Furthermore, the value is the amount of variability of the chosen independent variable which is explained by other independent variables whereas the tolerance is simply the inverse of VIF (Hair et al., 2010). The VIF cut-off points are 10 or 5 (Hair et al., 2011; Lahiri & Kedia, 2009) while for tolerance values the cut off is 0.2 and above (Hair et., 2011), this shows that VIF closer to 1.00 represents little or no Multicolinearity.

Table 4.6 indicates that the model highlights Collinearity statistics for the independent variables. In addition, the correlation between variables was below 0.9 which shows that there is no issue in Multicolinearity. Similarly, VIF values range between 1.99 - 4.8, while tolerance values range was between 0.2 - 0.44. Therefore, from the results reported, there is no violation of Multicolinearity assumption.

Table 4.6
Multicolinearity Test

Model		Collinearity Statistics	
		Tolerance	VIF
	Safety Culture	.331	3.017
	Policy	.372	2.692
	Incentives	.404	2.478
	Training	.373	2.681
	Communication	.447	2.238
	Pre - planning	.501	1.995
	E. response	.353	2.833
	Int. control	.207	4.824
	Bench Mark	.338	2.963

4.6 Data Analysis

For the main analyses, the Partial Least Squares (PLS) path modelling technique approach was employed. The researcher chose to use SmartPLS path modelling technique due to the following reasons that have been ascribed by researchers in the behavioural sciences: Firstly, the technique is most appropriate when assumptions of multivariate normality and interval scaled data cannot be made, and when the researcher is primarily concerned with prediction of the dependent variable (Hulland, 1999). Secondly, the PLS parameter estimates better reveal the strength and direction of the relationship among variables compared to correlation coefficients. It also avoids parameters estimation biases common in regression analysis (Calantone, Graham, & Mintu-Wimsatt, 2007). Thirdly, the PLS is most flexible when measuring constructs (Falk & Miller, 1992; Graham, Mintu, & Rodgers, 1994) and the relationships are modelled simultaneously, eliminating concerns about multi collinearity (Inkpen & Birkenshaw, 1994). Fourthly, it is more appropriate for a study of an exploratory nature (Lee, Yang & Graham, 2006) and is very suitable for a non-parametric analysis (Chin & Newsted, 1999).

4.6.1 Measurement Model (Outer Model) Evaluation

In making use of Smart PLS, the measurement model (outer model) was examined in the first step to determine the correctness of loadings of the indicators (items) on the theoretically devised respective constructs. Outer model is evaluated in order to confirm that items measure the construct they are to measure, consequently ascertaining that the instrument used is reliable. Moreover, the purpose of outer model is to diagnose the relationship between observable and underlying constructs. As such, it becomes important to trace appropriate indicators for ensuring a proper operationalization of a particular construct (Churchill, 1979) which further necessitates estimation of construct validity which can be justified in SEM through content validity, convergent validity, and discriminant validity (Hair *et al*., 2010).

4.6.1.1 Content Validity

Content validity signifies the appropriateness and ability of items generated for a construct in measuring the main concept under study (Hair *et al*., 2010). Moreover, Bohrnstedt (1970) and Vinzi, Lauro, and Tenenhaus (2003) suggest using Principal Component Analysis (PCA) method for assessing the indicators 'underlying factor structure. Smart PLS is based on PCA method as such, the factor loadings were created for all indicators in Smart PLS. It is a basic requirement that all indicators must exhibit highest loading values on their respective constructs than that on other constructs. Theoretically it was already ensured through a comprehensive literature review that indicators belong to their respective constructs. However, to support it statistically, factor analysis was performed which is shown in Table 4.7. It can be seen in Table 4.7 that the loadings of indicators are highest on their respective constructs as compared to their loadings on other constructs, and they consist of

significantly and acceptably high loadings. These two lead to confirmation of content validity.

Table 4.7 seeks to show the loadings of all items pertaining to each of the constructs taken in this study which includes: safety culture, safety performance and safety management system (policy, incentives, training, communication, internal control, preventive planning, emergency response and benchmarking)

In line with Chan (2003), the item loading can be termed as poor if is less than 0.30, fair if it is in range of 0.31 to 0.50, moderate if it is between 0.51 to 0.60, moderately strong if it is in range of 0.61 to 0.80, and very strong if it is between 0.81 to 1 (Krause, Gathmann, & Gorschewsky, 2008). It was further supported that the item loading should be over 0.30 for the mutual relationships (Andresen, 2000). It can be seen in Table 4.7 that each of the loadings is greater than 0.61 which shows either moderately or very strong loading for each of the indicators taken in the study. A total of 11 indicators (SC2, SC4, SC5, SC6, SP1, SMS4, SMS11, SMS12, SMS19, SMS25, SMS27) were deleted which consisted of poor loadings as per aforesaid criteria.

Table 4.7
Cross Loadings of the Items

Items	SC	Policy	Incent	Training	Comm	P. Plan	E. Resp	Int. Cont	Bench	SP
SC1	**0.852**	0.669	0.713	0.587	0.597	0.511	0.578	0.719	0.601	0.667
SC3	**0.881**	0.638	0.659	0.540	0.601	0.529	0.549	0.651	0.636	0.624
SC7	**0.866**	0.589	0.666	0.603	0.643	0.536	0.573	0.645	0.612	0.607
SMS1	0.654	**0.858**	0.640	0.685	0.481	0.454	0.461	0.587	0.612	0.636
SMS2	0.542	**0.760**	0.493	0.449	0.413	0.301	0.258	0.471	0.415	0.473
SMS3	0.550	**0.777**	0.542	0.552	0.467	0.418	0.476	0.600	0.556	0.550
SMS5	0.605	0.543	**0.820**	0.612	0.689	0.551	0.543	0.594	0.625	0.651
SMS6	0.635	0.581	**0.820**	0.469	0.620	0.521	0.574	0.626	0.607	0.647
SMS7	0.767	0.677	**0.820**	0.681	0.710	0.524	0.604	0.705	0.692	0.717
SMS8	0.583	0.633	0.592	**0.869**	0.585	0.449	0.493	0.671	0.535	0.597
SMS9	0.581	0.610	0.578	**0.867**	0.510	0.478	0.412	0.595	0.466	0.530
SMS10	0.556	0.599	0.612	**0.848**	0.684	0.493	0.540	0.670	0.581	0.633
SMS13	0.686	0.563	0.761	0.678	**0.834**	0.552	0.635	0.650	0.623	0.695
SMS14	0.508	0.301	0.573	0.445	**0.826**	0.575	0.610	0.593	0.681	0.634
SMS15	0.479	0.489	0.526	0.518	**0.731**	0.427	0.338	0.542	0.461	0.509
SMS16	0.487	0.374	0.470	0.522	0.529	**0.772**	0.515	0.442	0.434	0.489
SMS17	0.435	0.364	0.471	0.368	0.555	**0.788**	0.551	0.481	0.531	0.567
SMS18	0.473	0.405	0.486	0.371	0.406	**0.734**	0.447	0.478	0.447	0.506
SMS20	0.563	0.433	0.564	0.455	0.579	0.512	**0.845**	0.636	0.577	0.630
SMS21	0.559	0.482	0.564	0.530	0.454	0.512	**0.785**	0.573	0.537	0.621
SMS22	0.498	0.350	0.532	0.410	0.624	0.606	**0.838**	0.578	0.676	0.625
SMS23	0.651	0.606	0.646	0.575	0.599	0.551	0.588	**0.847**	0.601	0.644

Table 4.7 (Cont'd)

Items	SC	Policy	Incent	Training	Comm	P. Plan	E. Resp	Int. Cont	Bench	SP
SMS24	0.69	0.554	0.615	0.688	0.651	0.472	0.663	**0.853**	0.628	0.689
SMS25	0.625	0.604	0.641	0.638	0.645	0.521	0.581	**0.833**	0.645	0.668
SMS28	0.430	0.401	0.484	0.333	0.492	0.399	0.557	0.464	**0.805**	0.603
SMS29	0.745	0.704	0.766	0.672	0.746	0.626	0.676	0.769	**0.902**	0.766
SP2	0.657	0.592	0.747	0.672	0.745	0.677	0.679	0.742	0.713	**0.900**
SP3	0.541	0.546	0.534	0.419	0.525	0.475	0.559	0.579	0.705	**0.758**
SP4	0.633	0.621	0.676	0.602	0.658	0.543	0.664	0.654	0.627	**0.849**

4.6.2 Convergent Validity

In an attempt to ensure convergent validity, researchers try to show that the constructs‘ measures which should theoretically be related to each other are actually found related in such manner after the analysis. The three types of estimations viz. factor loadings, composite reliability (CR), and average variance extracted (AVE) have been suggested to establish convergent validity (Hair *et al*., 2010).

Firstly, all of the item loadings are examined and a loading value of 0.50 or more is suggested as acceptable in the literature of multivariate analysis (Fornell & Larcker, 1981; Hair *et al*., 2010). It can be seen in Table 4.8 that all items consisted of a loading higher than 0.50. Secondly, the composite reliability was examined which shows the degree to which the items consistently seek to indicate the latent construct (Hair *et al*., 2010). The suggested ideal value for CR has been 0.70 (Fornell & Larcker, 1981; Hair *et al*., 2010) and it can be seen in Table 4.8 that the CR values for all constructs were in the range of 0.841 – 0.900 which is well above the prescribed values. Thirdly, average variance extracted (AVE), which is extent of common variance among the study‘s latent construct indicators (Hair *et al*., 1998) was examined whose value should be ideally more than 0.50 (Fornell & Larcker, 1981; Hair *et al*., 2010). As it can be seen in Table 4.8, this condition was also fully met wherein the AVE values ranged between 0.639-0.751 As such, the results indicated that there exists convergent validity.

Table 4.8
Convergent validity Analysis

Constructs	Indicators	Loadings	Indicators Reliability	Composite Reliability	Average Variance Extracted
Safety Culture	SC1	.852	.726	.900	.751
	SC3	.881	.776		
	SC7	.866	.750		
Training	SMS8	.869	.755	.896	.742
	SMS9	.867	.752		
	SMS10	.848	.719		
Communication	SMS13	.835	.697	.840	.638
	SMS14	.825	.680		
	SMS15	.732	.536		
Emergency response	SMS20	.845	.715	.863	.678
	SMS21	.785	.616		
	SMS22	.838	.702		
Internal control	SMS23	.847	.717	.881	.731
	SMS24	.853	.727		
	SMS26	.833	.694		
Bench marking	SMS28	.805	.648	.844	.730
	SMS29	.902	.813		
Incentives	SMS5	.820	.672	.891	.732
	SMS6	.836	.698		
	SMS7	.908	.825		
Preventive planning	SMS16	.772	.596	.809	.585
	SMS17	.788	.621		
	SMS18	.734	.539		
Policy	SMS1	.860	.739	.841	.639
	SMS2	.760	.578		
	SMS3	.775	.601		
Safety performance	SP2	.900	.809	.875	.705
	SP3	.758	.575		
	SP4	.849	.721		

4.6.3 Discriminant Validity

Discriminant validity is aimed at confirming the construct validity of the outer model which seeks to ensure that the measures which shouldn‘t be related, are actually not found related after conducting the analysis. It further means that each measures are

more related to their own respective constructs than to other constructs. For that, the square roots of average variance extracted (AVE) is examined with correlations among the constructs of the study in line with suggestions made by Chin (2010), and Fornell and Larcker (1981).

Table 4.9
Discriminants Validity of the Constructs

	Bench	**Comm**	**E. Resp**	**Incent**	**Int. Cont**	**P. Plan**	**Policy**	**SC**	**SP**	**Training**
Bench	**.856**									
Comm	.739	**.799**								
E. Resp	.738	.670	**.823**							
Incentive	.748	.787	.714	**.855**						
Int. Cont	.780	.757	.744	.783	**.854**					
P. Plan	.613	.650	.683	.622	.658	**.765**				
Policy	.703	.603	.583	.729	.739	.525	**.799**			
SC	.790	.755	.743	.796	.824	.628	.756	**.867**		
SP	.802	.782	.795	.780	.844	.693	.741	.804	**.851**	
Training	.620	.698	.614	.726	.793	.566	.747	.738	.757	**.861**

Figures in bold represents the square root of the average variance extracted while the other figures represent squared correlations. (Bench=Benchmarking, Comm. =Communication, E. Resp. =Emergency response, Int. cont. =Internal control, P. plan=Preventive planning, Training)

Actually it is expected that 50% or more variance of indicators are accounted for, which means that the square root of AVE should be more than 0.50. In this study, Table 4.9 shows that the diagonal values (square root of AVE of the respective constructs) are higher than the other values of the column and the row in which they are situated, confirming the discriminant validity of the outer model. As such, in overall terms, the construct validity of the outer model was established, and it was further presumed that the subsequent results of hypothesis testing would be valid and reliable mainly because of the fact that the valid constructs offer conclusions which

lead to generalisation of thesis‘results. To conclude, construct validity was established in this study by confirming content validity, convergent validity, and discriminant validity.

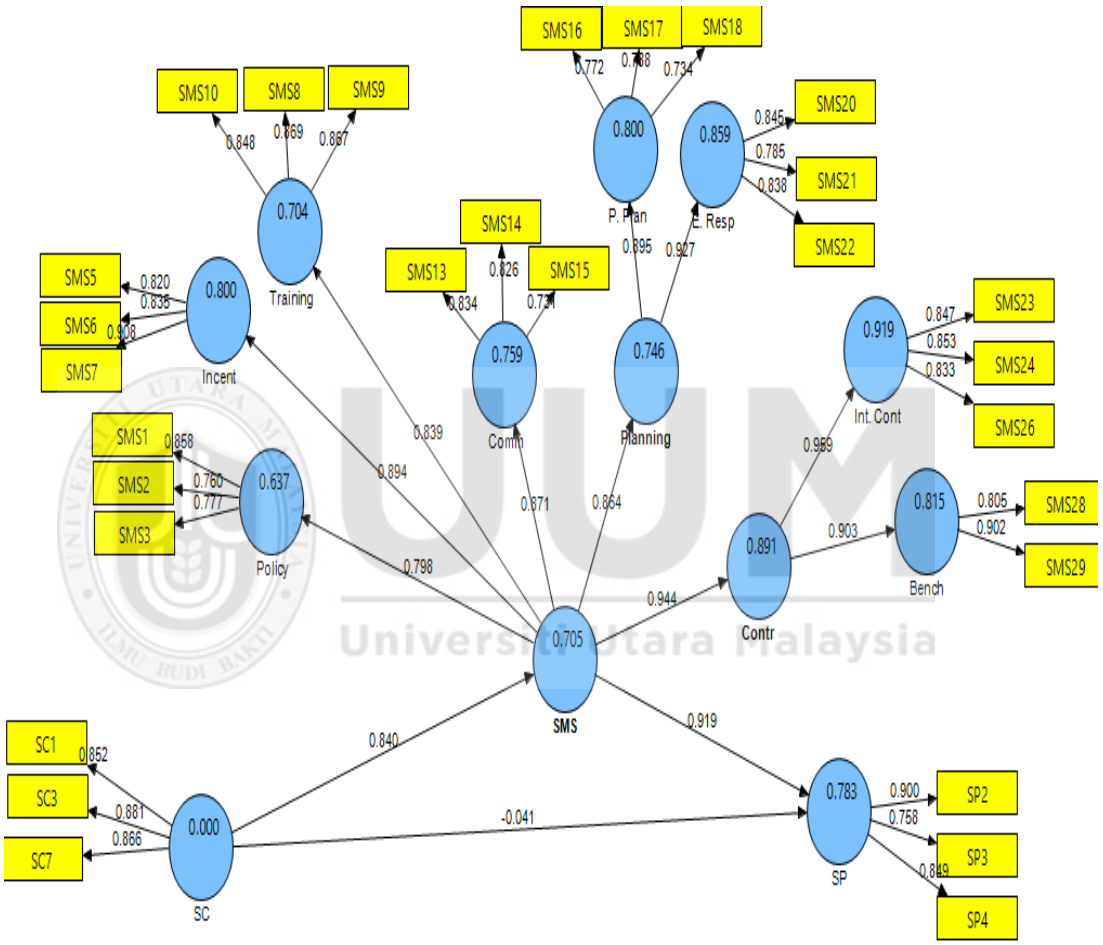

Figure 4.1 Hypothesized Model

4.6.4 Establishment of second order-construct.

After the measures were established, the next step included offering evidence to support the theoretical model as denoted by the structural portion of the model in line

with what was suggested by Chin (2010). Higher-order models quite frequently encompass testing second-order structures which consist of two layers of components (Hair, Hult, Ringle, & Sarstedt, 2013, p.39). In this study, it was hypothesized to estimate the overall mediating effect of safety management system which in first go necessitated considering it as a second order measurement model as it consisted of six dimensions (policy, communication, training, incentives, planning, control). From calculation perspective, in such cases, the estimation is done by taking into account the latent variable scores of the construct‘s (safety management system in this study) dimensions (policy, communication, training, incentives, planning, control) as its indicators. It should be noted that safety management system was the only construct which was measured as a second order construct. All of the remaining constructs of this study were studied as first order constructs which got measured directly by a respective set of items.

Furthermore, in order to get the dimensions of safety management systems conceptually described by the second order construct (safety management system), it was opined by Byrne (2010) that they have to be explicated appropriately by the hypothesized second order construct and also it is expected that they are remarkably distinct. It means that, prior to proceeding towards estimating the research model, it was essential to ensure that the first order constructs are deemed qualified enough to be conceptually described by the second order construct under consideration. In view of that, Table 4.10 presents the results pertaining to establishment of SMS as the second order construct in this study.

Table 4.10

Second-order Construct Establishment

Second-order Construct		Loading	Std. Error	T. Values	P. Values	R-square
Safety management system	**Policy**	0.798	0.018	43.762	0.000	0.637
	Incentives	0.894	0.018	50.005	0.000	0.800
	Training	0.839	0.033	25.278	0.000	0.704
	Comm.	0.871	0.022	38.925	0.000	0.759
	Planning	0.834	0.054	15.396	0.000	0.746
	Control	0.944	0.030	31.709	0.000	0.891

P<0.01

It can be seen in Table 4.10 that the first order construct viz policy, incentives, communication, training, control and planning are explained by the SMS as the R^2 values for this six range from 63.7% to 89.1%. The result as shown in Table 4.10 confirms the distinct nature of the construct in the study as such SMS as a second order construct is established and explained by six hypothesized construct in the first order. Moreover it is ideally suggested that there should be a minimum of three construct in the first order level to conduct a second order test (Hair et al., 2010: Kline, 2011). In consistency with it six first order had been selected in this study towards measuring SMS in the second-order position.

4.6.5 Structural Model

In this section of the report, the structural model and the result of the test of hypotheses are presented. The main concern of this section tends towards the testing of the hypotheses related to the direct effects. In achieving this, PLS path modelling multiple regression approach was used to test the main direct effects.

By using the same method stated above, the path coefficients were estimated using t-statistics. The significance level of the t-value was assessed by a one-tailed

distribution (Chin *et al.*, 1996; Churchill, 1979). According to Churchill (1979) and Sharma (2000), in a situation where a one-tailed statistical test is conducted, the significance level of t-value of 1% is greater than or equal to 2.326, at 5% is greater or equal to 1.645 while at 10% is greater or equal to 1.282, any t-value lesser than the stated are regarded as not significant. The direct effects are stated below:

H1: Safety culture is positively related to safety performance.

H2: Safety culture is positively related to safety management system.

H3: Safety management system is positively related to safety performance

Table 4.11
Paths Coefficients

Hypothesis	Relationship	Beta values	Std Error	T Statistics	Probability value	Decision
H1	Safety culture -> Safety performance	0.0984	0.0686	1.4302	0.0651	**Supported**
H2	Safety culture -> Safety Management system	0.8400	0.0335	25.095	0.0000	**Supported**
H3	Safety Management system -> Safety performance	0.9190	0.0868	10.5788	0.0000	**Supported**

P<0.01

Table 4.11 presents the results of the standard path coefficient, standard error, t-values and decision taken for the study. In summary, the result of the hypotheses testing of the direct relationship as shown in Table 4.11 revealed that all the accepted hypotheses possess a t-value above the critical value of 1.282 (10% significance level, one-tail test). The significant relationship for the direct hypothesis include; **H1** (β= 0.0984; t= 1.4302; p > .05), **H2** (β= 0.8400; t= 25.095; p < .1), **H3** (β= 0.9190; t=10.5788; p< .1). The result of the path analysis is presented in Figure 4.2. The latent variable scores from the measurement model for all first order construct was determined and used to determine the structural model so as to reduce the

complexity of the model, then path analysis was determined using bootstrapping. The next section presents the fourth hypothesis **(H4)** of the study.

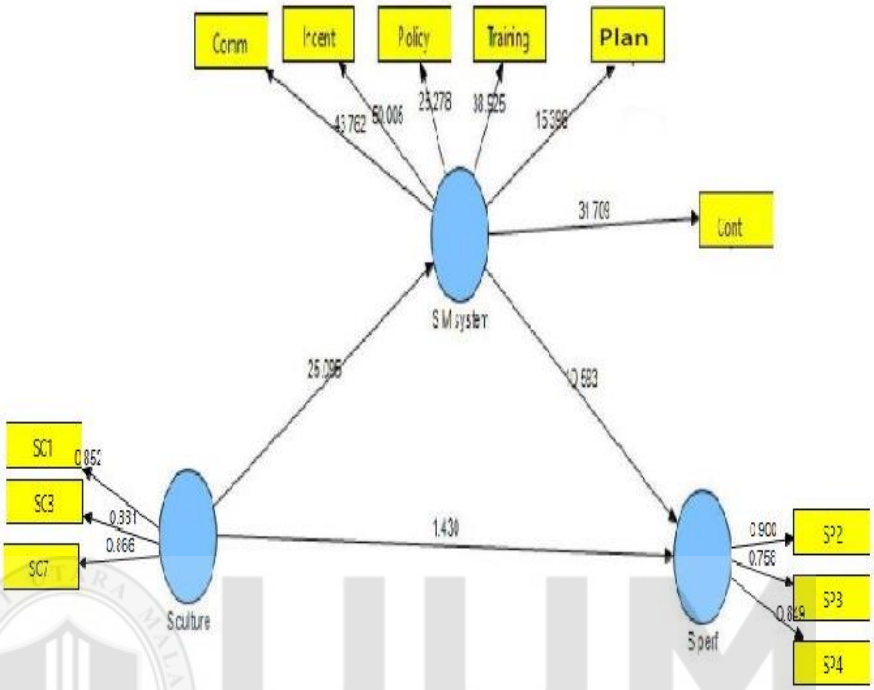

Figure 4.2 Result of the Path Analysis

4.7 Mediating Effect Hypothesis

In order to achieve the fourth hypothesis (**H4**), a mediating test as mentioned by Ramayah *et al*. (2011) was carried out to know if the mediating variable extends the independent variables influence to the dependent variable. Numerous procedures for carrying out mediation exists for instance sobel test (Sobel, 1982), three condition for Baron and Kenny (Baron & Kenny, 1986), product distribution method (MacKinnon, Lockwood & Williams, 2004) and bootstrapping (Hayes, 2009; Preacher & Hayes, 2004). This study utilised resampling mediation technique i.e. bootstrapping and path coefficients (Hayes, 2009; Preacher & Hayes, 2004). This

method is done firstly by finding out the path coefficients as well as t-values using the independent variable and the dependent variable without the existence of the mediator and secondly utilizing the mediator as well as the standard errors. In this study two different links were obtained which are; a signifying the independent variable path to the mediator (X-M), b which signifies the second link from the mediator to the dependent variable (M-Y). Calculation of the modified standard error for the product of a*b was done and the critical ratio was also determined which was used to calculate t-values linked with the product of a*b. This approach was utilised because Baron and Kenny (1986) approach does not utilize the use of standard errors (Hayes & Preacher, 2010). This study tested the effect of the mediating variable with smartPLS 2.0 M3 (Ringle *et al*., 2005) using the bootstrapping and the model displayed the t-values. The t values are calculated by using the formula below as provided by Hayes and Preacher, (2010).

$$T_{ab}=\frac{a*b}{S_{ab}}$$

Where;

a = path loading value of the relationship between the independent variable and the mediator.

b = path loading value of the relationship between the mediator and the dependent variable.

Sab = standard deviation of a and b above.

Table 4.10 presents the result of the mediating effect of safety management system on the relationship between safety culture and safety performance. If t-value of a*b is > 1.96 mediation is said to exist otherwise not.

Table 4.12
Test of mediation of SMS

	Safety culture (SC)
a*b	0.649
Sab	0.070
T	9.294

Note: *Significance of t values at 1%. Where Sab = Standard deviation of a and b, t= t value for mediation, a*b = product of independent variable path to the mediator and mediating variable path to the dependent variable.*

The table 4.12 shows the significant t value of the mediating effect of SMS on the relationship between safety culture and safety performance. Hence hypothesis **H4** is supported. The result shows the t value of 9.294 was significant at p value of 1%.

4.8 R-Square

According to literature, R square is the indicator that shows the amount of variance examined in the endogenous variable by its exogenous variable, R square reflects the quality of the variables included in the model (Hair et al., 2010). However, there are many criteria that can be employed as guidelines in assessing the level of R square. For example, Cohen (1988) criterion opine that R square value of 0.26 or more is considered to be substantial, 0.13 moderate and 0.02 weak. Meanwhile, Chin (1998) criterion states that R square value equal or more than 0.67 is substantial, 0.33 moderate and 0.19 weak. From the criterion mentioned above, the R square of the endogenous variable which is safety performance is 0.712.

4.8.1 Determining Effect Size

This section reports the results of the effect size of the hypotheses statistically supported. It is vital to determine the relevance and the extent to which the examined

path changes the explaining power of the endogenous construct (Cohen, 1988). As the path coefficient cannot provide any information about the effect size of the exogenous latent variables on the endogenous construct. In determining the effect size, Cohen F^2 value was used and calculated with the formula provided below by Cohen (1988).

$$\boldsymbol{F^2 = \frac{R^2\ Included - R^2\ excluded}{1 - R^2 included}}$$

Based on the guidelines provided by Cohen (1988), F^2values of 0.02, 0.15 and 0.35 respectively represent small, medium and large effect of the exogenous constructs on the endogenous constructs. The effect of the significant path coefficient is shown in Table 4.13.

Table 4.13
Relationship Effect Size and Rating

Relationship	R-squared included	R-squared excluded	Effect size	Ratings
SC-SP	0.712	0.708	0.014	None
SMS-SP	0.712	0.535	0.616	Large

As deduced from Table 4.13 which represents the effect size and their respective ratings, it can be seen that SMS has a large effect size on safety performance.

4.9 Determining the Predictive Relevance

After determining the effect size, the next analysis was to determine the predictive capacity of the model. As noted by Hair *et al.* (2012), Q^2 values not only evaluate how values are built around the model but also it evaluates the parameter estimates. Q^2 was calculated in this study through blindfolding, and then the results were obtained through the variable score out of which there was extraction of cross

validated redundancy. The cross validated redundancy defines models ability to predict the endogenous variables and therefore reveals the quality of the model.

Table 4.14
Construct Cross validated redundancy value

Total	**SSO**	**SSE**	**1-SSE/SSO (Q^2)**
S MS	504.0	247.0	0.5
S. PERF	126.0	111.3	0.1

From table 4.14 above in column Q^2, it can be seen that Q^2 values showed an outstanding relevance of 0.5 for SMS (safety management system) and 0.1 for S Perf, (safety performance) indicating that the model has a predictive relevance. Following Hair *et al*., (2013) if $Q^2 > 0$ then the model has a predictive relevance but if $Q^2 < 0$ then the model has no ability to be predictive.

4.10 Summary

This chapter discussed the response rate, data coding and entering, and data screening and cleaning/treatment procedures. Also discussed in this chapter is the description of the sample of study and the use of Partial Least Squares (PLS) path modelling technique for various data analyses procedures that confirmed the validity and reliability of the study constructs, also for testing the hypotheses of the present study. Also, some quality indexes for the model of study was also presented in this chapter. The summary of the results of the study is presented below in Table 4.15. The following chapter will discuss the findings followed by managerial (practical) and theoretical implications, suggestion for future research, limitation and conclusion of the present study.

Table 4.15
Summary of the Results

Hypothesis	Hypothesis path	Decision
H1	Safety culture is positively related to safety performance.	**Supported**
H2	Safety culture is positively related with safety management system.	**Supported**
H3	Safety management system is positively related with safety performance.	**Supported**
H4	Safety management system will mediate the relationship between safety culture and safety performance.	**Supported**

CHAPTER FIVE
DISCUSSION AND CONCLUSIONS

5.1 Introduction

The fourth chapter presented the analysis and results, This chapter discusses the analytical results that was revealed in chapter four, summarizes the discussion into conclusions, highlights on the contributions of the study (both theoretical and practical) presents research limitations and offers suggestions for further studies.

5.1.1 Executive Summary

This study examined the mediating roles safety management system on the relationship between safety culture and safety performance in F&B industries in Nigeria. To this end, a total of four hypotheses were stated and tested, the results empirically supported all four of the hypothesis. The following section provides the discussion of the findings that were presented in chapter four.

5.2 Discussions

As shown in the analytical findings of this study, safety culture possess potentialities to predict safety performance in F&B industries in Nigeria. This was however empirically analysed directly and indirectly through an intervening variable; the findings provided a literature support. The first objective of this study was discussed in section 5.2.1.

5.2.1 Relationship between Safety Culture and Safety Performance

The first objective of this study was to examine the relationship between safety culture and safety performance. In pursuant of this objective, one hypotheses was tested and the result of the hypotheses testing found that Hypothesis H1 which states that safety culture will be positively related to safety performance was supported. The findings gives credence to the fact that organizations with a strong safety culture tend to outperform organizations with negative safety culture (Clark, 1999; Neal & Griffin, 2000, Zohar, 2000).

Organization safety culture refers to the value an organization place on safety (McFadden *et al*., 2009). The result puts forward that firms with a positive safety culture tend to have better safety outcome because upper level management care about wellbeing and safety of employees, employees in such firms are empowered, involved actively and partake in activities that are safety related which are beneficial to the organization. Safety culture provides ways to the essential design and operating techniques of an organization, and helps organizations to avoid accidents thus improving safety performance (He et *al.*, 2012).

Also Carder and Ragan (2003) stated that firm's safety performance can be improved when the firm's demonstration of its management commitment to safety allows employees to be involved in safety related activities which is a proxy for the organizations safety culture. Similarly, Vecchio-sadus, and Griffith (2004) indicated that the essential ingredient in accomplishing a positive safety culture in an organization is when firms management are committed towards safety of their

employees and get employees involved in problem solving and decision making process. The benefit does not only reduce injury rates, but also offers financial and social rewards to such organizations. One possible reason why safety culture was found positively related to safety performance is because F&B industries in Nigeria are regulated by NAFDAC, this agency compels F&B management to instil adequate safety standards with regards to goods produced. This might likely influence firms outcome of safety. Another possible reason is that most F&B firms in Nigeria are owned or co-owned by foreign organizations of western countries where safety culture is given utmost priority, this culture is to some extent instilled in Nigerian F&B industries, as such it is translates in their performance.

The present line of result is consistent with previous studies by (Hajmohammad & Vacchon, 2014; Fernandez-muniz *et al*., 2007a; McFadden *et al*., 2009) done at the organizational level of analysis. In addition the findings of this study is in line with the resource based view theory as postulated by Barney (1997) the resource based view holds that successful and efficient application of resources (rare inimitable non-substantial) will facilitate organizations achievement of competitive advantage (Barney, 1991, 1997 & 2001). Culture have been studied as rare and inimitable resources owned by organization which enhances organizations competitive advantage which in turn shapes a firm performance. Taking a leaf from this it could be said that the safety culture gives organizations superior advantage consequently improving their performance. In essence it implies that firms that implement rare inimitable non-substantial resources can present competitive advantage and high performance for an organization in current competitive market (Barney, 1997;

Newbert, 2007). As such firms should instil a culture of safety which offers a firms a means to achieve competitive advantage and consequently superior safety performance. The next discussion relates to the relationship between safety culture and safety management system.

5.2.2 Relationship between Safety Culture and Safety Management System

The relationship in this study was supported which states that there is a positive relationship between safety culture and safety management system. The organizations safety culture reflects how an organization think and behave as well as their norms with regards to safety (Morrow *et al*., 2014). Thus it becomes plausible to state that the implementation of a safety management system is borne out of the fact that an organization has in place a strong safety culture. How proficient and successful a safety management system is depends immensely on the safety culture which is reflected in the commitment and attitudes to safety existing within the organization (Kirwan, 1998; O'Toole, 2002). Therefore the culture becomes an important determinant of a firms SMS, since it constitutes the underlying behaviours, attitudes and perception of safety in all levels in the organization.

Furthermore, Copper (1998) indicated that an organizations safety management system is a manifestation of a firms safety culture. In order words, firms with strong safety culture see the need to develop a safety management system. In addition, Stolzer *et al*. (2008) stressed that for an effective achievement of a safety management system, there must be a sense of commitment and involvement by managers as well as employees in organizations because they share a common goal

towards safety in the organization. Although extent literature does not provide evidence of previous studies that specifically investigated the relationship between safety culture and SMS, however the findings of the study confirms SMS as an antecedent of a firm's safety culture. This finding also gives credence to studies from other management field, like Bowen and Ostroff (2004) who emphasized that an organization culture which refers to organizationally embedded values and assumption have tendencies to shape human resources management practices which in turn shape up firms performance. Therefore, it is noteworthy that the significant influence of safety culture on safety management system within the context of Nigeria F&B industries is considered as reasonable.

5.2.3 Relationship between Safety Management System and Safety Performance

The current study hypothesized that safety management system is positively related to safety performance. In this study, safety management system refers to sets of persons, policies, resources, procedures and practices which act together in an organised manner so as to ease damage and losses caused in the process and in the place of work (Fernandez-Muniz *et al*., 2007a). It offers an organised contrivance for firms to constantly enhance safety and sets the organisational policies, procedures, structure and processes, which offers the organisation the ability to guarantee safe operations (Wang, 2011). The goal of a safety management system is to bring awareness, commitment, motivation and understanding among employees (Fernandez-muniz *et al*., 2007a).

This hypothesis was supported. The findings obtained in the current study further validate earlier works that attempted to explore the relationship between safety management system and safety performance. Some of the studies include Fernandez-muniz *et al*. (2007b), Bottani *et al*. (2009) as well as safety management system influence on firm's performance by Fernandez-muniz *et al*. (2009). In addition, Fan and Lo (2012) also found safety management system implementation to had effectively enhanced firms financial performance. One justification for the positive relationship could be found in Robotham (2007) who emphasized that the presence of managers who show commitment to safety within an organization is a prerequisite for the success of an SMS, as at the time this study was conducted, the respondents which were safety officers had adequate educational experience which is reflected in their level of commitment towards safety of their employees.

The implication of this finding reveals that deployment of safety management system in firms enables the achievement of the firms' safety objectives like reduction material damages, personal injuries, increase in employee satisfaction as well as their motivation. As such, the more firms are committed to safety management system implementation, the better their achievement of safety performance. Knowing the importance of this correlation, many organizations today now commit lots of resources towards safety management system implementation so as to encourage achievement of safety goals thus minimising cost incurred on safety. The next section discusses the fourth objective of this study.

5.2.4 Safety Management System Mediates the Relationship between Safety Culture and Safety Performance

This study hypothesised that SMS will mediate the relationship between safety culture and safety performance. The hypothesis was supported. This result indicates that firms with a positive safety culture are likely to introduce a safety management system which will result to a desired performance. This means that though safety culture are resources to improve organization's safety performance, however the impact on safety performance will be greater when Nigerian F&B industries develop and implement a strong SMS. It also implies that relevant and strong SMS has the ability to transfer the impact of safety culture to safety performance thereby improving safety performance. Put differently, it means that safety culture passes through SMS to affect safety performance. The result is supported by Wu *et al.* (2009) who reiterated that safety culture improvement is essential to the development of a safety management system which is an ingredient for safety performance improvement. In addition, Fernandez-Muniz *et al*. (2007b) also reiterated safety management system mediated management value for safety and safety performance.

Furthermore, Hajmohammad and Vacchon (2014) indicated the role of safety practice in mediating the relationship between safety culture and safety performance. This result also confirms the patient safety chain model put forward by McFadden *et al*. (2009) for health care industry, as it provides empirical evidence for the safety culture-initiative-outcome model in a food and beverage manufacturing context. Knowing the importance of safety management system in an organization, it is

necessary for firms to adopt a positive safety culture which helps to develop the safety management system and thus a better safety performance, as such organizations should strengthen their safety culture in all ramifications.

5.3 Implications

In the above sections, the results of the present study have been discussed based on the research questions. The findings from this study have several important implications to both practice and theory. The first section will discuss the managerial implications while the second section will talk about the theoretical implications combined with several suggestions for future research.

5.3.1 Managerial Implication

This study has key managerial implication to manufacturing leaders in Nigeria because improving safety has turned out to be a national priority. Therefore, this study provide empirical support that safety culture is tied to better safety outcome, this suggests that when organizations especially F&B industries in Nigeria desire to make improvements in safety, there is a need to base their emphasis on improving a safety culture. This study also provides support that improved care given to employees by management is beneficial to organizational goals, this can assist to enhance morale of workers thus enabling them to have self-assurance in the management of the organization.

Maintaining a positive safety culture is vital to an organizations success since it plays a crucial role in the development of a safety management system which helps

organizations to reduce the level of safety hazards and occurrences, thus reducing related financial costs incurred. Such organizations avoids much medical bills and allowances for hospitalized employees or compensations paid to family members of employees involved in occupational accidents or hazards. It should be noted that expenses incurred by firms as a result of such accidents subjects firms to an undesirable profitability and economic outcome thus it deters their competitive advantage in the global market.

5.3.2 Theoretical Implication

Findings from the hypothesis of this study have extended beyond findings of previous studies and thus contributed new information to the body of knowledge in safety performance research. Precisely, this study contribute to the research on the relationship between safety and safety performance at the organizational level thus further empirically supporting the theoretical justification of Resource Base View (Barney, 1997) in Nigerian food and beverage industry which suggests that when firms deploy and implement resources which are rare and inimitable they achieve sustained and superior competitive advantage thus enhancing their performance. In light of the present study, the safety culture can be viewed as an organizations resource which can improve a firm's safety performance.

In the present study, SMS were found to mediate the relationship between safety culture and safety performance thus upholding the Contingency theory. The Contingency Theory emphasize the importance of situational variables, in determining the relationship between organizational variables. In this study it is

argued that the relationship between safety culture and safety performance is contingent upon the safety management system implementation. The mediating effect was fully supported, this has an insightful theoretical implication. Despite mentioning safety management system as an antecedent of safety culture, there is a paucity of empirical study that specifically examined the mediating effect safety management system. This study provides empirical evidence on the mediating effect of safety management system. On the whole, the findings of this study provide additional empirical evidence to the body of knowledge in the fields of organization safety culture and safety performance.

The role of SMS in occupational safety is important because it helps to enhance organizations safety performance with respect to reduced injuries, cost paid by organizations and also increase employee attitude in engaging in unsafe acts. Hence future researchers may consider incorporating SMS in their work in safety. It should also be noted that previous studies on occupational safety health on safety culture were done in Western and Asian countries, however this study was done in a non-western and non-Asian setting hence it adds to the body of knowledge.

In summary findings from this study comprise the first piece of empirical research on the mediating effect of SMS on the relationship between safety culture and safety performance in Nigeria. The result fully supports the mediating effect of SMS hence it contributes to the body of knowledge as such other studies can also consider incorporating SMS as mediators in their study as findings from this study has proven its workability.

5.4 Limitation of the Study and Future Studies

While the study presents the significant role of safety culture and safety management system in determining superior safety performance in F&B firms, it should also be noted that some limitations exist in the study, first this study was done using a cross-sectional method in which data were collected at a particular point in time. However, some studies stated the benefits of sustainable manufacturing practices can be achieved in a long term rather than short term. Therefore, studying the phenomena of safety performance in manufacturing like F&B industry in more than one point in time (longitudinal study) is recommended. Therefore, this research recommends that interested future researchers on safety performance should consider using longitudinal approach.

It should be borne in mind that this study was conducted in Lagos which represents one out of the 36 states of Nigeria as such findings from this study cannot be generalised to all F&B industries in other states and geo-political zones of the country. Also, the data in this study on the predictive and criterion variables were collected from a single respondent of each selected F&B manufacturing company. The data represent a self-reporting by the respondents. This creates a possibility for common method variance which might have been introduced using a self-report approach for data collection (Ramayah, 2010; Yang *et al*., 2011). As a result of this, future researchers are advised to consider the collection of data from a multiple individuals in a particular F&B manufacturing firms to avoid issues related to common method bias. Finally, this study is limited in methodology as the design is completely quantitative. It should be noted that quantitative techniques has its

limitations, especially in translating people's feelings into numbers (Abas, 1999). In future research, it is recommended that qualitative technique be incorporated.

5.5 Conclusion

This study has empirically shown the established connection and relationships among the variables and it has tested both the direct and the mediating relationships in order to provide answers to the said research questions in relation to the corresponding research objectives stated in the introductory chapter of the study. Upon the validation of the research instrument used in this study, data were collected from 126 safety managers of F&B manufacturing firms in Nigeria. The evaluation of both the measurement and the structural model was done and evidences were found to support the result of the analysis. All four hypothesis of the study were supported thus achieving the objective of the study. More significantly the study fills the gap by finding out that safety culture/safety performance relationship is explained by the implementation of a firm safety management system, additionally it reveals that safety performance of firms is tied to successful deployment and development of a successful safety culture as well as a safety management system. Lastly firms who have a positive safety culture in turn implement an adequate safety management system, thus making this study special in its own rating and a contribution to the body of knowledge

REFERENCES

Abubakar, U. (2015). An Overview of the Occupational Safety and Health Systems of Nigeria, UK, USA, Australia and China: Nigeria Being the Reference Case Study. *American Journal of Educational Research*, *3*(11), 1350-1358.

Abudayyeh, O., Fredericks, T. K., Butt, S. E., & Shaar, A. (2006). An investigation of management's commitment to construction safety. *International Journal of Project Management*, *24*(2), 167-174.

Acuna, E., & Rodriguez, C. (2004). The treatment of missing values and its effect on classifier accuracy. In *Classification, clustering, and data mining applications* (pp. 639-647). Springer Berlin Heidelberg.

Adebiyi, K. A., & Charles-Owaba, O. E. (2009). Towards setting a sustainable manufacturing safety programme in Nigeria. *Disaster Prevention and Management: An International Journal*, *18*(4), 388-396.

Adeogun, B.K., & Okafor, C.C. (2013). International Journal of Environmental Science, Management and Engineering Research, (1), 24-29. Available online at http://www.ijesmer.com. Date retrieved, 10 November 2015

African Business Seminar Report (2014). Nigerian economic overview. Retrieved fromhttp://www.worldbank.org/content/dam/Worldbank/Feature%20Story/japan/pdf/event/2014/. Date retrieved, 15 June 2016.

Ajakaye, S. O. (2010). Effective labour inspection as correlate of Decent Work Agenda. A post research paper submitted to the department of Adult Education. University of Ibadan.

Akpan, E. I. (2011). Effective safety and health management policy for improved performance of organizations in Africa. *International Journal of Business and Management*, *6*(3), 159-165.

Aksorn, T., & Hadikusumo, B. H. W. (2008). Critical success factors influencing safety program performance in Thai construction projects. *Safety Science*, *46*(4), 709-727.

Alam, M. M. (2009). The combine effect of market orientation and owners/manager's innovation and business performance of small and medium sized manufacturing firms in Pakistan. *PhD Thesis, UUM, Sintok, Kedah, Malaysia.*

Ali, H., Azimah Chew Abdullah, N., & Subramaniam, C. (2009). Management practice in safety culture and its influence on workplace injury: An industrial study in Malaysia. *Disaster Prevention and Management: An International Journal*, *18*(5), 470-477.

Anderson, D. R., Sweeney, D. J., & Williams, T. A. (2000). *The Management Scientist: For Windows 95, Windows 98, and Windows NT*. South-Western College Pub..

Angle, H. L., & Perry, J. L. (1981). An empirical assessment of organizational commitment and organizational effectiveness. *Administrative science quarterly*, 1-14.

Antonsen, S. (2009). Safety culture and the issue of power. *Safety Science*, *47*(2), 183-191.

Arboleda, A., Morrow, P. C., Crum, M. R., & Shelley, M. C. (2003). Management practices as antecedents of safety culture within the trucking industry:

similarities and differences by hierarchical level. *Journal of safety research, 34*(2), 189-197.

Arezes, P. M., & Sérgio Miguel, A. (2003). The role of safety culture in safety performance measurement. *Measuring Business Excellence*, *7*(4), 20-28.

Arocena, P., Núñez, I., & Villanueva, M. (2008). The impact of prevention measures and organisational factors on occupational injuries. *Safety Science*,*46*(9), 1369-1384.

Asika, N. (1991). *Research methodology in the behavioural sciences*. Lagos Longman Nigeria Plc, Nigeria.

Askenazy, P., & Caroli, E. (2010). Innovative work practices, information technologies, and working conditions: Evidence for France. *Industrial Relations: A Journal of Economy and Society*, *49*(4), 544-565.

Atsumbe, B. N., Amine, J. D., Umar, I. Y., & Salawu, J. C. Appraisal of Occupational Safety in Manufacturing Industries in Kaduna and Niger States of Nigeria.

Awodele, O., Popoola, T. D., Ogbudu, B. S., Akinyede, A., Coker, H. A., & Akintonwa, A. (2014). Occupational Hazards and Safety Measures Amongst the Paint Factory Workers in Lagos, Nigeria. *Safety and health at work*, *5*(2), 106-111.

Bankole, A. R., & Ibrahim, L. O. (2012). Perceived Influence of Health Education on Occupational Health of Factory Workers in Lagos State, Nigeria.*British Journal of Arts & Social Sciences*, *8*(1).

Barling, J., Kelloway, E. K., & Iverson, R. D. (2003). High-quality work, job satisfaction, and occupational injuries. *Journal of Applied Psychology*, *88*(2), 276.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of management*, *17*(1), 99-120.

Barney, J. B. (1986). Strategic factor markets: Expectations, luck, and business strategy. *Management science*, *32*(10), 1231-1241.

Barney, J. B. (2001). Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view. *Journal of management*, *27*(6), 643-650.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, *51*(6), 1173.

Bartlett, J. E., Kotrilik, J.W., Higgins, C.C. (2001).Organizational Research: Determining Appropriate Sample size in Survey Research. *Information Technology, Learning and Performance Journal*, 19(1), 43-50.

Bass, B. M., & Avolio, B. J. (2000). *MLQ: Multifactor leadership questionnaire*. Mind Garden.

Bass, B. M., Avolio, B. J., Jung, D. I., & Berson, Y. (2003). Predicting unit performance by assessing transformational and transactional leadership. *Journal of applied psychology*, *88*(2), 207.

Bentley, T. A., & Haslam, R. A. (2001). Identification of risk factors and countermeasures for slip, trip and fall accidents during the delivery of mail. *Applied ergonomics*, *32*(2), 127-134.

Berg, H. P., & Kopisch, C. (2012). Safety Culture and its Influence on Safety/Kultura Bezpieczeństwa I Jej Wpływ Na Bezpieczeństwo. *Journal of KONBiN*, *23*(1), 17-28.

Beriha, G. S., Patnaik, B., & Mahapatra, S. S. (2010). Benchmarking on safety performance using Data Envelopment Analysis. In *AIMS International Conference on Value-based Management*.

Biggs, S. E., Banks, T. D., Davey, J. D., & Freeman, J. E. (2013). Safety leaders' perceptions of safety culture in a large Australasian construction organisation. *Safety science*, *52*, 3-12.

Bohrnstedt, G. W. (1970). Reliability and validity assessment in attitude measurement. *Attitude measurement*, 80-99.

Bohrnstedt, G. W. (1970). Reliability and validity assessment in attitude measurement. In G. F. Summers (Ed.), *Attitude measurement* (pp. 80–99). London: Rand McNally.

Boselie, P., Dietz, G., & Boon, C. (2005). Commonalities and contradictions in HRM and performance research. *Human Resource Management Journal*, *15*(3), 67-94.

Bottani, E., Monica, L., & Vignali, G. (2009). Safety management systems: performance differences between adopters and non-adopters. *Safety Science*, *47*(2), 155-162.

Boughaba, A., Hassane, C., & Roukia, O. (2014). Safety culture assessment in petrochemical industry: a comparative study of two Algerian plants. *Safety and health at work*, *5*(2), 60-65.

Bowen, D. E., & Ostroff, C. (2004). Understanding HRM–firm performance linkages: The role of the "strength" of the HRM system. *Academy of management review*, *29*(2), 203-221.

Bowman, C., & Toms, S. (2010). Accounting for competitive advantage: The resource-based view of the firm and the labour theory of value. *Critical Perspectives on Accounting*, *21*(3), 183-194.

Brenner, M. D., Fairris, D., & Ruser, J. (2004). "Flexible" work practices and occupational safety and health: exploring the relationship between cumulative trauma disorders and workplace transformation. *Industrial Relations: A Journal of Economy and Society*, *43*(1), 242-266.

Bright, K., & Cooper, C. L. (1993). Organizational culture and the management of quality: towards a new framework. *Journal of Managerial Psychology*, *8*(6), 21-27.

Britto, R. A., Corsi, T. M., & Grimm, C. M. (2010). The relationship between motor carrier financial performance and safety performance. *Transportation journal*, 42-51.

Brown, K. A., Willis, P. G., & Prussia, G. E. (2000). Predicting safe employee behavior in the steel industry: Development and test of a sociotechnical model. *Journal of Operations Management*, *18*(4), 445-465.

Bryman, A., & Bell, E. (2007). Business Research Methods second edition Oxford University Press UK.

Bureau of Labor Statistics. (2012). News release (USDL-12-2121). US Department of Labor.

Burns, J. M. (1978). Leadership New York. *NY: Harper and Row Publishers*.

Cameron, K. S., & Quinn, R. E. (2005). *Diagnosing and changing organizational culture: Based on the competing values framework*. John Wiley & Sons

Camuffo, A., De Stefano, F., & Paolino, C. (2015). Safety Reloaded: Lean Operations and High Involvement Work Practices for Sustainable Workplaces. *Journal of Business Ethics*, 1-15.

Carder, B., & Ragan, P. W. (2003). A survey-based system for safety measurement and improvement. *Journal of safety research*, *34*(2), 157-165.

Carrillo, J. A., Pérez, V., & Onieva, L. (2012). Safety Management in Manufacturing and its Influence in Injury Rates: Evidences from Spanish National Safety Management Survey (2009). In *Industrial Engineering: Innovative Networks* (pp. 209-217). Springer London.

Cavana, R. Y., Delahaye, B. L., & Sekaran, U. (2001). *Applied business research: Qualitative and quantitative method.* Australia: John Wiley & Sons.

Chan, Y. H. (2003). Biostatistics 104: correlational analysis. *Singapore Med J*, *44*(12), 614-9.

Chang, H. L., & Yeh, C. C. (2005). Factors affecting the safety performance of bus companies—The experience of Taiwan bus deregulation. *Safety science*, *43*(5), 323-344.

Chang, Y. H., Shao, P. C., & Chen, H. J. (2015). Performance evaluation of airport safety management systems in Taiwan. *Safety Science*, *75*, 72-86.

Chen, C. F., & Chen, S. C. (2012). Scale development of safety management system evaluation for the airline industry. *Accident Analysis & Prevention*, *47*, 177-181.

Cheyne, A., Cox, S., Oliver, A., & Tomás, J. M. (1998). Modelling safety climate in the prediction of levels of safety activity. *Work & Stress*, *12*(3), 255-271.

Chib, S., & Kanetkar, M. (2014). Safety culture: the buzzword to ensure occupational safety and health. *Procedia economics and finance*, *11*, 130-136.

Chin, W. W. (1998). Commentary: issues and opinion on structural equation modeling. *MIS Quarterly*, *22* (1), 7-16.

Chin, W. W. (1998b). The partial least squares approach to structural equation modelling. *Modern methods for business research*, 295(2), 295-336.

Chin, W. W. (2010). How to write up and report PLS analyses. In V.E. Vinzi, W.W. Chin, J. Henseler, & H. Wang (Eds.), *Handbook of Partial Least Squares, Springer Handbooks of Computational Statistics* (pp. 655-690). Springer-Verlag Berlin Heidelberg. doi 10.1007/978-3-540-32827-8_29

Chin, W. W., & Newsted, P. R. (1999). Structural equation modelling analysis with small samples using partial least squares.

Choi, B., Poon, S. K., & Davis, J. G. (2008). Effects of knowledge management strategy on organizational performance: A complementarity theory-based approach. *Omega*, *36*(2), 235-251.

Choudhry, R. M., Fang, D., & Ahmed, S. M. (2008). Safety management in construction: Best practices in Hong Kong. *Journal of professional issues in engineering education and practice*, *134*(1), 20-32.

Choudhry, R. M., Fang, D., & Mohamed, S. (2007). The nature of safety culture: A survey of the state-of-the-art. *Safety science*, *45*(10), 993-1012.

Christian, M. S., Bradley, J. C., Wallace, J. C., & Burke, M. J. (2009). Workplace safety: a meta-analysis of the roles of person and situation factors. *Journal of Applied Psychology*, *94*(5), 1103.

Cigularov, K. P., Chen, P. Y., & Rosecrance, J. (2010). The effects of error management climate and safety communication on safety: A multi-level study. *Accident Analysis & Prevention*, *42*(5), 1498-1506.

Clarke, S. (1998). Safety culture on the UK railway network. *Work & stress*,*12*(3), 285-292.

Clarke, S. (2000). Safety culture: under-specified and overrated?. *International Journal of Management Reviews*, *2*(1), 65-90.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc

Cole, K. S., Stevens-Adams, S. M., & Wenner, C. A. (2013). A Literature Review of Safety Culture. *Sandia National Laboratories*.

Compeau, D., Higgins, C. A., & Huff, S. (1999). Social cognitive theory and individual reactions to computing technology: A longitudinal study. *MIS quarterly*, 145-158.

Cooper Ph. D, M. D. (2000). Towards a model of safety culture. *Safety science*, *36*(2), 111-136.

Cooper, D. (1998), *Improving safety culture*: a practical guide. England: John Wiley and Sons Ltd.

Cooper, D. R., & Schindler, P. S. (2003). *Business research methods (8th ed.).* Boston: MA: McGrraw Hill.

Cooper, M. D., & Phillips, R. A. (2004). Exploratory analysis of the safety climate and safety behavior relationship. *Journal of safety research*, *35*(5), 497-512.

Corbett, L. M., & Rastrick, K. N. (2000). Quality performance and organizational culture: A New Zealand study. *International Journal of Quality & Reliability Management*, *17*(1), 14-26.

Cox, S. J., & Cheyne, A. J. T. (2000). Assessing safety culture in offshore environments. *Safety science*, *34*(1), 111-129.

Cox, S. J., & Vassie, L. H. (1998). Small and medium size enterprises (SME) interest in voluntary certification schemes for health and safety management: preliminary results. *Safety Science*, *29*, 67-73.

Cox, S., & Cox, T. (1991). The structure of employee attitudes to safety: A European example. *Work & stress*, *5*(2), 93-106.

Cox, S., & Flin, R. (1998). Safety culture: philosopher's stone or man of straw?.*Work & Stress*, *12*(3), 189-201.

Cox, S., Jones, B., & Rycraft, H. (2004). Behavioural approaches to safety management within UK reactor plants. *Safety Science*, *42*(9), 825-839.

Coyle, I. R., & Griffin, M. A. (2002). Safety climate and safety behaviour. *Australian Journal of management*, 27(4), 67-75

Coyle, I. R., Sleeman, S. D., & Adams, N. (1996). Safety climate. *Journal of Safety Research*, *26*(4), 247-254.

Creswell, J. W. (2003). *Research design* (2nd ed.). Thousand Oaks, CA: sage.

Cryer, C., Samaranayaka, A., Russell, D., Davie, G., & Langley, J. (2008).*The Epidemiology of Serious Non-Fatal Work-Related Traumatic Injury-A Demonstration Project*. Statistics New Zealand.

Cullen, W. D., & Cullen, L. (2001). *The Ladbroke Grove Rail Inquiry: Part 2; Report*. HSE Books.

Dal Corso, L. A. U. R. A. (2008). Mediation effects of safety climate and safety motivation on the relation between organizational climate and safety performance in the workplace. *Testing, Psychometrics, Methodology in Applied Psychology*, *15 (2)*, 77-90.

De Koster, R. B., Stam, D., & Balk, B. M. (2011). Accidents happen: The influence of safety-specific transformational leadership, safety consciousness, and hazard reducing systems on warehouse accidents. *Journal of Operations management*, *29*(7), 753-765.

Dedobbeleer, N., & Béland, F. (1998). Is risk perception one of the dimensions of safety climate? *Occupational injury: Risk prevention and intervention*, 73-81.

DeJoy, D. M., Schaffer, B. S., Wilson, M. G., Vandenberg, R. J., & Butts, M. M. (2004). Creating safer workplaces: assessing the determinants and role of safety climate. *Journal of safety research*, *35*(1), 81-90.

DeJoy, D.M. (1996) 'Theoretical models of health behaviour and workplace self-protection', *Journal of Safety Research*, Vol. 27, pp.61–72.

Díaz, R. I., & Cabrera, D. D. (1997). Safety climate and attitude as evaluation measures of organizational safety. *Accident Analysis & Prevention*, *29*(5), 643-650.

Díaz-Cabrera, D., Hernández-Fernaud, E., & Isla-Díaz, R. (2007). An evaluation of a new instrument to measure organisational safety culture values and practices. *Accident Analysis & Prevention*, *39*(6), 1202-1211.

Dillon, W. R., Madden, T. J., & Firtle, N. H. (1990). Marketing Research in a Marketing Environment, Homewood, IL: Richard D. Irwin.

Dobrzykowski, D. D., McFadden, K. L., & Vonderembse, M. A. Lean and integration for safety and financial performance in healthcare.

Donald, I. and Young, S. (1996) 'Managing safety: an attitudinal-based approach to improving safety in organizations', *Leadership and Organizational Journal*, Vol. 17, pp.13–20.

Dos Santos Grecco, C. H., Vidal, M. C. R., Cosenza, C. A. N., dos Santos, I. J. A. L., & de Carvalho, P. V. R. (2014). Safety culture assessment: A fuzzy model for improving safety performance in a radioactive installation. *Progress in Nuclear Energy*, *70*, 71-83.

Doug, A., Buron, N., Cuthill, I., Festing, M., Hutton, J., & Playle, L. (2006). Why do a pilot study? *www.je-lks.org/index.php/full-volumes/english-version-2005?task*. Date retrieved 16/4/2015

Edeh, H. (July, 2014). Retrieved from http://businessdayonline.com/2014/07/manufacturing-sector-now-major-nigerias-economic-driver-says-rencap/

Edkins, G. D. & Pollock, C. M. (1996). Proactive safety management: Application and evaluation within a rail context. *Safety Science*, 24, 83-93.

Ek, Å., Akselsson, R., Arvidsson, M., & Johansson, C. R. (2007). Safety culture in Swedish air traffic control. *Safety Science*, *45*(7), 791-811.

Ek, Å., Runefors, M., & Borell, J. (2014). Relationships between safety culture aspects–A work process to enable interpretation. *Marine Policy*, *44*, 179-186.

Emory, C. W., & Cooper, D. R. (1991). Business Research Methods. Homewood IL: Richard D. Irwin.

Eurostat, (2009). 8.6% of Workers in the EU Expereinced Work-related Health Problems. Statistics on Focus, 63/2009. Retrieved from: http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-09-063-/EN/KS-SF-09-063-EN.

Ezenwa, A. O. (2001). A study of fatal injuries in Nigerian factories. *Occupational medicine*, *51*(8), 485-489.

Fabiano, B., Currò, F., & Pastorino, R. (2004). A study of the relationship between occupational injuries and firm size and type in the Italian industry.*Safety Science*, *42*(7), 587-600.

Falk, R. F., & Miller, N. B. (1992). *A primer for soft modeling*. University of Akron Press.

Fang, D., & Wu, H. (2013). Development of a Safety Culture Interaction (SCI) model for construction projects. *Safety science*, *57*, 138-149.

Fang, D., Chen, Y., & Wong, L. (2006). Safety climate in construction industry: a case study in Hong Kong. *Journal of construction engineering and management*, *132*(6), 573-584.

Feng, Y. (2013). Effect of safety investments on safety performance of building projects. *Safety science*, *59*, 28-45.

Feng, Y., Teo, E. A. L., Ling, F. Y. Y., & Low, S. P. (2014). Exploring the interactive effects of safety investments, safety culture and project hazard on safety performance: An empirical analysis. *International Journal of Project Management*, *32*(6), 932-943.

Fernández-Muñiz, B., Montes-Peón, J. M., & Vázquez-Ordás, C. J. (2007b). Safety culture: Analysis of the causal relationships between its key dimensions. *Journal of safety research*, *38*(6), 627-641.

Fernández-Muñiz, B., Montes-Peón, J. M., & Vázquez-Ordás, C. J. (2007a). Safety management system: Development and validation of a multidimensional scale. *Journal of Loss Prevention in the process Industries*, *20*(1), 52-68.

Fernández-Muñiz, B., Montes-Peón, J. M., & Vázquez-Ordás, C. J. (2009). Relation between occupational safety management and firm performance. *Safety science*, *47*(7), 980-991.

Fernández-Muñiz, B., Montes-Peón, J. M., & Vázquez-Ordás, C. J. (2014). Safety leadership, risk management and safety performance in Spanish firms. *Safety science*, *70*, 295-307.

Fleming, M. T., Flin, R. H., Mearns, K., & Gordon, R. P. (1996, January). The offshore supervisor's role in safety management: Law enforcer or risk manager. In *SPE Health, Safety and Environment in Oil and Gas Exploration and Production Conference*. Society of Petroleum Engineers.

Flin, R., Mearns, K., O'Connor, P., & Bryden, R. (2000). Measuring safety climate: identifying the common features. *Safety science*, *34*(1), 177-192.

Ford, M. T., & Tetrick, L. E. (2011). Relations among occupational hazards, attitudes, and safety performance. *Journal of occupational health psychology*,*16*(1), 48.

Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 39-50.

Frazier, C. B., Ludwig, T. D., Whitaker, B., & Roberts, D. S. (2013). A hierarchical factor analysis of a safety culture survey. *Journal of safety research*, *45*, 15-28.

Gadd, S., & Collins, A. M. (2002). *Safety culture: A review of the literature*. Health and Safety Laboratory.

Geldart, S., Smith, C. A., Shannon, H. S., & Lohfeld, L. (2010). Organizational practices and workplace health and safety: A cross-sectional study in manufacturing companies. *Safety Science*, *48*(5), 562-569.

Geller, E. S. (1994). Ten principles for achieving a Total Safety Culture. Professional Safety September, 18-24.

Gerede, E. (2015). A study of challenges to the success of the safety management system in aircraft maintenance organizations in Turkey. *Safety science*, *73*, 106-116.

Gill, J., & Johnson, P. (2010). *Research methods for managers*. Sage.

Glendon, A. I., & Litherland, D. K. (2001). Safety climate factors, group differences and safety behaviour in road construction. *Safety science*, *39*(3), 157-188.

Glendon, A. I., & Stanton, N. A. (2000). Perspectives on safety culture. *Safety Science*, *34*(1), 193-214.

Glendon, A. I., Mckenna, E. F. (1995). Human Safety and Risk Management. Chapman and Hall, London

Gordon, R., Flin, R., Mearns, K. and Fleming, M.T. (1996) 'Assessing the human factors causes of accidents in the offshore oil industry', *Third International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production*, New Orleans, LA

Gordon, R., Kirwan, B., & Perrin, E. (2007). Measuring safety culture in a research and development centre: A comparison of two methods in the Air Traffic Management domain. *Safety Science*, *45*(6), 669-695.

Gouldner, A. W. (1960). The norm of reciprocity: A preliminary statement. *American sociological review*, 161-178.

Governor, J. S., Gittens, R. P., Koh, H. K., Friedman, D. J., & Davis, L. K. (2002). Fatal occupational injuries in Massachusetts: Massachusetts Department of Public Health.

Grabowski, M., Ayyalasomayajula, P., Merrick, J., Harrald, J. R., & Roberts, K. (2007). Leading indicators of safety in virtual organizations. *Safety Science*, *45*(10), 1013-1043.

Graham, J. L., Mintu, A. T., & Rodgers, W. (1994). Explorations of negotiation behaviors in ten foreign cultures using a model developed in the United States. *Management Science*, *40*(1), 72-95.

Griffin, M. A., & Neal, A. (2000). Perceptions of safety at work: a framework for linking safety climate to safety performance, knowledge, and motivation. *Journal of occupational health psychology*, *5*(3), 347.

Guldenmund, F. W. (2000). The nature of safety culture: a review of theory and research. *Safety science*, *34*(1), 215-257.

Guldenmund, F. W. (2007). The use of questionnaires in safety culture research–an evaluation. *Safety Science*, *45*(6), 723-743.

Gupta, C. (2006). *Human Resource Management (Rev. edition, ed.).* New Delhi: Sultan Chand & Sons.

Hahn, S. E., & Murphy, L. R. (2008). A short scale for measuring safety climate. *Safety Science, 46*(7), 1047-1066.

Hair, J. F. Jr., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate Data Analysis (6th ed.)*. US: Prentice Hall. PTR.

Hair, J. F., Black, W. C., Babin, B. J. & Anderson, R. E. (2010). *Multivariate data analysis, a global perspective (7th ed.).* New Jersey, USA: Pearson Education Inc.

Hair, J. F., Money, A. H., Samouel, P. & Page, M. (2007). *Research methods for business. England: John Wiley & Sons Limited.*

Hajmohammad, S., & Vachon, S. (2014). Safety Culture: A Catalyst for Sustainable Development. *Journal of business ethics*, *123*(2), 263-281.

Hale, A. R. (2000). Editorial: culture's confusions. Safety science, 34, 1-14.

Hale, A. R. (2003). Safety management in production. *Human Factors and Ergonomics in Manufacturing & Service Industries*, *13*(3), 185-201.

Hämäläinen, P., Takala, J., & Saarela, K. L. (2006). Global estimates of occupational accidents. *Safety Science*, *44*(2), 137-156.

Harvey, J., Erdos, G., Bolam, H., Cox, M. A., Kennedy, J. N., & Gregory, D. T. (2002). An analysis of safety culture attitudes in a highly regulated environment. *Work & Stress*, *16*(1), 18-36.

Håvold, J. I. (2005). Safety-culture in a Norwegian shipping company. *Journal of Safety Research*, *36*(5), 441-458.

Hayes, A. F. (2009). Beyond Baron and Kenny: statistical mediation analysis in the new millennium. *Communication Monographs, 76*(4), 408-420.

He, A., Xu, S., & Fu, G. (2012). Study on the basic problems of safety culture. *Procedia engineering*, *43*, 245-249.

Health and Safety Executive (HSE) (2003), *Competence assessment for the hazardous industries*, HMSO, London.

Helmreich, R. L., & Merritt, A. C. (2005). Culture at work in aviation and medicine. *Burlington, VT: Ashgate Publishing*.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The Use Of Partial Least Squares Path Modeling in International Marketing.

Hofmann, D. A., & Stetzer, A. (1996). A cross-level investigation of factors influencing unsafe behaviors and accidents. *Personnel Psychology*, *49*(2), 307-339.

Hofmann, D. A., & Stetzer, A. (1998). The role of safety climate and communication in accident interpretation: Implications for learning from negative events. *Academy of Management Journal*, *41*(6), 644-657.

Hofmann, D. A., Morgeson, F. P., & Gerras, S. J. (2003). Climate as a moderator of the relationship between leader-member exchange and content specific citizenship: safety climate as an exemplar. *Journal of Applied Psychology*, *88*(1), 170.

Hsin Lin, Y. (2012). Modeling the important organizational factors of safety management system performance. *Journal of Modelling in Management*, *7*(2), 166-179.

Hsu, I. Y., Su, T. S., Kao, C. S., Shu, Y. L., Lin, P. R., & Tseng, J. M. (2012). Analysis of business safety performance by structural equation models. *Safety science*, *50*(1), 1-11.

Hsu, S. H., Lee, C. C., Wu, M. C., & Takano, K. (2008). A cross-cultural study of organizational factors on safety: Japanese vs. Taiwanese oil refinery plants. *Accident Analysis & Prevention*, *40*(1), 24-34.

Huang, Y. H., Ho, M., Smith, G. S., & Chen, P. Y. (2006). Safety climate and self-reported injury: Assessing the mediating role of employee safety control. *Accident Analysis & Prevention*, *38*(3), 425-433.

Hudson, P. (2007). Implementing a safety culture in a major multi-national. *Safety Science*, *45*(6), 697-722.

Hudson, P. T. W. (2001). Safety management and safety culture: the long, hard and winding road. *Occupational health and safety management systems*, 3-32.

Hughes, S. W., Tippett, D. D., & Thomas, W. K. (2004). Measuring project success in the construction industry. *Engineering Management Journal*, *16*(3), 31-37.

Hull, A. M., Alexander, D. A., & Klein, S. (2002). Survivors of the Piper Alpha oil platform disaster: long-term follow-up study. *The British Journal of Psychiatry*, *181*(5), 433-438.

Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: A review of four recent studies. *Strategic management journal*, *20*(2), 195-204.

Idubor, E. E., & Oisamoje, M. D. (2013). An exploration of health and safety management issues in Nigeria's effort to industrialize. *European Scientific Journal*, *9*(12).

Inkpen, A. C., & Birkenshaw, J. (1994). International joint ventures and performance: An inter-organizational perspective. *International Business Review*, *3*(3), 201-217.

Isioye, A. (2012, May 2012). Safety in Nigeria. Focus on safety issues. (Blog post). Retrieved from adeyinkalive.blogspot.com/2012_05_01archive.html.

Jannadi, M. O., & Al-Sudairi, A. (1995). Safety management in the construction industry in Saudi Arabia: Survey shows that level of company practice influences safety performance. *Building research and information*, *23*(1), 60-63.

Kao, L. H., Stewart, M., & Lee, K. H. (2009). Using structural equation modeling to predict cabin safety outcomes among Taiwanese airlines. *Transportation Research Part E: Logistics and Transportation Review*, *45*(2), 357-365.

Kath, L. M., Marks, K. M., & Ranney, J. (2010). Safety climate dimensions, leader–member exchange, and organizational support as predictors of upward safety communication in a sample of rail industry workers. *Safety Science*, *48*(5), 643-650.

Katz-Navon, T. A. L., Naveh, E., & Stern, Z. (2005). Safety climate in health care organizations: a multidimensional approach. *Academy of Management Journal*, *48*(6), 1075-1089.

Kawka, N., & Kirchsteiger, C. (1999). Technical note on the contribution of sociotechnical factors to accidents notified to MARS. *Journal of Loss Prevention in the process Industries*, *12*(1), 53-57.

Kelloway, E. K., Stinson, V., & MacLean, C. (2004). Eyewitness testimony in occupational accident investigations: Towards a research agenda. *Law and human behaviour*, *28*(1), 115.

Kennedy, R., & Kirwan, B. (1998). Development of a hazard and operability-based method for identifying safety management vulnerabilities in high risk systems. *Safety Science*, *30*(3), 249-274.

Khan, F. I., & Abbasi, S. A. (1999). Major accidents in process industries and an analysis of causes and consequences. *Journal of Loss Prevention in the process Industries*, *12*(5), 361-378.

Kines, P., Andersen, L. P., Spangenberg, S., Mikkelsen, K. L., Dyreborg, J., & Zohar, D. (2010). Improving construction site safety through leader-based verbal safety communication. *Journal of Safety Research*, *41*(5), 399-406.

Kirwan, B. (1998). Safety management assessment and task analysis–a missing link. *Safety Management: The Challenge of Change. Elsevier, Oxford*, 67-92.

Klein, A. S., Masi, R. J., & Weidner, C. K. (1995). Organization Culture, Distribution and Amount of Control, and Perceptions of Quality an Empirical Study of Linkages. *Group & Organization Management*, *20*(2), 122-148.

Kobusingye, O., Guwatudde, D., & Lett, R. (2001). Injury patterns in rural and urban Uganda. *Injury prevention*, *7*(1), 46-50.

Koch, J. L., & Steers, R. M. (1978). Job attachment, satisfaction, and turnover among public sector employees. *Journal of vocational behavior*, *12*(1), 119-128.

Krause, F. G., Gathmann, S., & Gorschewsky, O. (2008). The use of intramedullary helix wire for the treatment of proximal humerus fractures. *Journal of Orthopaedic Trauma*, *22*(2), 96-101.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and psychological Measurement*, 30, 607-610.

Krosnik, J.A. (1999). *Maximizing Questionnaire Quality.* In P.R. John, P.R. Shaver, & L.S.Wrightsman (Eds).San Diego, CA: Academic Press.

Labodová, A. (2004). Implementing integrated management systems using a risk analysis based approach. *Journal of cleaner production*, *12*(6), 571-580.

Lahiri, S., & Kedia, B. L. (2009). The effects of internal resources and partnership quality on firm performance: An examination of Indian BPO providers. *Journal of International Management*, *15*(2), 209-224.

Langdridge, D., (2004). Introduction to research methods and data analysis in Psychology. Pearson prentice Hall.

Lee, K. H., Yang, G., & Graham, J. L. (2006). Tension and trust in international business negotiations: American executives negotiating with Chinese executives. *Journal of International Business Studies*, *37*(5), 623-641.

Lee, T. R. (1996). Perceptions, attitudes and behaviour: the vital elements of a safety culture. *Health and Safety*, *10*, 1-15.

Lee, T., & Harrison, K. (2000). Assessing safety culture in nuclear power stations. *Safety science*, *34*(1), 61-97.

Leedy, P. D., & Ormrod, J. E. (2005). Practical research. *Planning and design*,*8*.

Leigh, D. E. (1989). *Assisting Displaced Workers. Do the States Have a Better Idea?* WE Upjohn Institute for Employment Research, 300 South Westnedge Avenue, Kalamazoo, MI 49007.

Leigh, J. P., Marcin, J. P., & Miller, T. R. (2004). An estimate of the US government's undercount of nonfatal occupational injuries. *Journal of Occupational and Environmental Medicine*, *46*(1), 10-18.

Levine, D. I., & Toffel, M. W. (2010). Quality management and job quality: How the ISO 9001 standard for quality management systems affects employees and employers. *Management Science*, *56*(6), 978-996.

Lin, J., & Mills, A. (2001). Measuring the occupational health and safety performance of construction companies in Australia. *Facilities*, *19*(3/4), 131-139.

Lin, S. H., Tang, W. J., Miao, J. Y., Wang, Z. M., & Wang, P. X. (2008). Safety climate measurement at workplace in China: A validity and reliability assessment. *Safety Science*, *46*(7), 1037-1046.

Lingard, H., Wakefield, R., & Cashin, P. (2011). The development and testing of a hierarchical measure of project OHS performance. *Engineering, Construction and Architectural Management*, *18*(1), 30-49.

Lohmoller, J. (1989). Latent Variable Path Modelling with Partial Least Squares. *Physica-Verlag, Heidelberg.*

Longoni, A., Pagell, M., Johnston, D., & Veltri, A. (2013). When does lean hurt?–an exploration of lean practices and worker health and safety outcomes. *International Journal of Production Research*, *51*(11), 3300-3320.

Lu, C. S., & Shang, K. C. (2005). An empirical investigation of safety climate in container terminal operators. *Journal of safety Research*, *36*(3), 297-308.

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate behavioral research*, *39*(1), 99-128.

Malhotra, N., & Peterson, M. (2006). Basic Marketing Research; a decision-making approach. *New Jersey*, *7458*.

Mannan, M. S., Mentzer, R. A., & Zhang, J. (2013). Framework for creating a Best-in-Class safety culture. *Journal of Loss Prevention in the Process Industries*, *26*(6), 1423-1432.

Martha, C., Sanchez, X., & Gomà-i-Freixanet, M. (2009). Risk perception as a function of risk exposure amongst rock climbers. *Psychology of Sport and Exercise*, *10*(1), 193-200.

McCune, D., Lewis, C., & Arendt, D. (2011). Safety culture in your safety management system. *Implementing safety management systems in aviation*, 135-160.

McDonald, N., Corrigan, S., Daly, C., & Cromie, S. (2000). Safety management systems and safety culture in aircraft maintenance organisations. *Safety Science*, *34*(1), 151-176.

McFadden, K. L., Henagan, S. C., & Gowen, C. R. (2009). The patient safety chain: Transformational leadership's effect on patient safety culture, initiatives, and outcomes. *Journal of Operations Management*, *27*(5), 390-404.

McFadden, K. L., Stock, G. N., & Gowen III, C. R. (2015). Leadership, safety climate, and continuous quality improvement: Impact on process quality and patient safety. *Health care management review*, *40*(1), 24-34.

McNeely, S. C. (2012). *Examining the Relationship between Organizational Safety and Culture and Safety Management System Implementation in Aviation*. Northcentral University.

Mearns, K., & Yule, S. (2009). The role of national culture in determining safety performance: Challenges for the global oil and gas industry. *Safety science*, *47*(6), 777-785.

Mearns, K., Whitaker, S. M., & Flin, R. (2003). Safety climate, safety management practice and safety performance in offshore environments. *Safety science*, *41*(8), 641-680.

Michael, J. H., Guo, Z. G., Wiedenbeck, J. K., & Ray, C. D. (2006). Production supervisor impacts on subordinates' safety outcomes: An investigation of leader-member exchange and safety communication. *Journal of Safety Research*, *37*(5), 469-477.

Mitchell, A., Sharma, G., von Thaden, T., Wiegmann, D., & Zhang, H. (2002). *Safety culture: a concept in chaos.* Paper presented at the 46th Annual Meeting of the Human Factors and Ergonomics Society, Santa Monica Human Factors.

Mock, C., Adjei, S., Acheampong, F., DeRoo, L., & Simpson, K. (2005). Occupational injuries in Ghana. *International journal of occupational and environmental health*, *11*(3), 238-245.

Mohamed, S. (2002). Safety climate in construction site environments. *Journal of construction engineering and management*, *128*(5), 375-384.

Mohammed, S. (2003). Scorecard approach to benchmarking organizational safety culture in construction. *Journal of Construction and Engineering Management, 128*, 375-384.

Morrow, S. L., Koves, G. K., & Barnes, V. E. (2014). Exploring the relationship between safety culture and safety performance in US nuclear power operations. *Safety Science*, *69*, 37-47.

Mumford, M. D., & Hunter, S. T. (2005). Innovation in organizations: A multi-level perspective on creativity. *Research in multi-level issues*, *4*, 11-74.

Murray, M., Fitzpatrick, D., & O'Connell, C. (1997). Fishermens blues: factors related to accidents and safety among Newfoundland fishermen. *Work & stress*, *11*(3), 292-297.

Nahm, A. Y., Vonderembse, M. A., & Koufteros, X. A. (2004). The impact of organizational culture on time-based manufacturing and performance. *Decision sciences*, *35*(4), 579-607.

Nahmens, I., & Ikuma, L. H. (2009). An empirical examination of the relationship between lean construction and safety in the industrialized housing industry. *Lean Construction Journal*, *1*, 1-12.

National Bureau of Statistics. (Oct, 2010). Nigerian manufacturing sector. Summary report. Retrieved from www.nigerianstat.gov.ng.

Naveh, E., & Erez, M. (2004). Innovation and attention to detail in the quality improvement paradigm. *Management Science*, *50*(11), 1576-1586.

Naveh, E., & Marcus, A. (2007). Financial performance, ISO 9000 standard and safe driving practices effects on accident rate in the US motor carrier industry. *Accident Analysis & Prevention*, *39*(4), 731-742.

Naveh, E., Katz-Navon, T., & Stern, Z. (2011). The effect of safety management systems on continuous improvement of patient safety: the moderating role of safety climate and autonomy. *The Quality Management Journal*, *18*(1), 54.

Nazir, N. A., & Lone, M. A. (2008). Validation of Denison's Model of Organisational Culture and Effectiveness in the Indian Context. *Vision: The Journal of Business Perspective*, *12*(1), 49-58.

Neal, A., & Griffin, M. A. (2002). Safety climate and safety behaviour. *Australian journal of management*, *27*(1), 67-75.

Nenonen, S. (2011). Fatal workplace accidents in outsourced operations in the manufacturing industry. *Safety Science*, *49*(10), 1394-1403.

Nevhage, B., & Lindahl, H. *A conceptual model, methodology and tool to evaluate safety performance in an organization*. Lunds tekniska högskola.

Noronha, C. (2002). *The theory of culture-specific total quality management*. Palgrave Macmillan.

Okparaocha. (2014, May 14). Poor safety culture inhibiting economic growth – ASSE. Retrieved from http://tribune.com.ng/news/news-headlines/item/6577.

Olive, C., O'Connor, T. M., & Mannan, M. S. (2006). Relationship of safety culture and process safety. *Journal of Hazardous Materials*, *130*(1), 133-140.

Omokhodion, F. (2009). Occupational Health in Nigeria. Journal of Occupational Medicine, Vol. 59, 3-201.

Oppenheim, A.N. (1992).*Questionnaire design, interviewing and attitude measurement.* London: Pinter Publishers.

Organ, D. W., Podsakoff, P. M., & MacKenzie, S. B. (2006). *Organizational citizenship behavior: Its nature, antecedents, and consequences.* USA: Sage Publications, Inc.

Ostrom, L., Wilhelmsen, C., & Kaplan, B. (1993). Assessing safety culture.*Nuclear safety*, *34*(2), 163-172.

O'Toole, M. (2002). The relationship between employees' perceptions of safety and organizational culture. *Journal of safety research*, *33*(2), 231-243.

Oyawale, F. A., Odior, A. O., & Bolanle, R. O. (2011). Evaluation of safety practices and performance in a brewery industry in Nigeria between 2000–2007.*Journal of Applied Sciences and Environmental Management*, *15*(1).

Pallant, J. (2007). SPSS survival manual: A step-by-step guide to data analysis using SPSS version 15. *Nova Iorque: McGraw Hill*.

Parker, D., Lawrie, M., & Hudson, P. (2006). A framework for understanding the development of organisational safety culture. *Safety Science, 44*(6), 551-562.

Parten, M. (1950).*Surveys, polls and samples: practical procedures.* New York: Harper and Brothers.

Paul, P. S., & Maiti, J. (2007). The role of behavioral factors on safety management in underground mines. *Safety Science*, *45*(4), 449-471.

Pekovic, S. (2015). Quality and environmental management practices: their linkages with safety performance. *Production Planning & Control*, (ahead-of-print), 1-15.

Pessemier, W. (2009). Improving safety performance by understanding perceptions of risk and improving safety management systems. *International Journal of Emergency Services*, *1*(1), 10 – 28.

Pidgeon, N. F. (1991). Safety culture and risk management in organizations. *Journal of cross-cultural psychology*, (22), 129-140.

Piercy, N. F., Cravens, D. W., Lane, N., & Vorhies, D. W. (2006). Driving organizational citizenship behaviors and salesperson in-role behavior performance: The role of management control and perceived organizational support. *Journal of the Academy of Marketing Science*, *34*(2), 244-262.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior research methods, instruments, & computers*, *36*(4), 717-731.

Prussia, G. E., Brown, K. A., & Willis, P. G. (2003). Mental models of safety: do managers and employees see eye to eye?. *Journal of Safety Research*, *34*(2), 143-156.

Ramayah, T., Samat, N., & Lo, M. C. (2011). Market orientation, service quality and organizational performance in service organizations in Malaysia.*Asia-Pacific Journal of Business Administration*, *3*(1), 8-27.

Rauch, A., Wiklund, J., Lumpkin, G. T., & Frese, M. (2009). Entrepreneurial orientation and business performance: An assessment of past research and suggestions for the future. *Entrepreneurship theory and practice*, *33*(3), 761-787.

Reader, T. W., Noort, M. C., Shorrock, S., & Kirwan, B. (2015). Safety sans Frontières: an international safety culture model. *Risk analysis*.

Reason, J. (1990). *Human error*. Cambridge university press.

Reason, J. (2000). Human error: models and management. *Bmj*, *320*(7237), 768-770.

Reason, J. T., & Reason, J. T. (1997). *Managing the risks of organizational accidents* (Vol. 6). Aldershot: Ashgate.

Richter, A., & Koch, C. (2004). Integration, differentiation and ambiguity in safety cultures. *Safety Science*, *42*(8), 703-722.

Roscoe, J. T. (1975). *Fundamental research statistics for the behavioural sciences (p. 239)*. New York: Holt, Rinehart and Winston.

Rousseau, D. M. (1990). New hire perceptions of their own and their employer's obligations: A study of psychological contracts. *Journal of organizational behavior*, *11*(5), 389-400.

Rundmo, T. (1994).Associations between safety and contingency measures and occupational accidents on offshore petroleum platforms. *Scandinavian Journal of Work and Environmental Health, 20*, 128–131.

Salkind, N. J. (2003). Exploring research. ISBN-10: 0130983527 USA.

Samajdar, C. (2014, January). Triple bottom line strategy for sustainable steel industry. In *Business and Information Management (ICBIM), 2014 2nd International Conference on* (pp. 101-103). IEEE.

Sangosanya, A. O. (2011). Firm's growth dynamics in Nigeria's manufacturing industry: A panel analysis. *Journal of Applied Econometric Review*, *1*(1), 1-18.

Santos-Reyes, J., & Beard, A. N. (2009). A systemic analysis of the Edge Hill railway accident. *Accident Analysis & Prevention*, *41*(6), 1133-1144.

Sawacha, E., Naoum, S., & Fong, D. (1999). Factors affecting safety performance on construction sites. *International Journal of Project Management*, *17*(5), 309-315.

Sekaran, U. (2000) Research Methods of Business-A Skill-Building Approach. NY: *John Wiley and Sons, Inc*.

Sekaran, U. (2003) Research Methods for Business: A Skill Building Approach. .*John Willey and Sons, New York*.

Sekaran, U., & Bougie, R. (2010). Research method for business. A skill building approach (4th ed.). NY: *John Wiley and Sons, Inc*.

Seo, D. C., Torabi, M. R., Blair, E. H., & Ellis, N. T. (2004). A cross-validation of safety climate scale using confirmatory factor analytic approach. *Journal of safety research*, *35*(4), 427-445.

Sgourou, E., Katsakiori, P., Goutsos, S., & Manatakis, E. (2010). Assessment of selected safety performance evaluation methods in regards to their conceptual, methodological and practical characteristics. *Safety science*, *48*(8), 1019-1025.

Shah, R., & Ward, P. T. (2003). Lean manufacturing: context, practice bundles, and performance. *Journal of operations management*, *21*(2), 129-149.

Shang, K. C., & Lu, C. S. (2009). Effects of safety climate on perceptions of safety performance in container terminal operations. *Transport reviews*, *29*(1), 1-19.

Shang, K. C., Yang, C. S., & Lu, C. S. (2011). The effect of safety management on perceived safety performance in container stevedoring operations. *International Journal of Shipping and Transport Logistics*, *3*(3), 323-341.

Shannon, H. S., Mayr, J., & Haines, T. (1997). Overview of the relationship between organizational and workplace factors and injury rates. *Safety Science*, *26*(3), 201-217.

Sharma, P. N. & Kim, K. H. (2012). Model selection in information system Research using Partial Least Squares Based Structural Equation Modelling.

Singer, S., Lin, S., Falwell, A., Gaba, D., & Baker, L. (2009). Relationship of safety climate and safety performance in hospitals. *Health services research*,*44*(2p1), 399-421.

Siu, O. L., Phillips, D. R., & Leung, T. W. (2004). Safety climate and safety performance among construction workers in Hong Kong: the role of psychological strains as mediators. *Accident Analysis & Prevention*, *36*(3), 359-366.

Smith, E., Loftin, R., Murphy-Hill, E., Bird, C., & Zimmermann, T. (2013, May). Improving developer participation rates in surveys. In *Cooperative and Human Aspects of Software Engineering (CHASE), 2013 6th International Workshop on* (pp. 89-92). IEEE.

Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. *Sociological methodology*, *13*(1982), 290-312.

Sorensen, J. N. (2002). Safety culture: A survey of the state of the art. *Reliability Engineering and System Safety*, 76(2002), 189-204.

Stolzer, A. J., Halford, C. D., & Goglia, J. J. (2008). *Safety management systems in aviation*. Ashgate Publishing, Ltd.

Sudman, S., & Bradburn, N. M. (1982). Asking questions: a practical guide to questionnaire design.

Tabachnick, B.G., & Fidell, L.S. (2007). *Using multivariate statistics* (5th ed.). Boston: Pearson Education Inc.

Teo, E. A. L., Ling, F. Y. Y., & Chong, A. F. W. (2005). Framework for project managers to manage construction safety. *International Journal of project management*, *23*(4), 329-341.

Tharaldsen, J. E., Mearns, K. J., & Knudsen, K. (2010). Perspectives on safety: The impact of group membership, work factors and trust on safety performance in UK and Norwegian drilling company employees. *Safety science*, *48*(8), 1062-1072.

The Nigerian Voice (Jan, 2011). Safety at work Nigerian workers, the endangered specie: http://www.thenigerianvoice.com/nvnews/42628/1/safety-at-work-nigerian-workers-the-endangered-spe.html.

Thompson, R.C., Hilton, T.F. and Witt, L.A. (1998) 'Where the safety rubber meets the shop floor: a confirmatory model of management influence on workshop safety', *Journal of Safety Research*, Vol. 29, pp.15–24.

Tregaskis, O., Daniels, K., Glover, L., Butler, P., & Meyer, M. (2013). High performance work practices and firm performance: A longitudinal case study. *British Journal of Management*, *24*(2), 225-244.

Umeokafor, N., Isaac, D., Jones, K., & Umeadi, B. (2014). Enforcement of occupational safety and health regulations in Nigeria: An exploration. *European Scientific Journal*.

Vassie, L. H., & Lucas, W. R. (2001). An assessment of health and safety management within working groups in the UK manufacturing sector. *Journal of safety research*, *32*(4), 479-490.

Vinodkumar, M. N., & Bhasi, M. (2010). Safety management practices and safety behaviour: Assessing the mediating role of safety knowledge and motivation. *Accident Analysis & Prevention*, *42*(6), 2082-2093.

Vinzi, V. E., Lauro, C., & Tenenhaus, M. (2003). *PLS path modeling*. (Working Paper). DMS –University of Naples, HEC – School of Management, Jouy-en-Josas.

Voon, M. L., Lo, M. C., Ngui, K. S., & Ayob, N. B. (2011). The influence of leadership styles on employees' job satisfaction in public sector organizations in Malaysia. *International Journal of Business, Management and Social Sciences*, *2*(1), 24-32.

Vredenburgh, A. G. (2002). Organizational safety: which management practices are most effective in reducing employee injury rates? *Journal of safety Research*, *33*(2), 259-276.

Wang, C. H., & Liu, Y. J. (2012). Omnidirectional safety culture analysis and discussion for railway industry. *Safety science*, *50*(5), 1196-1204.

Wang, M. K. H. (2011). Safety Culture and Safety Management Systems–Enhancing the Heartware of Managing Aviation Safety. *Journal of Aviation Management 2011*, 59.

Warwick, D. P., & Lininger, C. A. (1975). *The sample survey: Theory and practice*. McGraw-Hill.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic management journal*, *5*(2), 171-180.

Wiklund, J., & Shepherd, D. (2003). Research notes and commentaries: knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses. *Strategic management journal*, *24*(13), 1307-1314.

Woo, G. S. (2015). Starting a Safety Management System Culture in Small Flight School Organizations. *Journal of Aviation/Aerospace Education & Research*, *24*(3), 1-32.

Wood, S., & Wall, T. (2002). Human Resource Management and Business Performance.

Wu, T. C., Chang, S. H., Shu, C. M., Chen, C. T., & Wang, C. P. (2011). Safety leadership and safety performance in petrochemical industries: The mediating

role of safety climate. *Journal of Loss Prevention in the Process Industries*, *24*(6), 716-721.

Wu, T. C., Chen, C. H., & Li, C. C. (2008). A correlation among safety leadership, safety climate and safety performance. *Journal of loss prevention in the process industries*, *21*(3), 307-318.

Yong, K. T., & Pheng, L. S. (2008). Organizational culture and TQM implementation in construction firms in Singapore. *Construction Management and Economics*, *26*(3), 237-248.

Yorio, P. L., & Wachter, J. K. (2014). The impact of human performance focused safety and health management practices on injury and illness rates: Do size and industry matter? *Safety science*, *62*, 157-167.

Zacharatos, A., Barling, J., & Iverson, R. D. (2005). High-performance work systems and occupational safety. *Journal of Applied Psychology*, *90*(1), 77.

Zhang, H., Wiegmann, D. A., Von Thaden, T. L., Sharma, G., & Mitchell, A. A. (2002, September). Safety culture: a concept in chaos? In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 46, No. 15, pp. 1404-1408). SAGE Publications.

Zikmund, V. (2003). Health, well-being, and the quality of life: Some psychosomatic reflections.

Appendix A

SURVEY QUESTIONNAIRE

THE MEDIATING EFFECT OF SAFETY MANAGEMENT SYSTEM ON THE RELATIONSHIP BETWEEN SAFETY CULTURE AND SAFETY PERFORMANCE IN LAGOS (NIGERIA) FOOD & BEVERAGE MANUFACTURING INDUSTRY

TO WHOM IT MAY CONCERN

Dear Sir/Ma,

You are humbly selected to be part of the respondents of this research because your position falls into either the safety officer or risk officer in one of the Food and Beverage manufacturing industry in Lagos Nigeria. This survey is to investigate the mediating effect of safety management system on the relationship between safety culture and safety performance in the Nigerian F&B manufacturing industry. Responses to the items posed in this inquiry are graded by a five-point interval scale. We humbly request for your sincere and objective responses. Your responses are promised to be treated with confidentiality and shall be exclusively used for the purpose of this research.

This questionnaire comprises four sections. The first section asks with questions about the respondent's demographic details, and the second section contains items measuring safety culture. Section three and four respectively contain items measuring safety management system and safety performance.

Thank you.

Yours faithfully,
Victor Olabode Otitolaiye

Section I: Demographic Details

A. Your Job Position

1	**2**	**3**
Junior	Middle	Senior

B. Gender: M or F

C. Years of Experiences:

i. ( ) below 3 years ii. ( ) 4-6 years iii. ( ) 7-9 years

iv. ( ) Above 10 years

D. Qualification:

i. ( ) OND. ii. ( ) HND iii. ( ) Degree iv. ( ) MSc. v. ( ) PhD.

E. No. of Employee: i. **( )** 250 to 499. ii. ( ) 500 to 999. iii. ( ) 1000 and above

F. Ownership: i. Multinational .ii. Private

Guiding Instruction

On the following scale, please indicate the appropriate number which best reflect your perception

(1) Strongly disagree SD	(2) Disagree D	(3) Neutral N	(4) Agree A	(5) Strongly Agree SA

Section II: safety culture

Based on the provided scale please tick to indicate your level of agreement toward the statement	**SD**	**D**	**N**	**A**	**SA**
1. Senior management listens to and cares about employees' safety concerns					
2. The firm's management is driving the workforce to be a safety-centred organization					
3. The firm's management acts upon the employees' suggestions regarding safety matters					
4. The firm's employees encourage each other to report any safety concerns they might have					
5. Employees' safety is constantly reinforced as a priority					
6. The firm's management knowingly compromise safety concerns for productivity					
7. **The firm's employees adhere to the established safety rules and guidelines**					

Section III: Safety Management System

Based on the provided scale please tick to indicate your level of agreement toward the statement	SD	D	N	A	SA
1. Firm coordinates its health and safety policies with other HR policies to ensure commitment and well-being of workers.					
2. Written declaration is available to all workers reflecting management's concern for safety, principles of action and objectives to achieve.					
3. Safety policy contains commitment to continuous improvement attempting to improve objectives already achieved.					
4. Incentives are frequently offered to workers to put in practice principles and procedures of action (e.g. correct use of protective equipment).					
5. Resolutions are frequently adopted that originated from consultations with or suggestions from workers.					
6. Meetings are periodically held between managers and workers to take decisions affecting organization of work.					
7. There are frequent use of teams made up of workers from different parts of organization to resolve specific problems relating to working conditions.					
8. Workers are given sufficient training period when entering firm, changing jobs or using new technique.					
9. Training actions are continuously and periodically integrated in formal established training plans.					
10. Training plans are decided jointly with workers or their representatives.					
11. Firm help workers to train in house (leave, grants).					
12. Instruction manuals or work procedures are elaborated to aid in preventive actions.					
13. There is a fluent communication embodied in periodic and frequent meetings, campaigns or oral presentations to transmit principles and rules of action.					
14. Information system are made available to affected workers prior to modifications and changes in production processes, job positions or rules of action.					
15. Written circulars are elaborated and meetings organized to inform workers about risks associated with their work and how to prevent accidents.					
16. Prevention plans formulated setting measures to					

take on basis of information provided by evaluation of risks in all job positions.					
17. Prevention plans are circulated among all workers.					
18. Prevention plans are periodically reviewed and updated when job conditions are modified or workers health damaged.					
19. Firms has elaborated emergency plan for serious risks or catastrophes.					
20. Firm has implemented its emergency plan.					
21. All workers are informed about emergency plan.					
22. Periodic simulations are carried out to check efficacy of emergency plan.					
23. Periodic checks are conducted on execution of prevention plans and compliance level of regulations.					
24. Standard or pre-determined plans and actions are compared, evaluating implementation and efficacy in order to identify corrective action.					
25. Procedures are put in place (reports, periodic statistics) to check achievement of objectives allocated to managers.					
26. Systematic inspections are conducted periodically to ensure effective functioning of whole system					
27. Accidents are reported, investigated, analysed and recorded.					
28. Firm's accidents rates are regularly compared with those of other organizations from same sector using similar production processes.					
29. Firm's techniques and management practices are regularly compared with those of other organizations from all sectors, to obtain new ideas about management of similar problems.					

Section IV: Safety Performance
ED (1) =extremely dissatisfied, D (2) =dissatisfied, N (3) =neutral, S (4) =satisfied, ES (5) =extremely satisfied

Please indicate your degree of satisfaction with the following	**ED**	**D**	**N**	**S**	**ES**
1. Satisfaction with number of personal injuries.					
2. Satisfaction with number of material damages.					

3. Satisfaction with employee motivation.					
4. Satisfaction with absenteeism.					

Do you have any other comments about health and safety in your workplace?

_____
_____
_____
_____
_____
_____
_____