LEADERSHIP STYLES AND SAFETY BEHAVIOURS WITH SAFETY CLIMATE AS A MEDIATOR A MONG OIL AND GAS WORKERS

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ABSTRACT

Existing submissions from industry practitioners and researchers suggest a high rate of occupational accidents, injuries and fatalities occasioned by poor safety and health management systems, and attendant safety-related behaviours in the Nigerian oil and gas industry. In an attempt to improve employees' safety behaviours, this study investigated the relationship between leadership styles, safety climate and safety behaviours in the Nigerian O & G industry. Specifically, this study examines the influence of authentic leadership, inclusive leadership, safety climate on components of safety behaviours namely, safety compliance, safety participation and risky behaviour. Via a cross-sectional design and quantitative approach, the study was conducted among 319 systematically selected O & G workers in Rivers State, Nigeria. The PLS-SEM tool (SmartPLS 3.0) was used in analyzing the data collected from the respondents. The findings of the study indicated that the direct relationships between authentic and inclusive leadership styles with safety climate were positively significant. Also, the study found direct significantly positive relationships between safety climate and safety compliance and safety participation. However, the relationship between safety climate and risky behaviour was negative. Similarly, safety climate mediated the relationship between the authentic and inclusive leadership styles with safety compliance and safety participation, but not with risky behaviour. Based on the findings, it can be concluded that the authentic leadership and inclusive leadership styles are critical to positively shaping the safety climate perceptions of O & G workers. Positively shaped safety climate perceptions should in-turn determine the positive safety behaviours of the workers. Consequently, theoretical and practical implications, in addition to recommendations for future research are holistically discussed.

Keywords: Authentic Leadership, Inclusive Leadership, Safety Climate, Safety Behaviour, Oil and Gas Industry, Nigeria

ABSTRAK

Maklumat sedia ada daripada pengamal industri dan penyelidik menunjukkan kadar kemalangan, kecederaan dan kematian yang tinggi dalam pekerjaan. Hal ini berpunca daripada sistem pengurusan keselamatan dan kesihatan yang lemah, dan tingkah laku berkaitan keselamatan atendan dalam industri minyak dan gas di Nigeria. Dalam usaha untuk meningkatkan aspek tingkah laku keselamatan pekerja, kajian ini menyelidik hubungan antara gaya kepimpinan, iklim keselamatan dan tingkah laku keselamatan dalam industri minyak dan gas di Nigeria. Kajian ini menyelidik secara menyeluruh pengaruh kepimpinan autentik, kepimpinan inklusif, iklim keselamatan dan komponen tingkah laku keselamatan iaitu, pematuhan keselamatan, penyertaan keselamatan dan tingkah laku berisiko. Melalui reka bentuk keratan rentas dan pendekatan kuantitatif, kajian ini dijalankan ke atas 319 orang pekerja minyak dan gas yang dipilih secara sistematik di Rivers State, Nigeria. Perisian PLS-SEM (SmartPLS 3.0) digunakan untuk menganalisis data yang diperoleh daripada responden. Dapatan kajian menunjukkan bahawa hubungan langsung antara gaya kepimpinan autentik dan gaya kepimpinan inklusif dengan iklim keselamatan adalah positif secara signifikan. Kajian ini juga menemui hubungan langsung yang positif dan signifikan antara iklim keselamatan dan pematuhan keselamatan, serta penyertaan keselamatan. Walau bagaimanapun, hubungan di antara persekitaran keselamatan dan tingkah laku berisiko adalah negatif. Iklim keselamatan juga didapati mengantarakan hubungan antara gaya kepimpinan autentik dan gaya kepimpinan inklusif dengan pematuhan keselamatan serta penyertaan keselamatan, tetapi tidak bagi tingkah laku berisiko. Berdasarkan hasil kajian, dapat disimpulkan bahawa gaya kepimpinan autentik dan gaya kepimpinan inklusif adalah penting untuk membentuk persepsi positif iklim keselamatan pekerja industri minyak dan gas. Persepsi positif iklim keselamatan ini seterusnya menentukan tingkah laku positif keselamatan pekerja. Seterusnya, selain cadangan untuk kajian akan datang, implikasi teori dan praktikal turut dibincangkan secara holistik.

Kata kunci: kepimpinan autentik, kepimpinan inklusif, iklim keselamatan, tingkah laku keselamatan, industri minyak dan gas, Nigeria

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-- John F. Kennedy.

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LIST OF ABBREVIATIONS

O & G	Oil and Gas
GDP	Gross Domestic Product
OSH	Occupational Safety and Health
HSE	Health, Safety and Environment
NNPC	Nigerian National Petroleum Corporation
OPEC	Organization of the Petroleum Exporting Countries
SET	Social Exchange Theory
SST	Social Systems Theory
HPWS	High Performance Work Systems
SMPs	Safety Management Practices
DPR	Department of Petroleum Resources
CMV	Commom Method Variance
AVE	Average Variance Extracted
MV	Common Method Variance
PhD	Doctor of Philosophy
PLS	Partial Least Squares
Q^2	Construct Cross-validated Redundancy
R^2	R-squared values
SEM	Structural Equation Modelling
SET	Social Exchange Theory
SPSS	Statistical Package for the Social Sciences

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

Workplace safety has been identified as an integral part of organizational activities (Beus, Payne, Bergman, & Arthur, 2010; Cagno, Micheli, Jacinto, & Masi, 2014; Sinelnikov, Inouye, & Kerper, 2015), yet remains a serious challenge in view of workers' continuous exposure to chemical, ergonomic, biological, psychosocial and related hazards (Leka, Jain, Iavicoli, Vartia, & Ertel, 2011; Lievens & Vlerick, 2013). Interestingly, the increasing cases of major accidents, injuries and work-related incidences have contributed to the growing concern among industry practitioners and researchers on the need to improve safety in workplaces (Cavazza & Serpe, 2009; Goh, Love, Stagbouer, & Annesley, 2012; Li, Jiang, Yao, & Li, 2013). Also, the increasing direct and indirect costs associated with these occurrences of workplace accidents, injuries and possible eventual fatalities have further contributed to the growing attention being paid to improving workplace safety (Neal & Griffin, 2002; Shalini, 2009).

Direct costs associated with workplace incidents accrue to companies in the form of medical and health bills, claims for permanent incapacitation and death, damages to work equipment, forfeitures, penalties, legal liabilities and continuous expenses for improvements to HSE activities (Pessemier, 2009; Moore, 2009; Battaglia, Marco, & Passetti, 2014). On the contrary, indirect costs accruable as a result of workplace incidents accrue in the form of production losses, increases in insurance costs, loss of confidence, absenteeism, increased staff turnover and denting of corporate image

(Moore, 2009). Others are pain, suffering, grief and loss to employees and related persons (Nahrgang, Morgeson, & Hofmann, 2007; Bell, O'Connell, Reeder, & Nigel, 2008; Pessemier, 2009; Battaglai et al., 2014).

Despite efforts directed toward the concerted and sustained efforts aimed at reducing the number of work-related unsafe occurrences, and in improving safety behaviours across organizations, global records indicate that in every 15 seconds 153 workers are involved in a work-related accident and a worker dies therefrom or from a disease (International Labour Organization, 2015). On the average, 6,300 people die from occupational accidents on a daily basis out of the 317 million accidents that occur in workplaces (ILO, 2015). Furthermore, the economic cost of workplace accidents and injuries is staggering, varying between 1.8% and 6.0% Gross Domestic Product (GDP) across various countries (Takala *et al*., 2014). The ILO (2015) further noted that 4% of various nations' GDP or about US$2.8 trillion is lost as a result of occupational accidents and diseases.

In the Nigerian work setting, accidents, injuries and fatalities do occur (Umeokafor *et al*., 2014), and Nigeria is noted to have the highest number of recorded workplace fatal accidents in Sub-Saharan Africa (Hamalainen, Takala, & Sareela, 2006). For instance, in year 2012 only, statistics show that 185 lives were lost in 470 fire incidents that occurred in Nigeria. Of the totality of the incidents, 168 lives were lost in 164 fire incidences specifically in the oil and gas (O & G) sector (Premium Times, 2016). In specific comparison to other industries, Table 1.1 is an illustration of the number of accidents and fatalities based on industry records from 2002 to 2015. A further look at the table indicates that the highest number of fatality rate per injured worker is reported from the petroleum and gas industry.

Table 1.1
Accidents and Fatalities Rate in the Nigerian Work Setting (2002-2015)

Industry	**Number of Incidents/Accidents**	**Number of Injuries**	**Number of Deaths**
Food Processing	301	32	19
Building Construction	752	18	19
Wood and wood products	72	18	3
Petroleum/Gas	81	3	24
Production and Recycling	16	5	1
Manufacturing of Rubber Products	409	50	29

Source: Umeokafor et al. (2014)

Evidently, though accidents are used to measure the level of safety in workplaces, a lack of accidents cannot be used to infer the presence of safety (Beus, McCord, & Zohar, 2016). The above fact is predicated upon the notion that incidents are a function of a myriad of organizational factors such as unsafe behaviours and inherent failures in organizational systems with or without the presence of effective safety management systems (Beus *et al*., 2016). Hence, the researcher may not solely depend on the illustration in Table 1.1 as the major drive for examining the O & G sector, but the mere presence of inherent behaviours that causes accidents calls for concern. This is in line with the submission of Beus *et al*. (2016) who noted that safety-related work behaviours are more accurate workplace safety indicators because they can be used to infer both the absence and presence of safety.

Characteristically, Martins *et al*. (2012) noted that accident-related figures presented might not be a true representation of the reality on ground, as there is actually a 70% underreporting of accidents in Africa. More so, the researcher also noted an unavailability of a structured OSH database in Nigeria where OSH-related statistics can be extracted. This has made it difficult to do an accurate trend and comparative analysis. Available data are thus scattered, with a compilation of accidents and injuries statistics done based on empirical submissions of other researchers. The researcher further supports the position of Martins *et al*. (2012) who noted a 70% underreporting of accidents in Africa to note that statistics on accidents, injuries and fatalities rate in Nigeria are shrouded in secrecy, inaccessible, company specific and somewhat untrue based on observations on researchers and related industry practitioners. Cases are actually higher than what is supposedly reported.

The need for increased efforts directed toward continuous improvements in workplace safety is noted above. However, of present concern is the need to improve workplace safety in the O & G industry. Specifically, loads of empirical underpinnings and industry-based opinions further noted that increases in workplace accidents and injuries and related costs call for additional enquiries aimed at suggesting ways of improving workplace safety (Attwood, Khan, & Veitch, 2006; Kane, 2010; Sneddon, Mearns, & Flin, 2013; Bergh, Hinna, Leka, & Jain, 2014). Also, the hazardous nature of the O & G work environment and the risks such environment pose to workers also contribute to the call for concern (Dahl & Olsen, 2013; Wold & Lauman, 2015).

In Nigeria, the need for improving workplace safety is noted in the O & G industry specifically because of the high rates of accidents, injuries and fatalities so reported therefrom (Umeokafor *et al.*, 2014; Energy Mix Report, 2016). More so, O & G worksites in Nigeria are gradually becoming killing fields due to poor workplace safety practices (Vanguard, 2013). Surprisingly, from April 2009 to April, 2010, over 100 work-related fatalities and billions of Naira from damages and compensations were reported in the industry (The Nigerian Voice, 2011).

Furthermore, the O & G industry is the main income earner and chief contributor of the nation's GDP (ThisDay, 2014), contributing to about 35% of the GDP, and exports from petroleum products represents over 90% of the total exports revenue of the country (OPEC, 2015). Since the industry employs 10% of Nigeria's labour force (InterNations, 2015) and in view of the number of workplace accidents therein reported, by deduction, the need for improvements in workplace safety concerns cannot be over-emphasized. Additionally, major global O & G accidents triggered the need for empirical endeavours aimed at addressing safety concerns within the industry. For example, the Deepwater Horizon oil disaster (Skogdalen, Utne, & Vinnem, 2011) and the BP oil disaster (Cherry & Snierson, 2011). Similarly, the Chevron Nigeria explosion, the Nigeria deep sea drilling explosion and the Port Harcourt oil vessel explosion (Arnold Itkin, 2011) are typical major O & G accidents that have raised concerns and the need for efforts directed towards improving safety in the industry and especially amongst its workforce.

Evidently, the nature and frequency of accidents in the global O & G industry has been attributed to the role social and organizational factors play in the aetiology of these incidences (Cullen, 1990; Mearns, Whitaker, & Flin, 2003; Reason, 2016; Ashanka & Ranasinghe, 2016; Johnson, Haegeli, & Hendrikx, 2016). More so, errors from human behaviours predicated upon non-compliance to rules and regulations, non-participation in safety-related activities and risk-taking tendencies have been attributed to be the major causes of workplace accidents (Reason, 1997; Adie, *et al*., 2005; Johnson, 2007; Bottani, Monica & Vignali, 2009; Gibb, Lingard, Behm, & Cooke, 2014; Griffin, Young, & Stanton, 2015; Strauch, 2016) and especially the oil and gas industry (Mearns & Yule, 2009; Norway, Petroleum Safety Authority, 2011a, b; Hopkins, 2011; Dahl, 2013). Furthermore, in the Nigerian O & G setting, complacency, lack of attention and non-compliance to safety-related issues are noted to be the key triggers of most accidents (ArnoldItkin, 2011; Department of Petroleum Resources, 2012; Wakilbe, 2012).

Interestingly, so much attention has been paid to identifying and maintaining socio-psychological organizational activities that are capable of improving workplace safety through appropriate proactive safety behaviours in the O & G sector (Dahl & Olsen, 2013). However, eliminating the occurrences of these hazardous conditions is still far from being accomplished. Furthermore, despite technological and structural improvements made so far in reducing accidents in the industry, operators and researchers believe that more is still to be done to further improve safety-related behaviours (Mearns & Reader, 2008; Maslen & Hopkins, 2014). Where this is not done, and incidences continue to occur in the Nigerian O & G industry, the effects of inaction could be cataclysmic. Hence the call for efforts geared towards effectively and efficiently managing activities that improve safety behaviours in the O & G industry (Didla, Mearns, & Flin, 2009; Sneddon *et al*., 2013; Bergh *et al*., 2014).

This study is therefore important on the premise that identifying factors that are critical to improving safety behaviours in the O & G industry will be worthwhile. This is in view of the extant theoretical and managerial postulations so presented in this section of the thesis. Basically, safety behaviours of workers are bound to change, costs probably and likely to be incurred from accidents, injuries and fatalities will be directed towards workplace improvement initiatives. The whole of these would make the O & G safer, and by extension ensure its continuous contribution to Nigeria's economy.

1.1.1 SUMMARY OF THE OIL AND GAS INDUSTRY AND OVERVIEW OF OCCUPATIONAL SAFETY AND HEALTH SYSTEMS IN NIGERIA

Nigeria, with a population of over 170 million people is one of the countries located in the Sub-Saharan Africa region and with a total land mass of 923, 768.64 sq.km as at 2015. It shares borders with the Gulf of Guinea to the south, Niger Republic and Chad in the north, Republic of Benin to the west and the Cameroon to the east. In 2015, Nigeria was ranked the largest economy in Africa, followed by South Africa and Egypt, but has however lost that position to South Africa upon the re-calculation of its Gross Domestic Product (GDP) (Wikipedia, 2107). Evidently, in 2014 and early 2015, Nigeria was named the third fastest growing economy in the world by the CNNMoney (Vanguard, 2016). Presently, Nigeria is nowhere among the first 14 fastest growing economies in Africa. One of the major reasons adduced to this fall in the economic growth of Nigeria is the slump in crude oil prices (Vanguard, 2016), the Boko Haram insurgency, corruption and general systems mismanagement and failures.

As of 2015, Nigeria was noted to be the largest oil producer in Africa and is among the top ten countries in the world with oil and natural gas endowments. Specifically, the country houses the second largest confirmed oil reserves in Africa with 37.2 million barrels of oil and 180 trillion cubic feet (Tcf) of natural gas (Adams & Opoku, 2017). However, militancy and security issues and attendant business risks have greatly reduced efforts aimed at sustaining the drive for continued exploration efforts (INVESTOPEDIA, 2016). Upon the discovery of crude oil by the Shell Group in 1956 in Oloibiri, Old Rivers State, Niger Delta, Nigeria, oil, gas and related petroleum resources has been an essential component of Nigeria's socio-economic and political existence. Before the advent of the Nigerian National Petroleum Corporation in 1977, which was mainly set up for regulatory purposes, non-Nigerian multinational companies were the key players in the industry. They completely dominated crude oil exploration, drilling, refining and export. It was until the 1990s that Nigerian companies started making entry into the industry (KPMG, 2014).

Prior to the complete regulation and control of the oil industry, the interest of government in the industry was centered on collecting taxes, royalties and lease rentals (Olojede, Fajonyomi, Akhape & Mudashiru, 2003). However, this situation changed with the adoption of the United Nations' Resolution 1803 (XVII) which gave countries sovereign ownership over natural resources produced by them. Consequently, the Petroleum Act of 1969 was thus enacted. Nigeria eventually became a member nation the Organization of Petroleum Exporting Countries (OPEC), thus becoming a major player in terms of regulation, management and control of the industry. Specifically, the Department of Petroleum Resources (DPR) which is a subsidiary of the Nigerian National Petroleum Corporation (NNPC) ensures compliance with the regulations of the industry, processes and approved licenses, leases and operational permits, and also establishes and implements safety, health and environmental regulations.

Interestingly, oil is produced in the Niger Delta region of Nigeria with Akwa-Ibom, Rivers, Delta, Bayelsa and Cross-Rivers as the states that top the list of nine oil producing states in the country. However, two other states, Anambra and Lagos have joined the oil producing states with possible exploration potential being considered in Borno and Bauchi states in north-east Nigeria. Most importantly is that these states houses over 90% of the workers in the industry who work in either the upstream, downstream and services sector of the industry.

On the structure of the industry, it is majorly divided into:

- The upstream sector: characterised by exploration and production of crude oil and gas. It is the single most important sector in the country's economy, which accounts for over 90% of its exports and over 75% of the national revenue of government. Specific arrangements in this sector includes, but not limited to Joint Venture (JV), Production Sharing Contracts (PSCc), Service Contracts (SC) and Marginal Field Concession (MFC).

- The downstream sector: the key components of this sector are, transmission and conveyance, refining, distribution and marketing, Liquefied Natural Gas (LNG). There are currently four refineries in Nigeria – Kaduna (Kaduna State), Port Harcourt – 2 (Rivers State), and Warri (Delta State).

- The service sector includes: exploration support services, drilling services, production support services, and downstream services. There are lots of companies spread around the oil producing states that are mainly into provision of services for the main industry players.

Even as companies operating in the Nigerian oil and gas industry are bound by the provisions of the law and related regulatory frameworks to observe the highest international safety standards in the course of their operations, there are noted issues of corruption and compromise by the industry regulators, and the evident lack of technical know-how and clumsy judicial enforcement mechanisms have seriously obstructed compliance (Energymix, 2016).

In Nigeria, OSH management is fairly new and efforts directed towards implementing various strategies for improving workplace health and safety is largely based on the Factories Act (1958, 1987 & CAP. 26 L.F.N, 1990, CAP. F1 L.F.N. 2004), Labour Act of 1974 and the Workman's Compensation Act of 1987. Some provisions of these Acts provides for the safety and health of workers in various industries (referred to as factories). Unfortunately, Nigeria still does not have a national agency or body corporate charged with the responsibility of making policies, procedures, frameworks and guidelines for management occupational safety and health. More so, the Acts has been noted by researchers as being archaic, insufficient in terms of coverage and independence (Umeokafor *et al*., 2014). Additionally, it is noted that Nigeria currently faces a lack of large enough and coherent OSH databanks (Okojie, 2010), even as it has been noted that occupational fatalities in Nigeria is one of highest in the world with about 24 fatalities per 100, 000 workers per year (Hamalainen *et al*., 2009). Corroborating the above position, Umeokafor *et al*. (2014) suggested that occupationally-related accidents are on the increase in Nigeria, and the petroleum, oil and gas sector has one of the highest occupational fatalities in comparison to other industries.

It has been noted from the extant literature review that the critical nature of the oil and gas industry calls for continuous upgrade on safety and health strategies in line with international standards and best practices. In the downstream, upstream and services sector of the industry, issues bothering on the safety and health of workers and the workplace is paramount (Oppong, 2014). Unfortunately, statistics of the occurrences of occupational incidences are shrouded in secrecy and unavailable to access and use for empirical endeavours as the present study. There is also no structured system in place to ascertain these occurrences of occupational fatalities based on the three sectors of the industry. A look at the websites of the regulators and its subsidiaries is blatantly silent on the nature, types, classifications and/or sectors of the O & G industry with the highest number of incidences, injuries and fatalities. This is a call for concern for government, regulators, labour unions, operators and relevant key stakeholders in the O & G industry.

1.2 PROBLEM STATEMENT

Despite efforts directed towards improving workplace safety in the O & G industry, accidents still occur (Hovden, Lie, Karlsen, & Alteren, 2008; Hoivik, Tharaldsen, Baste & Moen, 2009; Bergh, Ringstad, Leka, & Zwetsloot, 2014; Bergh, Hinna, Leka, & Jain, 2014; Silvestre & Gimenes, 2017). Industry practitioners and researchers in the industry are therefore becoming increasingly concerned in view of the increasing number of accidents, injuries and eventual fatalities (Morel, Amalberti, & Chauvin, 2008; Tharaldsen, Olsen & Rundmo, 2008; Bergh et al., 2014; Witter, Tenney, Clarke, & Newman, 2014). The effects of employee behaviours as a major contributor to accident causation is noted (Adie, *et al*., 2005; Johnson, 2007) and the need for setting-up, implementing, and ensuring continuous improvements on functional socio-psychological organizational-level activities capable of improving employees safety behaviours in the O & G industry is over-emphasized, yet under-researched (Mearns & Reader, 2008; Hovden, *et al*., 2008; Al-Haadir, Panuwatwanich, & Stewart, 2013). More so, the route and/or mechanisms through which these socio-psychological organizational factors further explains safety-related behaviours is grossly under-researched (Hoivik, *et al*., 2009).

Notwithstanding that employee behaviours are identified as major causes of workplace accidents, management and system failures are also noted likewise (Geller, 2006; Salmon & Lenné, 2009). Consequently, organizational factors, characteristic of management activities can directly or indirectly be effective in improving employee safety behaviours. For example, safety management practices (Vinodkumar & Bhasi, 2010), job demands, job characteristics, burnout, engagement

(Nahrgang *et al*., 2011; Li, Jiang, Yao, & Li, 2013), safety culture (Morrow, Koves, & Barnes, 2014), incentives scheme (Maslen & Hopkins, 2014), safety climate (Fugas, Silva & Melia, 2012; Bosak, Coetsee, & Cullinane, 2013), symbolic social interaction (Stryker, 2008; Zohar & Tenne-Gazit, 2008), structural attributes of the work environment (Zohar, 2014), psychological work ownership (Van-Dyne & Pierce, 2004; Pierce, Jussila, & Cummings, 2009) and leadership (Lievens & Vlerick, 2013; Dahl & Olsen, 2013).

It is established that leadership is a key organizational factors that is most critical to improving safety behaviours in workplaces (Lu & Yang, 2010; Kapp 2012; Clarke, 2013; Lievens & Vlerick, 2013). It is also noted that failures in safety systems and the eventual outcomes of such failures have been attributed to failures in leadership styles (Amorse & Anderson-Butcher, 2007; Taj, Abdolvahabi, Naghavi, Rahmati, & Naini, 2010). However, there is no agreement as to how safety behaviours are influenced by leadership, especially among employees in highly regulated work settings (Martinez-Corcoles, Gracia, Tomas & Peiro, 2011). Consequently, while it is well-established that different leadership styles influence safety behaviours differently (Clarke, 2013), very little has been done in terms of theoretical development and research specifically exploring the fundamental mechanisms of how different leadership styles affect safety behaviours differentially and via any know empirical route or mechanism (Kark, Katz-Navon, & Delegach, 2015).

While the relationship between leadership and safety behaviours is noted and well-established, Nielsen, Skogstad, Matthiesen and Einarsen (2016) argue that researchers mainly focused on constructive styles of leadership - general transformational and transactional leadership styles as exemplars (Zohar, 2002; Zohar & Luria, 2010; Kapp, 2012; Hoffmeister *et al*., 2014). Other leadership styles have thus suffered from the desired empirical attention they deserve, especially in their ability to elicit performance outcomes across industries in the form of safety-related behaviours (Barlow & Iverson, 2005). Additionally, Martinez-Corcoles, Gracia, Tomas, Peiro and Schobel (2013) noted that the question of which style of leadership might best fit within the context of a highly regulated work setting is still unavailable. Sequel to the above, two very important, industry-relevant, result-oriented, yet under-researched leadership styles are proposed to be examined within the context of the present study. They are the authentic (Eid, Mearns, Larsson, Laberg, & Johnsen, 2012; Cavazotte, Duarte, & Gobbo, 2013) and the inclusive (Carmeli, Reiter-Palmon, & Ziv, 2010) leadership styles.

Sequel to the above, while the authentic leadership style is noted to be able to improve safety behaviours (Eid *et al*., 2012), it is plagued by a paucity of empirical underpinnings (Gardner *et al*., 2011; Eid *et al*., 2012). Also, while the inclusive leadership style is noted to lead to improved psychological safety (Carmeli, Brueller, & Dutton, 2009), no study has examined its relationship within the context of safety climate, and in relation to safety behaviours. Sadly, only a few leadership-related studies have been done with specific focus on the O & G industry (Zohar & Luria, 2003; Al-Moumen, 2009; Kalha, 2009; Dahl & Olsen, 2013), yet none examined the authentic and inclusive leadership styles. While the the role of leaders in improving safety behaviours is well-established *ab initio*, research on the mechanisms and/or additional route through which this relationship occurs and/or is further explained is limited (Kelloway, Mullen, & Francis, 2006). Hence, for a deeper and more cutting-edge understanding (Mathieu, DeShon, & Bergh, 2007; Wu & Zumbo, 2008) and in cases where there is an established strong relation between the predictor and the criterion variable, the introduction of a mediator variable is warranted (Baron & Kenny, 1986; Muller, Judd, & Yzerbyt, 2005; McKinnon, 2008; Cohen, Cohen, West, & Aiken, 2003).

The above positions are well-noted in the management studies (Carmeli *et al*., 2010; Mostafa & Gould-Williams, 2014), and in the safety research area (safety knowledge and safety motivation - Vinodkumar & Bhasi, 2010; knowledge-related job-characteristics - Lievens & Vlerick, 2013; work climate - Dahl & Olsen, 2013; safety control - Huang, Smith, & Chen, 2006; group climate level - Zohar & Luria, 2005; -safety climate level (Luria, 2010). Evidently, the quality of the relationship between leaders and their followers play a contributory role in influencing climate perceptions (Kozlowski & Doherty, 1989; Dragoni, 2005). More so, Kelloway and Barling (2010) suggested that leaders who promote safety also create a positive safety climate among their followers. Therefore, as leaders create climate, climate in turn determines employee behaviours (Schneider & Reichers, 1983), hence strongly predicting safety-related behaviours (Clarke, 2010). However, little empirical submissions have been done in further expanding the above theoretical presumption (Clarke, 2010, 2013).

Basically, the selection of safety climate as a mediator in the present study is grounded upon extant theoretical and practical submissions, as it is recognized as a fundamental and ultimate solution for improving workplace safety (Lu & Shang, 2005; Beus *et al*., 2010; Bahari & Clarke, 2013; Bosak, Coetsee, & Cullinane, 2013; Barbaranelli, Petitta, & Probst, 2015). Also, positive safety climate is considered a factor with the sole greatest impact on safety performance (OSHA, 2009; Cigularov *et al*., 2013). Furthermore, Clarke (2010) noted that safety climate is a facet-specific climate, and will be expected to strongly predict safety behaviour (Schneider, 2010). Also, the introduction of safety climate as a mediator in the context of the proposed study is that it is theory-driven – the Social Exchange Theory (Blau, 1964) and Social System Theory (Getzels & Guba, 1957; Parsons, 1970).

While the above positions are noted, there is limited inquiry looking at the relationship between safety climate and either its organizational antecedents or its individual outcomes (Clarke, 2010, Zohar, 2010). Some studies have been done in this regard (Barling, Loughlin, & Kelloway, 2002; Clarke & Ward, 2006; Kelloway *et al*., 2006; Clarke & Flitcroft, 2008; Zohar & Tenne-Gazit, 2008; Martinez-Corcoles *et al*., 2011; Clarke 2010, 2013). However, more research is warranted due to inconsistencies in findings which arose from nomenclature differences, statistical and methodological disparities (Martinez-Corcoles *et al*., 2011; Clarke, 2010). There is also grave paucity of related research specifically focusing on the O & G industry. Also, while previous studies have examined safety behaviours based on safety compliance and participation, to the best knowledge of the researcher, no study have examined risky behaviour as another component of safety behaviours vis-à-vis safety climate and the leadership styles selected for this study

To this end, a study examining the simultaneous effects of the proposed leadership styles vis-à-vis specific safety climate factors and safety behaviour dimensions is unavailable to the best knowledge of the researcher. Specifically, the aim of this study is to examine the relationship between leadership styles and safety behaviours with safety climate as a mediator in the O & G industry in Nigeria.

1.3 RESEARCH QUESTIONS

Based on the discussions above, the following research questions are proposed:

1. What is the level of safety behaviours in the O & G industry in Rivers State, Nigeria?
2. What is the relationship between authentic leadership and safety climate in the O & G industry in Rivers State, Nigeria?
3. What is the relationship between inclusive leadership and safety climate in the O & G industry in Rivers State, Nigeria?
4. What is the relationship between safety climate and safety behaviours (compliance, participation and risky behaviours) in the O & G industry in Rivers State, Nigeria?
5. What is the mediating role of safety climate in the relationship between authentic and inclusive leadership styles and safety behaviours (compliance, participation and risky behaviour) in the O & G industry in Rivers State, Nigeria?

RESEARCH OBJECTIVES

In view of the research questions above, the following research objectives are proposed:

1. To determine the level of safety behaviours in the O & G industry in Rivers State, Nigeria.
2. To investigate the relationship between authentic leadership and safety climate in the O & G industry in Rivers State, Nigeria.
3. To examine the relationship between inclusive leadership and safety climate in the O & G industry in Rivers State, Nigeria.
4. To investigate the relationship between safety climate and safety behaviours (compliance, participation and risky behaviours) in the O & G industry in Rivers State, Nigeria.
5. To examine the mediating role of safety climate in the relationship between authentic and inclusive leadership styles and safety behaviours (compliance, participation and risky behaviour) in the O & G industry in Rivers State, Nigeria.

1.5 SCOPE OF THE STUDY

This study examines the relationship between authentic leadership, inclusive leadership styles and safety behaviours. Further examined is the mediating role of safety climate in the above relationship among O & G workers in Rivers State, Nigeria. The following reasons are adduced for the proposed scope. Generally, workers across industries with diverse job roles and skills are exposed to occupational threats and hazardous work conditions on a daily basis (Yang, Wang, Chang, Guo, & Huang, 2010). Interestingly, the O & G workers are not left out among occupations with high risk exposures to hazardous and injury-causing situations (Dahl & Olsen, 2013; Li *et al*., 2013). Furthermore, the O & G industry is high risk in nature and the occurrence of accidents are often times catastrophic and with related direct and indirect costs (Kane, 2010; Bergh *et al*., 2014). The high rates of accidents, injuries and fatalities in the industry vis-à-vis other industries in Nigeria calls for concern and the need for a study of this nature. Thirdly, the industry plays a major role in shaping the economy of Nigeria as the main income earner and chief contributor to its GDP (ThisDay, 2014).

Rivers State is selected as the geographical scope of this research because it produces more than 60% of Nigeria's crude oil and gas output (Osaghae, 1995; Abu & Nwosu, 2009; Encyclopedia Brittanica, 2015). The state accounts for one of the highest number of O & G and related industry workers, (PENGASSAN, 2015), and in fact plays host to the only gas liquefaction plant in Nigeria (Nigeria Liquefied Natural Gas, 2015). Specifically, this study focused on employees who are highly exposed to workplace hazards and are at high risk of occupational accidents. For example, drillers, electricians, engineers, mechanics, riggers, scaffolders, welders, and other support staff. They constituted the population of the study.

1.6 SIGNIFICANCE OF THE STUDY

This study focuses on improving safety behaviours in the O & G industry in Rivers State, Nigeria. Upon completion, both theoretical and practical significance have been noted and suggested accordingly. From the theoretical standpoint, a number of studies have been done on the relationship between leadership and safety behaviours characteristic of general transformational and transactional leadership styles. Obvious theoretical gaps were created by not giving other leadership styles desired empirical prominence. This study is therefore significant and well-placed to contribute theoretically in that it has provided an evidence-based understanding as to how authentic and inclusive leadership styles influence safety climate which in turn determines safety behaviours (compliance, participation and risky behaviours). This is an original and significant contribution to the body of knowledge in the safety research domain.

Furthermore, the present study made a significant and original theoretical contribution to the body of knowledge by underpinning the above relationships with the Social Exchange Theory (Blau, 1964) and Social System Theory (Getzels & Guba, 1957; Parsons, 1970). Additionally, a further review of the leadership and OSH literature suggests that most studies related to the context of the present study were done in Western, Eastern and most especially well-developed and high technology-driven work systems and with similar cultures. Evidently, no study has been done with specific focus on the O & G industry. More so, the literature relating to the present study is almost non-existent in the Nigerian context. The present study therefore contributes significantly on the understanding of how leadership is related to safety behaviours and how safety climate can further explain the leadership-safety behaviour relationship with special attention to the Nigerian context and more specifically the O & G industry.

For practice, findings from the present study suggested ways of improving safety behaviours at individual-employee levels. It also brought afore the most important social-psychological organizational factors and how these factors shape workers willingness to improving safety-related behaviours, and by extension a reduction in the number of work-related accidents. Industry practitioners and policy makers are then encouraged to use the outcome of this study to formulate result-oriented and evidence-based OSH master plan through appropriate legislative frameworks for implementation across the industry. This should also ensure the review of existing policies aimed at improving workplace safety. This study should also espouse the need for training of safety leaders to display authentic and inclusive leadership behaviours by regulatory agencies in promoting/ensuring workplace safety in organizations.

1.7 DEFINITION OF KEY TERMS

1.7.1. Authentic Leadership

This is a leadership style that is characteristic of leaders who are totally familiar with their values and belief system, are confident in themselves, are genuine in their demeanours, display reliability and trust-worthiness in their drive to building the strength and thinking capabilities of their followers (Avolio & Gardner, 2005; Gardner, Avolio, Luthans, May, & Walumbwa, 2005; Nelson, Boudrias, Brunet, Morin, De Civita, & Savoie, 2014; Leroy, Anseel, Gardner, & Sels, 2015).

1..7.2 Inclusive Leadership

This is a leadership style that is characteristic of leaders who exhibit openness, accessibility, and availability while interacting with their subordinates (Carmeli *et al*., 2010), thereby expediting the development of psychological safety among employees (Edmundson, 2004; Wuffli, 2016; Brown, Subramaniam, & Ali, 2017).

1.7.3 Safety Climate

Safety climate denotes the perceptions of employees with regards priority given to safety by organizations (Zohar, 1980; Smith *et al*., 2006; Zohar, 2014; Dutra, Kim, Willims, Kawachi, & Okechukwu, 2014). Safety climate is a superficial characteristics of an organization's safety culture, which is accessed based on employees' attitudes and perceptions (Cox & Flin, 1998; Flin, Mearns, O'Connor, &

Bryden, 2000; Zhou, Fang, & Wang, 2008). In the present study, safety climate will be made of the following dimensions; management commitment to safety, safety training, safety communication, and safety systems (rules and procedures).

1.7.4 Safety Behaviours

Safety behaviors denotes any workplace behaviors that affect the likelihood of physical harm to persons (Beus *et al*., 2016). In the present study, the following dimensions constitute the safety behaviours construct; safety compliance, safety participation and risk behaviour.

1.8 OUTLINE OF THE THESIS

There are five chapters in this thesis. In Chapter 1, a presentation of the background of the study, the problem statement, research questions, research objectives, scope of the stud, and the significance of the study was done. In Chapter 2, a detailed review of extant literature on authentic and inclusive leadership styles, safety climate and safety behaviours was done. The underpinning theory of the study was also explained. Thereafter, a brief review of the O & G industry was presented. Chapter 3 presented a detailed overview of the methodology that was used to conduct this study. Specifically comprised therein are, the research design, measurements/operational definition of variables, data collection, population, sampling techniques and techniques of data analyses. Chapter 4 presents the results of the analyses conducted. Finally, Chapter 5 presents a detailed discussion of the findings, implications and limitations of the study, recommendations/directions for future research and the conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter begins with a thorough presentation of the definition, importance, historical perspectives and measurement of safety behaviours. It also critically examines studies on safety behaviours across a myriad of organizations and work settings. Furthermore, this chapter reviews the leadership-safety behaviours relationship, with specific focus on the authentic and inclusive leadership styles. Also presented in this chapter is a review of the safety climate-safety behaviour relationship and how safety climate mediates the leadership-safety behaviour relationship. A diagram on the gaps extracted from the literature review is presented and the underpinning theories supporting the proposed framework of this study is then presented accordingly. A brief summary of the Nigerian O & G sector and the prevailing occupational safety and health management system was also presented in the final section of this chapter.

2.2 DEFINITION, IMPORTANCE, HISTORICAL PERSPECTIVES AND MEASUREMENT OF SAFETY BEHAVIOUR

Neal, Griffin and Hart (2000) noted that the factors that constitute performance are a representation of the major dimensions of task-relevant behaviours. The role of workers' safety-related behaviours and how these behaviours act as a panacea to ensuring the workability of technical systems of organizations is worthy of note (Fernández-Muñiz, Montes-Peón, & Vázquez-Ordás, 2012). Therefore, safety behaviour is referred to as behaviours that constitute work performance for safety-related job roles (Griffin & Neal, 2000; Clarke, 2013). In reversing the definition of unsafe behaviours by Flin (2007), safety behaviour is referred to as adopting precautionary measures, applying requisite measures and reporting of possible risks of accidents that may and/or occur in workplaces (Prati & Pietrantoni, 2012).

Characteristically, two key points are noted in the above definitions of safety behaviours which will be applied and used for the purpose of the present study. Firstly, safety behaviours are behaviours characteristic of safety compliance and safety participation, and thus considered components of safety performance (Vinodkumar & Bhasi, 2010). Secondly, employees behaving in acceptable manners include, not only complying with the organization's rules and procedures, and/or actively participating in safety-related and promotional activities that ensures improvements in workplace safety (Fernández-Muñiz *et al*., 2012), but behaving in manners that reduces exposures to risks and workplace hazards (Martinez-Corcoles *et al*., 2013). Since safety behaviours will be explained and/or referred to as components of safety performance, an interchangeable use of these nomenclatures is allowed and has been so used in previous studies (Cooper & Phillips, 2004; McLain & Jarrell, 2007; Lu & Yang, 2010; Vinodkumar & Bhasi, 2010; Al-Haadir, Panuwatwanich, & Stewart, 2013; Cavazotte *et al*., 2013; Fernández-Muñiz *et al*., 2014; Zhang & Wu, 2014). How then is safety performance defined vis-à-vis its connection to safety behaviours?

Safety performance is referred to as the level of safety in an organization which is normally indicated by the number of workplace accidents (Arezes & Miguel, 2003; Mannan, O'Connor & Keren, 2008). It is also referred to as indicators showing the probability of how accidents occur and how these accidents lead to serious injuries and /or fatalities (Chang & Yeh, 2004; Huang, Smith, & Chen, 2006). Succinctly put, accident and injury levels are indicators reflecting the true state of safety performance within an organization (Vinodkumar & Bhasi, 2010). Additionally, the European Transport Safety Council (ETSC) defined safety performance as "changes over time in the level of safety, with a reduction in the number of accidents or the number of killed or injured people, which can be regarded as an improvement in safety performance" (ETSC, 2001, p. 11).

On a related note, Kohli (2007) said safety performance, in the form of safety-related behaviours, is a cohesive set of regulations and activities specifically designed to improve workplace safety. Also, Burke, Sarpy, Tesluk and Smith-Crowe (2002) described safety performance, not from the accidents and injuries point of view, but from actions and behaviours of workers and how such characteristics encourage workplace safety. Based on the above submissions, it is the opinion of the researcher that in whatever way safety performance is/was viewed or operationalized, one key prevalent element is that safety performance denotes outcome of improvements in workplace safety. Hence, having discussed the definition of safety performance, the researcher will now briefly explain the importance of safety performance vis-à-vis its role in reducing organizations' operational costs.

The attention and prominence being given to improving workplace safety is basically in view of the increasing number of accidents, injuries and eventual fatalities that occur therefrom (Hofmann, Jacobs, & Landy, 1995; Mearns *et al*., 2003; Wallace & Vodanovich, 2003; Siu, Phillips, & Leung, 2004; Mearns & Reader, 2008; Wu, Chen, & Li, 2008; Al-Haadir, Panuwatwanich, & Stewart, 2013; Fernández-Muñiz *et al*., 2014). It is also based on the fact that poor safety performance has become of foremost concern for corporate entities because it is a source of huge direct and indirect costs (Neal & Griffin, 2006). As such, the use of safety performance indicators in building a responsible, productive and effective organization is noted and encouraged (Bell, O'Connell, Reeder, & Nigel, 2008).

Characteristically, for the direct costs related to accidents, Pessemier (2009) noted that they comprise medical expenses, claims from deaths and permanent incapacitation, legal and litigation expenses, equipment damage and the likes. For the indirect costs of work-related accidents, production loses, insurance costs, absenteeism from work, employee turnover, pain, suffering grief and related pains are mostly contained therein (Nahrgang *et al*., 2007; Bell *et al*., 2008). Furthermore, Moore (2009) opined that accidents can also damage the corporate image of organizations. In view of the costs so associated with the occurrence and severity of accidents, it is expected that organizations double efforts in ensuring workplaces are safe enough and future occurrence of these incidences are mitigated.

In giving credence to the above position of the need for improved safety performance indicators and for maintaining corporate image of organizations, it will be interesting to note the foundational basis for which safety performance is being accorded prominence. Consequently, in response to the increasing number of workplace safety-related issues, countries designed legal frameworks for ensuring reduction in accidents, injuries and possible fatalities. These frameworks were specifically designed to make employers ensure that workplaces are as safe as possible and free from recognized hazards (Hammer, 1985). One of the most prominent among these laws is the Occupational Safety and Health Act which was signed by President Nixon of the United States of America in 1970. It is upon the promulgation of this Act that other occupation-specific regulations sprung up and are now in use (Kartam, Flood, & Koushki, 2000).

On the issue of measurement, it has been quite challenging developing appropriate measures of safety performance and with specific focus on safety behaviours. As noted by some researchers, accidents, injuries and fatalities rates and compensation costs have been used to measure safety performance (Cooper & Phillips, 2004; Siu *et al.*, 2004; Chang & Yeh, 2004). However, these measures have been referred to as after-event measures, as they are reactive and do not occur all the time (Huang, Smith & Chen, 2006). Although the indicators used in measuring safety performance is justifiable in view of the increasing number of occupationally-related accidents across a myriad of work settings and due to the need to improve workplace safety (Hofmann & Mark, 2006; Singer, Falwell, Gaba, & Baker, 2008).

Conversely, another dimensional view of measuring safety performance have been proposed. The advocates of this proposition suggest the use of the modern approach to measuring safety performance, calling for the use of preventive, rather than reactive measures (Strickoff, 2000). Specifically, hazard identification and observed safe behaviour have been suggested as the most useful indicators of safety performance (Reber, Wallin, & Duhon, 1989). More so, while accidents, lost time injuries, man-hours lost, direct cost of accidents, and sometimes severities of accidents have also been used as safety performance indicators, Coyle, Sleeman and Adams (1995) noted that researchers did not pay the needful attention to the precursors of these accidents so that proactive measures can be put in place for reductiing and forestalling of these occurrences. Based on this, Coyle *et al*. (1995) further argued that such practices are quite strange, in that attitudes and perceptions shape our behaviours which in turn affect/guide our accidents-related actions and inactions (Wigglesworth, 1978).

On a relational note, over the years, researchers have looked at safety performance from the eyes of accidents prevention and encouraging behaviours that can lead to improvements in work place safety (Siu *et al*., 2004; Smith, Huang, Ho, & Chen, 2006; Ford & Tetrick, 2011; Huang *et al*., 2012). Also, Burke *et al*. (2002) and Kelloway, Stinson, and Maclean (2004) looked at safety performance from behaviours of workers that are capable of improving the general safety of workers and by extension the attendant environment. In giving weight to the above, it was further opined that prevention of the occurrence of accidents not only counts for the safety performance of the organizations, but counts on even non-safety and general organizational outcomes. Other researchers also argued on the need for the prevention of accidents as an indicator of safety performance in organizations (Huang *et al*., 2006; Wu *et al*., 2008).

Succinctly put, data from injuries and accidents have been heavily relied upon as the prominent measures of safety performance across organizations and varying work settings (Smith *et al*. 2006; Vinodkumar & Bhasi, 2009; Luria, 2010; Williams *et al*., 2012). However, Vinodkumar and Bhasi (2010) noted this practice as “traditional” (pp. 2084). Researchers are however of the opinion that it would be worthwhile to measure safety performance based on behaviour-based indicators, as these are proactive, rather than reactive measures (Fugas *et al*., 2012; Cui, Fan, Fu, & Zhu, 2013). However, these traditional measures are still relevant within the contexts of empirical endeavours in the safety research area.

Contributing to the debate on the appropriate definitions of the measures of safety performance, Cooper and Phillips (2004) argued against the use of reactive indicators like accidents rates and compensations, as these have become notoriously problematic, of questionable integrity and retrospective. They however proposed an alignment of emerging strategies (Strickoff, 2000; Cohen, 2002) and suggested that a combination of strategies would enable organizations assess the true situation of safety among their employees and within the organization. While the above position is well-established with empirical underpinnings, Marchand, Simard, Carpentier-Roy, and Ouellet (1998) further opined that it is inappropriate to measure safety performance based on a uni-dimensional model. This is because it focuses only on employees' compliance to safety rules and procedures. They however proposed an expanded model which included employees' safety initiatives.

Consequent upon the above, Andrew Neal and his colleagues (Neal & Griffin, 1997; Griffin & Neal, 2000; Neal, Griffin, & Hart, 2000) gave prominence to expanding the measurement of safety performance as a two-dimensional construct. Their submissions were based on the job performance theory as proposed by Borman and Motowidlo (1993) and Campbell, McCloy, Oppler, and Sager (1993). The two principal components of job performance as suggested by Borman and Motowidlo (1993) are task performance and contextual performance. Task performance is formal and involuntary work-related activities that contributes to set organizational goals and objectives. Contextual performance is actually voluntary activities that contribute to the socio-psychological principles of the organization.

Applying the above concept within the gamut of the occupational safety and health literature, Neal and colleagues conceptualized the two job performance constructs of task performance and contextual performance to be safety compliance and safety participation as the two components of safety performance (Neal & Griffin, 1997; Griffin & Neal, 2000). Safety compliance is defined as activities evidenced by abide by safety procedures and working in a safe manner (Neal *et al*., 2000). They are also formal on-the-job activities that stems from ensuring safe working conditions, observing safety rules and procedures, to the use of appropriate personal protective equipment (Burke, *et al*., 2002; Brondino, Silva, & Pasini, 2012).

On the other hand, safety participation denotes "helping co-workers, promoting the safety program within the workplace, demonstrating initiative, and putting effort into improving safety in the workplace" (Neal *et al*., 2000, p. 101). Neal and Griffin (2006) however noted that these activities may not necessarily metamorphose or lead to safety at the place of work, but helps to build an atmosphere that supports and/or have the aura of safety. For example, activities that promotes safety in the workplace and helping co-workers to do their jobs in a safe manner.

Failure to comply with safety rules and procedures (violations) are common place across industries like mining (Laurence, 2005), transport (Lawton, 1998), construction (DeArmond *et al*., 2010) and petroleum (Dahl, 2013). However, when workers take risks, Reason, Parker and Lawton (1998) opined that such actions are not deliberate, since unsafe acts are reinforced naturally (Clarke, 2006). To this end, activities, practices and procedures that are perceived as natural reinforcements of the behaviours of workers in complying with safety rules and procedures should be noted (Clarke, 2006). On the other hand, safety participation goes beyond workers' formal job performance roles to extra-role initiatives. This is however reflected in the allowable level of involvement and commitment workers are exposed to, on safety related matters.

The operationalization and measurement of safety performance as a multidimensional construct can also be examined from another perspective. This is being done, taking into cognizance the critical role of a combination of human, technological and organizational level factors in accident causation and possible prevention (Carnino, Nicolet, & Wanner, 1990; Reason, 1990). Further insights to the above were proffered by Weigmann, Zhang, Von Thaden, Sharma and Gibbons (2004) who explained the historical development of theoretical approaches to accident causation, vis-à-vis the contributions of international researchers on safety. In their work, Weignann *et al*. (2004) noted that the management of factors that causes accidents have been viewed from various stages. However, the stages that are of concern to the present study are: the period of human error, the sociotechnical period (Hendrick, 1991; Rassmussen, 1986) and the organizational culture period (Gordon, Flin, Mearns, & Fleming, 1996; Wilpert, 2000).

In the human error stage, mistakes made by humans rather than mechanical failures were noted to be the source of systems breakdown. The sociotechnical period focused on the interaction of human errors and machine failures when reconnoitering the causes of accidents and errors. The final stage, being the safety culture state takes into cognizance safety-related characteristics of the system, work and organizational design and the use of technology (Martinez-Corcoles, *et al*., 2011). In their submission to the above positions, Levenson *et al*. (2009) noted that safety is a system property and not a component of the general organization, and thus be managed from a system point of view rather than as a component of the general system. To this end, to effectively manage safety and safety-related outcomes, there has to be an understanding of the various parts of the organization and how they interact to achieve set organizational goals and objectives (Martinez-Corcoles *et al*., 2011). One of such important components of the organization that has an important role to play in accident causation, vis-à-vis interactions with organizational technicalities is the social aspect.

Earlier positions of this review noted that data from accidents and injuries and safety compliance and safety participation were mainly used to measure safety performance. However, another dimension that is worth considering is risky behaviour. This is based on the proposition of Ramanujam and Goodman (2003) on the concept of latent errors, where risky behaviours are noted to be a shift from regular organizational practices, processes, and anticipations which do not lead to instant adverse consequences, but may lead to efficient, but not essentially safe outcomes (Martinez-Corcoles *et al*., 2013). Sequel to the above, Rotundo and Sackett (2002) in further expanding work performance behaviours identified the counterproductive performance behaviour and suggested its integration in further empirical endeavours.

To this end therefore, Martinez-Corcoles *et al*. (2013) contrasted risky behaviour with the counterproductive behaviour as suggested by Rotundo and Sackett (2002) noting that it is a deviation from adhering to organizations safety-related procedures which always does not cause adverse safety-related events. The present study would specifically measure safety performance with safety compliance, safety participation and risk-taking behaviours (Martinez-Corcoles *et al*., 2011, 2013), at the employee level. A thorough examination of previous empirical endeavours in the safety performance literature does not suggest a consensus on how safety outcomes should be measured. Data from accidents and injuries (Zohar, 2000, 2002; Mearns *et al*., 2003; Smith *et al*., 2006) were traditionally used to measure safety performance outcomes. Proponents of this school of thought saw accidents as events that are not expected, whose occurrence posed some form of risk to workers health and which can also hinder organizations' operations (Carvalho, Dos Santos, & Vidal, 2005).

Interestingly, proponents of the second approach used behaviour-related approaches in measuring safety performance outcomes and identified various safety-related behaviours across a myriad of organizations and work settings (Cooper & Phillips, 2004; Neal *et al*., 2000; O'Dea & Flin, 2001). Safety compliance and safety participation have been examined as components of safety behaviours (Neal & Griffin, 2004, 2006; Vinodkumar & Bhasi, 2010), and risky behaviours, as a single component of safety outcomes (Martinez-Corcoles *et al*., 2011; Bosak *et al*., 2013). The present study would be examining a combination of all the above safety-related behaviours. This is a first look. It is also in support of the position of Cooper and Phillips (1994) who argued that the use of objective data gotten from accident and injuries in measuring safety performance has become infamously problematic, lacks some level of sensitivity, are doubtful, retrospective and do not always consider exposures to risks by workers (Glendon & Litherland, 2001; Fernández-Muñiz *et al*., 2007). These measures have also been described as unstable (DeJoy *et al*., 2004; Havold, 2005).

In giving further credence to the position of previous researchers on the use of behaviour-based approaches in measuring safety performance (Zhou *et al*., 2008; Martinez-Corcoles *et al*., 2013; Dahl, 2013; Morrow, Koves, & Barnes, 2014), a methodological cue can be taken from the position of Rotundo and Sackett (2002). This is based on their threefold work performance structure, bearing in mind that workers values, beliefs, attitudes and perceptions towards safety are proven by their safety-related behaviours (Martinez-Corcoles *et al*., 2011). Additionally, Yule, Flin and Murdy (2006) are of the opinion that “risk-taking behaviours” are a viable outcome in safety research (pp. 148-149), hence the inclusion of this dimension for measuring safety behaviour within the context of the present study. This position has also been solidified based on the submission of Bosak *et al*. (2013).

Conventionally, empirical endeavours in the safety research area has dwelt on ascertaining how individual attributes like personality traits and attitudes are related to hazardous exposures and eventual workplace accidents (Hansen, 1989; Sutherland & Cooper, 1991). However, due to the occurrence and impact of major industrial disasters like Bhopal (Bowander, 1987) and Chernobyl disasters (Meshkati, 1998), safety researchers have demonstrated the need to examine and understand the importance of human-related socio-psychological organizational factors and how these have acted as major contributors to accident causation (Reason, 1990).

Individual characteristics are considered very important contributing factors to workplace accident causation (Hofmann, *et al*. 1995). Also, in the investigation of the root causes of accidents, the “human error” factor is always the overarching factor (Kletz, 1985; Reason, 1990). However, workers’ behaviours which are often times characterized by risk-taking tendencies are influenced by different levels of organizational factors (Dwyer & Raftery, 1991; Embrey, 1992; Pate-Cornell, 1990;

Pate-Cornell & Bea, 1992). In support of the above, Donald and Canter (1994) opined that individual characteristics are shaped by organizational factors as they have a significant influence on safety behaviours. In the course of this literature review, some of these organizational-level factors and how that relate to safety performance and in improving workplace safety will be discussed in-depth.

In view of the above positions, researchers and industry practitioners have recognized the need for identifying and implementing organizational practices that are capable of shaping the behaviours of workers so as to improve safety performance outcomes (Zhou *et al*., 2008; Hahn & Murphy, 2008; Vinodkumar & Bhasi, 2010; Cigularov, Chen, & Rosecrance, 2010). Furthermore, though so much research has been done in the occupational safety and health domain with the aim of suggesting workplace practices capable of improving safety performance outcomes, the hope of eliminating as many dangers and hazards as possible from the workplace has not been completely achieved (Cavazza & Serpe, 2009). This has prompted the call and need for further studies aimed at examining organizational and workplace practices and how they are able to elicit high safety performance outcomes across industries (Neal and Griffin, 2006; Christian, Bradley, Wallace, & Burke, 2009; Martinez-Corcoles *et al*., 2012). For the purpose of the present study therefore, safety behaviours (performance) will be measured with items of safety compliance, safety participation and risk-taking behaviours.

2.3EMPIRICAL STUDIES ON SAFETY PERFORMANCE (BEHAVIOURS)

Having explained the historical perspectives and measurements of safety performance as mostly displayed by safety behaviours, the researcher critically examined some studies on safety performance across a myriad of organizations, work settings and socio-cultural backgrounds. This is being done to identify various strategies and means by which safety performance outcomes were elicited and which are the most appropriate and / or most important antecedents of safety performance, especially as it relates to the proposed study. It is also important to note that safety behaviours (safety compliance and safety participation) are the predominant components of safety performance. Hence, in the present study, safety performance also depicts safety behaviours.

Measures and strategies meant to elicit high safety performance outcomes are put in place in view of the increasing number of accidents, injuries and fatalities among workers and within organizations (Cavazza & Serpe, 2009; Vinodkumar & Bhasi, 2009; Hoffmeister, Gibbons, Johnson, Cigularov, Chen, & Rosecrance, 2014). More so, organizations have been making deliberate efforts in setting up of systems, procedures and strategies that directly and/or indirectly affect the behaviours of workers in working safely, and by extension reducing the number of accidents, injuries and fatalities (Donald & Canter, 1994).

Consequently, key socio-psychological organizational factors have been identified as best measures in improving workplace safety (Vinodkumar & Bhasi, 2010; Nahrgang *et al*., 2011; Lievens & Vlerick, 2013; Dahl & Olsen, 2013; Morrow *et al*., 2014; Maslen & Hopkins, 2014). To this end, behaviour-based, safety-related attitudes that are capable of eliciting high safety performance outcomes would be the focus of the proposed study. However, a number of factors have been used to examine safety behaviours across a number of settings and socio-demographic milieus. Some examples are, safety management practices with diverse components (DePasquale & Geller, 1996; Mearns et al., 2003; Vinodkumar & Bhasi, 2010; Harper et al., 1997; Shannon, Mayr & Haines, 1997; Choudhry, Fang, & Ahmed, 2008; Choudhry, 2014; Wachter & Yorio, 2014; Wold & Laumann, 2015), job demands, job controls (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001b; Parker, Axtell, & Turner, 2001; Fay & Sonnentag, 2002; Turner, Stride, Carter, McCaughney, & Carroll, 2012; Li, Jiang, Yao, & Li, 2013; Halbesleben, 2010; Nahrgang, Morgeson & Hofmann, 2011.

Other factors are, dispositional mindfulness (Dane, 2011; Brown, Ryan, & Creswell, 2007; Goodall, Trejnowska, & Darling, 2012; Dane & Brummel, 2013; Bodenlos, Wells, Noonan, & Mayrsohn, 2015; Malinowski & Lim, 2015; Zhang, Ding, Li, & Wu, 2013; Kass, VanWormer, Mikulas, Legan, Bumgarner, 2011; Kontogiannis & Malakis, 2009; Kiken & Shook, 2011; Feldman, Greeson, Renna, Robbins-Monteith, 2011; Zhang & Wu, 2014), personal characteristics (Wallace, Kass, & Stanny, 2002; Wallace & Vodanovich, 2003; Zhang *et al*., 2013; Clarke & Robertson, 2011; Freeman, 2004; Sinclair, Martins, & Sears, 2010; 2010) and organizational factors Lai, Liu, & Ling, 2010; Hasan & Jha, 2013; Hasan & Jha, 2013; Parboteeah & Kapp, 2008; Jaafar, 2010; Razuri, Alarcon & Diethlam, 2007; Wu, Lee, Shu & Shu, 2010;

Pessemier, 2009), safety culture (Morrow, Koves, & Barnes, 2014), incentives scheme (Maslen & Hopkins, 2014).

However, safety climate (Fugas *et al.*, 2012; Bosak *et al.*, 2013) and leadership (Lievens & Vlerick, 2013; Dahl & Olsen, 2013) are very important antecedents of safety behaviours, are to be discussed based on their individual merits and how they relate within the ambits of the present study. The factors previously noted above in relation to safety behaviours are all noted in the course of the literature review of this study.

2.4 LEADERSHIP

Garavan and O'Brien (2001) have suggested a directional shift in further understanding how safety should be managed in organizations. However, there are a limited number of empirical endeavours focusing on the routes through which organizational factors are able to elicit safety behaviours in workplaces (Griffin & Neal, 2000; Zohar, 2002; Cox & Cox, 1991). Interestingly, leadership is progressively being acknowledged as a principal element in supporting effective performance in extant management studies (Carmeli & Schaubroeck, 2006; Kovjanic, Schuh, & Jonas, 2013; D'Innocenzo, Mathieu, & Kukenberger, 2016). Consequently, there are quite a number of definitions of leadership in the management literature (Yun, Cox & Sims Jr, 2006; Alas, Tafel & Tuulik, 2007), yet a concrete definition that encompasses the understanding of leadership from both theoretical, conceptual and practical points of view is yet to be agreed upon. Accordingly, it is noted that 'leadership is one of the most observed and least understood phenomena on earth' (Burns, 1978, p.2).

According to Roach and Behling (1984), leadership is "the process of influencing the activities of an organized group toward goal achievement" (p. 46). On Another note, Yukl (2002, p.7) noted that leadership is 'the process of influencing others to understand and agree about what needs to be done and how it can be done effectively, and the process of facilitating individual and collective efforts to accomplish shared objectives'. Furthermore, it is defined as a social influence process where a person's aid and support is enlisted with the aim of achieving a common goal and/or objectives (Chemers, 1997).

Notwithstanding the fuzziness and inconsistencies in the definition of leadership, plays and important role in determining the successes recorded by organizations. Over the years of the expansion of empirical endeavours on how leadership exerts performance, different leadership styles and characteristics have been examined in line with desired performance and related outcome measures (Vechio, Justin & Pearce, 2010; Reid, Bud-West, Winston, & Wood, 2014). Consequently, since leadership is noted to exert various performance outcomes, its importance in exerting safety-related performance outcomes is thus worthy of note (Donovan, Salmon & Lenne, 2016).

Evidently, leadership has been identified as one of the most important socio-psychological organizational factors that is capable of eliciting high safety performance outcomes (Barling, *et al*., 2002; Mullen & Kelloway, 2009). Therefore, having an insight into the critical nature of leadership in the safety research domain is noteworthy (Dekker, 2011). A detailed insight as to how leadership improves workplace safety behaviours across a myriad of organizations and work settings will now be done.

Leadership is selected and is being examined as an antecedent of safety performance for obvious reasons and supported thereto with attendant empirical underpinnings. Firstly, leadership has been identified as one of the key organizational factors that is most critical to improving safety behaviours in organizations (Lu & Yang, 2010; Kapp 2012; Clarke, 2013; Lievens & Vlerick, 2013). Secondly, failures, unexpected eventualities and related risky outcomes in safety systems have been attributed to failures in leadership styles (Amorse & Anderson-Butcher, 2007; Taj, Abdolvahabi, Naghavi, Rahmati, & Naini, 2010). Thirdly, in general organizational outcomes context, leadership has been identified as an important factor in predicting organizational outcomes (Mumford & Hunter, 2005) and in eliciting creative behaviours in the workplace (Joussi & Dionne, 2003). Also, leadership has been specifically identified as an indicator of the success or failures of organizations (Bass, 2009) and has also been recognised as an important element in defining corporate strategies and for streamlining of organizational outcomes (Collier, Fishwick, & Floyd, 2004).

Consequently, leaders are known to contribute to boosting the safety-related psyche of workers (Nembhard & Edmondson, 2006) through the exhibition of openness, availability and accessibility to the employees under their supervision (Edmondson, 2004; Carmeli et al., 2009). Such practices by supervisors also help to build trust among the workers which eventually makes them behave in ways that improve safety outcomes in the organization (Burke *et al*., 2007). Quinn and Rohrbaugh (1983), Quinn and McGrath (1985) and Zohar (2010) also noted that the emergence of workplace climate is as a result of leader-member relationships which is often an offshoot of workplace complexities presenting employees with competing demands that need to be managed concurrently. Generally, leadership is the strongest factor that can affect organizational safety performance (Martinez-Corcoles *et al*., 2013).

Two leadership styles has been identified by Burns (1978). They are, transactional and transformational leadership styles (Burns, 1978). However, a third leadership style has been recently identified by Bass and Avolio (2000). It is the laissez-faire leadership style. In the transactional leadership style, both leaders and subordinates work together to achieve individual interests (Bass, 1999). However, the transformational leadership style encourages that subordinates are led to improve their attitudes, beliefs and value systems (Bass, 1985). Contrastingly, third leadership style as identified by Bass and Avolio (2000) has been referred to as lack of leadership (McFadden, Henagan, & Gowen, 2009). In all, leadership is important in achieving set organizational goal and objectives (Krishnan, 2005). In the subsequent paragraphs of this section, some studies specifically focusing on the role of leadership in influencing safety behaviours will now be discussed. Thereafter, the researcher will narrow down to the leadership styles to be considered and further examined with respect to the research in focus.

In the study of the influence of supervisor leadership practices on safety performance among 555 construction workers in the United States of America, Kapp (2012) collected data from first line supervisors of construction firms and noted that increases in the levels of transformational and contingent reward-based leadership styles elicited a correspondingly increasing level in proactive safety related behaviours in the form of compliance and participation. The study also found that group safety climate moderated the relationship between leadership practices and safety compliance. In a similar study, Hoffmeister *et al*. (2014) noted varying levels of outcomes on the effect of the relationship between to facets of leadership (transformational and transactional) and employee safety among 1167 construction workers in the United States of America.

Similarly, in the study of the impact of transformational leadership on safety performance, Lievens and Vlerick (2013) conducted a cross-sectional survey among 152 Belgian nurses and found that transformational leadership significantly impacted the nurses' behaviours on how they comply with and participate in safety-related activities. They also found out that knowledge-based job characteristics mediated the above relationship. On a relational note, Martinez-Corcoles *et al*. (2013) examined leadership from a team point of view and its effect on safety performance among 479 workers in 2 Spanish high reliability organizations (nuclear power plants). The important role of team leadership factors was noted, in that higher proactive safety performance behaviours significantly improved and risk taking behaviours reduced accordingly, with leaders empowering behaviours as exemplars. In this study, risky taking behaviours constituted one of the dimensions of safety behaviours.

Similarly, Dahl and Olsen (2013) in a survey with a large number (10003) of oil and gas workers in the Norwegian continental shelve noted the very important role of leadership in influencing the level of safety compliance in the offshore platforms. These effects were however directly and indirectly manifested. For the indirect effect, it was manifested through three work climate dimensions.

In another study on improving safety performance in construction sites, Kines, Andersen, Spangenberg, Mikkelsen, Dyreborg and Zohar (2010) tested the effect of leadership involvement through their level of communication with their subordinates in the Danish setting. Through a 1693 good-for-analysis questionnaire, it was suggested that leader-initiated leader-subordinate verbal communications had positive and lasting effect on the level of safety in the construction sites. This eventually led to positive safety performance indicators. In another study by Inness, Turner, Barling, and Stride (2010) investigated the relationship between transformational leadership behaviours of supervisors and employee safety performance among 159 persons with two jobs in the United States. Results indicated that supervisor's transformational leadership behaviours significantly associated with safety participation.

In another study by Squires, Tourangeau, Laschinger and Doran (2010) on establishing a link between leadership and safety outcomes among 600 acute care registered nurses in Canada noted that resonant leadership and interactional justice influenced the relationship between leaders and their subordinate nurses. Also, by extension it affected the quality of work environment and safety climate. In another study, Kark, Katz-Navon and Delegach (2015) examined how transformational and transaction leadership styles influences safety behaviours of employees in Israel and at different times. In their findings, they noted that transactional leadership was positively related to safety improvement initiatives.

While the researcher has explained in details how various leadership styles influence safety outcomes across organizations and work settings, it can be noted that most of the studies cited were done in Western, European and Asian work settings with advanced technological apparatus. Nothing has been done in the Nigerian context, and the differences in culture, work environment and HR practices differ accordingly

(Bahari & Clarke, 2013). More so, there are other leadership styles that have not been given the desired empirical prominence within the safety research domain that the researcher will now focus on and discuss in-depth. While each leadership style has its time and place, none of the styles can be referred to as good or bad (Cooper, 2015). However, the failure or success of any leadership style is determined by how the leaders use them (Nixon, Harrington, & Parker, 2012).

The concept of leadership and its ability in eliciting high safety performance outcomes and specifically in the form of safety-related behaviours (Lu & Yang, 2010; Akselsson, Jacobsson, Borjesson, & Enander, 2012, a research gap does exist in that most of the studies so cited above primarily focused on general transformation and transactional leadership styles (Nielsen, Eid, Mearns, & Larsson *et al*., 2013). However, some of the studies have examined the authentic leadership and empowering leadership styles in relation to safety (Cavazotte *et al*., 2013; Martinez-Corcoles *et al*., 2011). Other leadership styles have thus suffered empirical prominence. Moreover, Martinez-Corcoles *et al*. (2013) noted that the question of which style of leadership might best fit within the context of a highly regulated work setting is still unavailable.

While the findings from the studies on leadership has provided loads of insight on how various leadership styles and behaviours support improvements in workplace safety, there is however a little consensus about the leadership styles that are most influential in exerting safety-related outcomes across diverse socio-demographic milieu. It is thus noted that researchers examine leadership styles based on their merits and their ability to determine outcomes in view of the context of study of the empirical efforts. Therefore, the researcher proposes to examine two very important, industry-relevant, result-oriented, evidence-based, empirically-underpinned, yet under-researched leadership styles and how they are capable of eliciting high safety behaviours indicators. The grounds for which these leadership styles were selected will also be discussed accordingly. But basically, the authentic and inclusive leadership styles extension or amplification of the transformational leadership style.

2.4.1 Authentic Leadership

Among organizational behaviour scholars, one widely held and promoted view is the need for organizational activities and phenomena that should lead to the well-being of human beings (Ilies, Morgeson, & Nahrgang, 2005). Leadership has therefore been identified as one major socio-psychological organizational phenomena that can address this concern (Luthans & Avolio, 2003; May, Chan, Hodges, & Avolio, 2003). Specifically, the authentic leadership style has been so identified and will be the focus of the present study, though empirical investigations on the authentic leadership style is still in its infancy (Donovan *et al*., 2016). Interestingly, the concept of authentic leadership evolved and further gained empirical prominence in the leadership and management domain in view of the highly revealed scandals, malfeasance and mismanagement in the corporate world and in response to challenges facing corporate entities on the need for improved performance indicators at all levels of organizational activities (Walumbwa, Avolio, Gardner, Wernsing, & Peterson, 2008). Additionally, it is noted that the recent economic crises and related major disasters such as the oil spill in the Gulf of Mexico, or the nuclear disaster in

Japan strengthens the call for leader behaviours that do not deny responsibility, that do not hide information and deceive others, but leader behaviours characteristic of authenticity and integrity (Peus, Wesche, Streicher, Braun, & Frey, 2012).

Stakeholders and the general public sought to hold leaders accountable in view of the lapses so noted by poor performance of organizations and leaders not matching their words with requisite actions and deeds (Aguilera, 2005; Dealy & Thomas, 2006). Avolio and colleagues noted that authentic leaders are leaders who are totally familiar with their values and belief system, are confident in themselves, are genuine in their demeanours, display reliability and trust-worthiness in their drive to building the strength and thinking capabilities of their followers (Avolio & Gardner, 2005; Gardner, Avolio, Luthans, May, & Walumbwa, 2005).

Authentic leadership has been defined by Luthans and Avolio (2003) as a process of a combination of a positive leader capabilities vis-à-vis a very developed organizational setting. They further noted that this process is one that positively inspires a combination of socio-psychological positive behaviours both from the leaders and the led, and by extension stimulating positive personal growth and development. Specific attributes of the authentic leader as noted by Luthans and Avolio (2003) is that they are self-reliant, anticipative, irrepressible, honest/principled, and they accord importance to helping their followers become future leaders. The above submissions notwithstanding, other researchers in the field of management (Cooper, Scandura & Schreischeim, 2005; Shamir & EIlam, 2005) are of the opinion that the definition as suggested by Luthans and Avolio (2003) may not be all-encompassing in its entirety. They noted the idea of authentic leadership goes beyond positive psychological abilities.

In view of the above, Ilies *et al*. (2005) suggested a more directional model of authentic leadership made of four distinct components. They are, self-awareness, unbiased processing, authentic behaviours/acting and authentic relational orientation. In a related development, Gardner *et al*. (2005) and Gardner, Cogliser, Davis and Dickens (2011) conducted a review aimed at integrating and synthesising the various ideas and submissions from various researchers as to the definitions, constituents and measurements of the authentic leadership construct. They specifically identified the following as core components needed to have and in-depth understanding of the authentic leadership construct; internalised regulation, balanced processing of information, relational transparency and authentic behaviour. However, the researcher in the present study will look at and/or measure authentic leadership based on the propositions of Gardner *et al*. (2005) and Ilies *et al*. (2005), for the following reasons hereunder stated.

Firstly, it has its foundation from the social psychology theory and is based on empirical underpinnings specifically relating to the concept of authenticity (Deci & Ryan, 2000; Kernis, 2003). Secondly, this position is taken in that it clearly acknowledges the role played by internalised moral view to authentic leadership (Eigel & Kuhnert, 2005). Thirdly, it is state-like in nature, in that its focus is clearly on developing authentic leaders and at the same time developing authentic followers

(Avolio & Luthans, 2006). The components of authentic leadership will now be discussed.

Self-awareness as a constituent of the authentic leadership style is being aware of, and trusting in one's abilities, and socio-psychological demeanours (Ilies *et al*., 2005). From a broader perspective, Walumbwa *et al*. (2008) noted that self-awareness is a demonstration of learnt traits, how these traits are derived, what they mean, and how they converge to making their impact felt with regards how one sees his/herself over a period of time. Striking features of this component of authentic leadership is that one knows that there are "within-self" traits that are contradictory, and having an understanding of the role these conflicts play in prompting a directional skew of one's thought, behavioural and cognitive processes is important to note (Ilies *et al*., 2005). Directly relating this concept to leadership, it has been argued and opined that a very important quality of an authentic leader is to know, and be true one's self (May, Chan, Hodges, & Avolio, 2003).

Relational transparency has to do with presenting one's self in an authentic manner and striving to display openness and being truthful in any relationship one is involved in (Ilies *et al*., 2005; Walumbwa *et al*., 2008). By displaying such openness, genuine intentions and truthfulness in relationships, trust is built vis-à-vis a minimization of the display of inappropriate emotions (Kernis, 2003). When leaders display attributes of relational transparency between and among their followers and associates, trust is built, and trust in turn leads to cooperative behaviours (Jones & George, 1998). These cooperative behaviours as displayed by colleagues leads to the creation of a synergy that enables free exchange of information and the enablement of a knowledge-sharing culture in organizations (Ilies *et al*., 2005).

Balanced processing is also referred to as unbiased processing. It involves objectively analysing all relevant information for decision-making. Under this process leaders open themselves to the view of colleagues, and the leaders decisions are taken based on an in-depth analyses of the generality of ideas so gathers from their colleagues and the likes (Gardner *et al*., 2005). Additionally, when leaders engage themselves in balanced processing of information, the implication of engaging in this process is that it leads of improvements in organization's key performance indicators (Ilies *et al*., 2005).

Moral perspective is view as an adopted and integrated form of self-regulation (Ryan & Deci, 2003). However, a combination of pressures and interests from groups, the organization and the society vis-à-vis internal moral standards defines the moral perspectives of leaders (Avolio & Gardner, 2005). In light of the above, leaders need to be aware of the conflicts that may arise as a result of their decisions and the attendant implications of their stance (Kernis, 2003). Some studies on the authentic leadership style will now be presented by the researcher.

Cooper *et al*. (2005) gave an insight into the constraints that might evolve as a result of developing measures of authentic leadership as against other leadership styles. However, Walumbwa *et al*. (2008) developed and validated a theory-based measure of authentic leadership from study samples taken from China, Kenya and the United States. Future studies on this leadership styles took a cue from the measures they developed. This has also been widely accepted and in use in the leadership research area. Interestingly, some studies examining the relationship between authentic leadership and various organizational and individual level outcomes have been done.

For example, eudemonic well-being (Ilies *et al*., 2005), project delivery (Lloyd-Walker & Walker, 2011), nursing job satisfaction (Fallatah & Laschinger, 2016), ethical decision making (Zhu, Avolio, Riggio, & Sosik, 2011; Cianci, Hannah, Roberts, Tsakumis, 2014), work engagement and job satisfaction (Giallonardo, Wong, & Iwasiw, 2010), voice behaviour and care quality (Wong, Spence, Laschinger, & Cummings, 2010), leaders emotional display (Gardner, Fischer, & Hunt, 2009). The above empirical endeavours examined the authentic leadership style in relation to specific organizational outcomes which are not related to safety behaviours. However, this leadership style is being introduced in the present study on the presumption that since it is capable of influencing key organizational outcomes, its application in the safety research area will be worthwhile. Unfortunately, prior to year 2011, no study has been done in this regard.

However, a somewhat related study by Nielsen, *et al*. (2013) does not capture the essence of the present study. Their study specifically, examined authentic leadership, safety climate, personality and risk perception among 293 workers of a safety critical organization. It is opinion of the researcher that the work of Nielsen *et al*. (2013) is plausibly in response to the literature review and directions for future studies as suggested by Eid *et al*. (2012). Also, in a similar study conducted to examine the influence of authentic leadership on the safety-related behaviours among 186 oil industry workers in Brazil, Cavazotte, Duarte and Gobbo (2013) found that authentic leadership is related to employees' safety performance. However, this relationship was further explained through other psychological mechanisms (employees' perception of justice through feedback). Also, the safety performance factors examined in the study are conscientiousness and propensity to risk.

In response to the empirical gap on what factors are responsible for positive or negative safety climate, Hystad, Bartone and Eid (2013) reported that authentic leadership directly affects safety climate and indirectly affects psychological capital with the essence of lowering the risks of accidents among Norwegian O & G workers. In another related study, Borgersen, Hystad, Larsson and Eid (2014) it is noted that authentic leadership was found to be statistically significant in explaining the variance in safety climate in the international marine industry. This was however controlled by age, rank on board and social desirable responding. Hence, to the best knowledge of the researcher, no empirical study have been done on the relationship between authentic leadership and safety behaviours, and more especially with safety climate as a mediator. More so, the studies cited above were all done in Western, European and other advanced work settings with no similarity to the work setting and geographical location of the present study. This, therefore is another clarion call for further research.

2.4.2 Inclusive Leadership

Poor performance and corporate failures have been attributed to poor leadership styles (Dealy & Thomas, 2006). Hence, the need for identifying leadership styles that proffers better understanding of organizational outcomes and possible solutions to the lingering leadership crises has been brought to limelight (Echols, 2009). Furthermore, it is noted that while no universally accepted definition and praxis of leadership does exist, researchers are left with the choice of suggesting leadership styles that suit the context of their study. This is also in view of the growing need to identifying the best leadership styles needed for making improvements in organizational performance indicators. To this end therefore, the researcher in the present study will align with the school-of-thought supporting the use of the inclusive leadership style in relationship to organizational outcomes.

Taking a cue from development theory, inclusiveness as a concept therein states the need to proactively ensure the involvement of the unfortunate and less-privileged people in the process of development (Wuffli, 2016). Literarily, inclusive means "involving everything" and not restricted to a particular group of persons. In the leadership literature, inclusive leadership is used to describe a holistic and/or broad-based leadership style that encourages diversity in fostering better leader-follower relationship (Wuffli, 2016). Specifically put, it entails a horizontal cross-sectional and cross-cultural interaction between leaders and their followers in driving organizational goals and objectives. Inclusive leadership has also been explained to mean processes where leaders and followers work together, are actively engaged in leadership roles and processes (McCauley, Moxley, & van Velsor, 1998).

Inclusive leadership, originally christened by Nembhard and Edmondson (2006) refers to leaders who are open, accessible and available while interacting with their subordinates (Carmeli *et al*., 2010). Specifically, Nembhard and Edmondson (2006) noted that this type of leaders welcome inputs from others which in turn gives their followers the sense of belonging that their opinions are sincerely appreciated. However, a further review of the inclusive leadership literature by the researcher suggests that little or no empirical endeavour has been done on this leadership style vis-à-vis its ability in eliciting performance outcomes in the form of safety compliance and safety participation. Also, this leadership style is being selected for this study because it emphasizes doing things with people and not to people as compared to the transformational and transactional leadership styles (Hollander, Park, & Elman, 2008). It also provides for greater involvement of employees in the hierarchical decision making process. Therefore, some studies that have thrown some light on the concept of inclusive leadership are discussed hereunder.

For example, the religious setting and religious performance (Echols, 2009), the educational setting (Ryan, 2007; Rayner, 2009; Dorczak, 2011), turnover (Nishii & Mayer, 2009), change (Bowers, Robertson, & Patchman, 2012), employee involvement in creative tasks (Carmeli *et al*., 2010), and leader-member relations (Hollander, 2012). However, a further review of the above studies indicate that the only study close in relation to the present research is the work of Carmeli *et al*. (2010) who examined psychological safety as a mediator in the inclusive leadership-employee involvement in creative tasks relationship. The present study is however focusing on the relationship between inclusive leadership and safety behaviours with safety climate as a mediator. This is the first within the leadership and safety research area. Psychological safety (Edmondson, 1999, 2004) and safety climate (Zohar, 1980, 2010; Eid *et al*., 2012) are quite different in nomenclature, meaning and measurement.

2.5 SAFETY CLIMATE

In this section, various insights as to the definition of safety climate will be presented, reasons why safety climate was selected for this study will be presented. Also to be presented in this section is delineation of safety climate, further comparative analysis of safety climate as an attitudes or perception construct and its relationship with safety culture. The measurements of safety climate based on empirical underpinnings is also presented in this section of the chapter in discuss. The dimensions of safety climate selected for the study is thereafter discussed in details.

2.5.1 Definitions

Safety climate is a behaviour-based safety construct applied to employee psychology (Geller, 2000). However, before delving into the literature review of safety climate, the researcher will briefly explain organizational climate, out of which safety climate was born, or has been referred to as a specific form of organizational climate (Coyle *et al*., 1995; Neal *et al*., 2000). Organizational climate is therefore defined as perceptions built, based on organizational practices, policies and procedures (Reichers & Schneider, 1990). Another definition as put forward by Ostrof, Kinicki and Tamkins (2003) noted that it is "an experientially based description of what people see and report happening to them in an organizational situation. Climate involves employees' perception of what the organization is like in terms of practices, policies, procedures, routines and rewards." (p. 566).

Like organizational climate, safety climate has been defined by researchers based on the context of their study. As Lin, Tang, Miao, Wang and Wang (2008) noted, safety climate has different meanings based on the different cultural backgrounds, and has most times been mistaken for safety culture. They further noted that though safety culture and safety climate are both related as organizational climate factors, safety climate lays further emphasis on the perceptions of employees with regards priority given to safety by organizations (Zohar, 1980; Smith *et al*., 2006). Also, while safety culture points to prevailing organizational indicators, safety-related belief systems and values (Fang, Chen, & Wong, 2006), safety climate is seen as superficial characteristics of an organization's safety culture, which is accessed based on employees' attitudes and perceptions (Cox & Flin, 1998; Flin, Mearns, O'Connor, & Bryden, 2000; Zhou *et al*., 2008).

Based on the above submissions, it is important to note the position of Zohar (1980), who stated that theoretically, safety climate would act as a measurement parameter for guiding employees' normative safety-related behaviours vis-à-vis the development of lucid sets of perceptions regarding possible safety related outcomes which helps to fashion corresponding safety-related behaviours. These perceptions are however built based on displayed actions by their superiors which actually should show the priority given to safety by management (Zohar, 2000). However, these perceptions are situational-based, comparatively unstable and shaped by environmental or other prevailing workplace conditions (Zhang, Weigmann, Thaden, Sharma, Mitchell (2002).

Taking a cue from the above presumptions and for the purpose of this study, the main definition of safety climate will be from the ground-breaking work of Zohar (1980), who defined safety climate as "a summary of molar perceptions that employees share about their work environment… a frame of mind for guiding appropriate and adaptive tasks behaviours" (p. 96). All other definitions of safety climate have been drawn from the above, and in support of the position of Guldenmund (2000) who advised safety climate scholars to take a cue from the definition of Zohar (1980). Taking to this advice some other safety climate scholars who leaned on this definition exist in the OSH domain (Mearns, *et al*., 2001; Mearns *et al*., 2003; Flin *et al*., 2000; Seo, Torabi, Blair, & Ellis, 2004; Clarke, 2006; Zhou *et al*., 2008; Cavazza & Serpe, 2009; Fernández-Muñiz *et al*., 2012).

2.5.2 Why Safety Climate?

Safety climate has been defined by many researchers as employees' perception of well-being or the extent to which the work environment is perceived as personally beneficial or detrimental based on the true priority given to safety by management (Johnson, 2007; Larsson *et al*., 2008; Morrow *et al*., 2010; Probst & Estrada, 2010; Brondino *et al*., 2012; Jiang *et al*., 2012; Tholen *et al*., 2013; Dekker & Nyce, 2015). However, this true priority given to safety by management is usually displayed through safety-related policies, practices, and procedures.

Generally, when there is a perception of favourable safety climate, workers display proactive safety related behaviours in the form of compliance, participation and risk taking. However, a review of relevant safety climate literature suggests that the following reasons that can be adduced to using safety climate as a very important factor in explaining safety performance outcomes with compliance, participation and risk behaviours as exemplars. Specifically, SC is,

- Acknowledged as a prime solution for improving workplace safety in various industries (Smith *et al*., 2006; Arezes & Migual, 2008; Zohar & Luria, 2010; Bosak *et al*., 2013; Barbaranelli *et al*., 2015).

- An important variable that contributes to safe behaviour (Vinodkumar & Bhasi, 2009, 2010; Beus *et al*., 2010; Gittleman *et al*., 2010; Young, 2010), and positive safety climates have been considered as a factor with the sole greatest impact on safety performance (OSHA, 2009; Cigularov *et al*., 2013).

- A description of a prominent connection between organizational and psychological processes and how they relate to safety. Extant empirical underpinnings points to the fact that safety climate is the main antecedent to safety-related motivation for employees which in turn influences both their behaviours and related safety outcomes for the organization (Neal & Griffin, 2000, Seo, 2005; Cavazza & Serpe, 2009).

- A foremost indicator that offers proactive directions for improving workplace safety (Flin *et al*., 2000; Seo *et al*., 2004; Kines *et al*., 2011a).

- A valid reference to guide behaviours of workers in working safely and also reduce or eliminate danger (Melia & Sese, 1999; Huang *et al*., 2010;

Fernández-Muñiz *et al*., 2012). It is also the concluded that safety climate is the best early indicator of unsafe work behaviour (Seo, 2005).

Some antecedents of safety performance have been discussed in previous sections of this chapter. In view of the on the above presumptions and statements of fact, safety climate is being chosen as the construct that will be used to explain safety performance within the context of the present study.

2.5.3 Delineation of Safety Climate

Safety climate has been delineated into level and strength. That is, safety climate level and safety climate strength. Safety climate level has been defined as the mean climate score of a group, based on an aggregated perception of individuals to the required level of analysis (Reichers & Schneider, 1990). In essence, when there is a high level of safety climate, it is an indication of the high level safety-related issues are accorded (Zohar, 2000; Zohar, 2003: Zohar & Luria, 2004). In essence, when employees perceive a high sense of safety in their various work clusters, they are bound to report high level scores on the safety climate scales. When aggregated, different units would lead to reporting on high overall mean scores (Luria, 2010).

When safety climate levels are high, employees are made to behave in a safe manner, and this should eventually metamorphose into general organizational level improvements in safe behaviours (Luria, 2010). True to this, the National Safety Council (1999) also posited that when safety climate levels are high, accidents are eventually reduced through a reduction in unsafe behaviours, human behaviour has been attributed to the main cause of occupationally-related accidents. Safety climate strength is a unanimity in climate perceptions (Schneider, Slavaggio, & Subirats, 2002) based on an aggregated level of noticeable safe behaviours across an organization. While safety climate level is measured in terms of being high or low, positive or negative (Beus *et al*., 2010), safety climate strength is measured in terms of being weak or strong (Luria, 2010). More like a vertical and horizontal direction and/or effect, and has been viewed to be a resultant effect of the perceptions of group members and their relationship with their leaders.

In further giving credence to the meaning and understanding of safety climate strength, Zohar and Luria (2005; 2008) used dispersion models to safety climate strength varies between groups and that theses variations are quite meaningful. On another note, Schneider *et al*. (2002) are of the opinion that the reason for the homogenous aggregation is not to imply that there are variations within the groups. Other empirical endeavours that have thrown more light into the safety climate level and strength exists (Luria, 2008; Pousette, Larsson, & Turner, 2008; Beus *et al*., 2010). These studies however suggested mechanisms by which safety climate increases. For example, organizational tenure (Beus *et al*., 2010).

2.5.4 Safety Climate - attitude and/or perception

Arguments exist in the OSH literature as to the distinction between safety climate and safety attitude and/or perception. While Siu *et al*. (2004) categorically posited that safety climate is safety attitude, Zhou and colleagues believe that safety attitude is a component of safety climate (Zhou *et al*., 2011). In another line of thought, Guldenmund (2007) suggested that safety climate studies are basically safety attitudes studies. This position was based on Guldenmund's (2000) bias in support of the definition of safety climate by Zohar (1980) who noted that safety climate is the perception of workers regarding the priority given to safety by management. However, in view of the fact that safety climate and safety attitudes share common themes, it is important to note here that these two constructs share some distinguishable characteristics.

A few, y*et al*l-encompassing definitions of attitude have been proposed. For example, Steers (1981) defined attitudes as a tendency to react in ways that are favourable or unfavourable to animate and/or inanimate things in a person's environment. Accordingly, attitude is defined as a learned predisposition to behave in consistent ways to objects or situations (Fishbein & Ajzen, 1975). Also, Eagly and Chaiken (1993) noted that attitude is a psychological predisposition predicated upon an evaluation of certain things with some level of bias or un-bias. Consequently, taking a cue for the above definitions, it can be opined here that attitudes are built over time based on interactions, social inclinations and exposures. People are definitely not born with attitudes, they are just exposed to circumstances that shape their attitudes.

In direct contrast to the above positions, Teary and O'Leary (1995) posited that attitudes are not a perfect measure of actual behaviours, because they are, to a reasonable extent, consistent and cannot be easily changed. In line with this, Lindsay and Norman (1972) defined perception as a sensational process by which meaningful experiences of the world are interpreted and organized by people. Hence, perceptions change with changes in the environment where such perceptions are shaped. Therefore, attitudes and perceptions are different, but in reality two inseparable constructs. Perceptions may actually reflect attitudes, but not in its entirety. Based on the above presumptions and in view of the present study, safety climate will be viewed as employees' perceptions on the priority given to safety by their management.

2.5.5 Safety-Culture Safety-Climate Distinction

Safety culture and safety climate are sometimes used interchangeably, but they have different meanings, even if they are sub-sets of the larger organizational culture (Cooper, 2000). Specifically, safety culture has been defined as the features of organizational culture that affects the attitudes and belief system of workers vis-à-vis expected safety performance outcomes (Guldenmund, 2000). It is the set of safety-related fundamental indicators on beliefs and values as possessed by organizations (Fang *et al*. 2006). In another look, Fernández-Muñiz *et al*. (2007) opined that safety culture is a sub-set of the organizational culture that relates to the employees, their jobs, various organizational make-ups, and how these factors influence workers' health and safety.

On the other hand, safety climate is viewed as the current surface features of safety culture (Flin *et al*., 2000). Often time also, it is referred to as the superficial display of the safety culture of an organization (Glendon & Stanton, 2000). By inference however, and taking a cue from Dennison (1996) in the distinction between culture and climate, safety climate and safety culture can be said to be a representation of the values and beliefs system of an organization, but at different levels of abstraction (Schein, 2010). Additionally, while safety climate is temporary and changes according to organizational values, safety culture is more static, not easily changed, because it is built over a long period of time.

Searching further into the safety-culture safety-climate distinction, DeJoy *et al*. (2004) suggested that the distinction between these two constructs rests in the research methodology. They suggested that while studies on safety climate used a quantitative approach, safety culture related examinations used qualitative or ethnographic approaches (Mearns & Fin, 1999; Guldenmund, 2000). In concluding on this distinction however, support is given to the position of Guldenmund (2007) who agrees with Denison (1996), that safety culture and safety climate are two inseparable entities, and that they are two approaches used is ensuring the safety and health of employees in an organization. They are both approaches used in eliciting high safety performance outcomes at both individual and organizational levels of abstraction.

2.5.6 Measurement and Dimensions of Safety Climate

Many researchers have examined the safety climate construct across a myriad of work settings and socio-demographic milieu (Zohar, 1980; Dedobbeleer & Beland, 1991; Williamson, Feyer, Cairns, & Biancotti, 1997; Flin *et al*., 2000; Neal *et al*., 2000; Neal & Griffin, 2002; Mearns *et al*., 2003; Silva, Lima, & Baptista, 2004; Clarke, 2006; Smith *et al*., 2006; Pousette *et al*., 2008; Zhou *et al*., 2008; Zohar & Luria, 2010; O'Connor, O'Dea, Kennedy, & Buttrey, 2011; Fugas *et al*., 2012; Bosak *et al*., 2013; Tholen *et al*., 2013; Huang, Zohar, Robertson, Garabet, Lee, & Murphy, 2013; Hon, Chan, & Yam, 2014; Lee, Huang, Robertson, Murphy, Garabet, & Chang, 2014). However, there has been a continued on-going debate in the OSH literature as to how safety climate should be measured.

Additionally, though there is an agreement on the definition and common understanding of what safety climate is, how to measure it has been of concern for safety climate scholars in view of the disagreements and controversies noted in this regard (Johnson, 2007). While some researchers argue in favour of safety climate being a uni-dimensional construct or latent variable (Neal *et al*., 2000), others have suggested that it is multi-dimensional or have examined safety climate factors from a multi-dimensional point of view (Cooper & Phillips, 2004; Zohar & Luria, 2005; Huang *et al*., 2006; Parket *et al*., 2006; Hon *et al*., 2012; Cigularov *et al*., 2013; Hon *et al*., 2014; Barbaranelli *et al*., 2015). The proponents of measuring safety climate as a multi-dimensional construct do not however agree on the number of dimensions are enough in having a good measurement (Cavazza & Serpe, 2009).

Evidently, and for the purpose of the present study, safety climate would be measured as a multi-dimensional construct, even if there is a disagreement as to the number of factors that should constitute the dimensions, or which of the factors are most effective in eliciting safety performance outcomes (Lin *et al*., 2008; Kath *et al*., 2010). Even so, safety climate has been largely studies as a muliti-dimensional construct since the ground-breaking study by Zohar (1980). To this end, researchers are allowed to choose which factors or dimensions of safety climate fit their desired population, context and culture. In fact, researchers are left with the discretion of selecting factors of safety climate (Lin *et al*., 2008). However, a few other arguments abound as to why researchers disagree on the number of factors that should make up the safety climate construct.

Seo *et al*. (2004) and Cavazza and Serpe (2009) suggested that it might be as a result of the validity of the scales, as the scales are usually developed based on country-specific and organization-specific contexts. Hence, giving researchers the leeway to select safety climate factors that suit the context and setting of their study. A chronological presentation of the dimensions of safety climate will now be done. Consequently, the definition of safety climate clearly suggests that is best measured as a multi-dimensional construct as the perceptions of the employees are formed based on different organizational practices and aspects of work. Taking a cue from the first dimensional classification of safety climate, Zohar (1980) identified eight factors that constitute safety climate, using a sample of 20 workers from 20 industrial organizations. The factors so identified are: perceived importance of safety training programs, perceived management attitudes towards safety, perceived effects of safe conduct over promotion, perceived level of risk at the work place, perceived effects of workplace on safety, perceived status of the safety officer, perceived effects of safe conduct on social status, and perceived status of safety committee.

Similarly, Brown and Holmes (1986) validated a shortened version of Zohar's scale among 425 workers in the manufacturing setting and extracted three factors, namely, management concern, management action and physical risk. In another study across two different organizations, Coyle *et al*. (1995) extracted seven factors from one organization and six factors from the other organization. It is based on this that they suggested that there is actually instability in the factor structure of safety climate, and that the safety climate factor structure is actually industry-specific (Cox & Flin, 1998). This position was taken when their study developed five safety climate factors: individual responsibility, safeness of the work environment, personal immunity, personal scepticism, and effectiveness of arrangements for safety.

Consequently, some other researchers have also examined safety climate from a multi-dimensional point of view with the aim of eliciting high safety-related behaviours across organizations and work settings. Specifically, Hofmann and Stetzer (1996) conducted a study among 222 employees from 21 groups in the chemical processing industry. Individual and group level analysis revealed perceptions of role workload, and group process, safety climate and intentions to approach co-workers involved in unsafe acts, as the variables that significantly associated with unsafe behaviours. Similarly, Mearns *et al*. (2003) conducted a cross-organizational study in 13 offshore oil and gas installations and among 682 and 806 employees at different times. The study was conducted to identify the best safety factors that are capable of eliciting high safety performance outcomes. The following factors were extracted as having the highest statistical relevance to the context of their study: involvement in safety; satisfaction with safety; work pressure; perceived manager competence; perceived management commitment; perceived supervisor competence; willingness to report incidents; communication.

In a study conducted in the manufacturing setting, Cheyne, Cox, Oliver and Tomas (1998) identified the following five factors of safety climate based on employees' perceptions: safety management, individual responsibility, personal involvement, safety standard and goals, and communication. In a not-too-recent study, Vinodkumar and Bhasi (2009) validated the safety climate scales among 2536 chemical workers in India. The following safety climate factors were however extracted: management commitment, workers attitude, workers' participation, safeness of work environment, priority of safety over production and risk perception.

Howbeit, it can be noted from the above that, aside individual responsibility, being one of the safety climate factors extracted, the other factors as reported by Cox and Flin (1998) and Cheyne *et al*. (1998) are quite different. Consequently, Cooper and Philips (2004) further noted that safety climate factors are industry-specific and cannot be generalized. While some of the studies cited above used accidents and injuries rates, and/or safety-related behaviours as safety performance indicators, a few studies focusing on the relationship between safety climate and behaviour-based safety performance indicators will now be reviewed.

Based on the unavailability of a consistent factor structure of safety climate, Seo, *et al*. (2004) used a meta-analytic approach to cross-validate safety climate scales among 722 grain industry workers in the United States. The following safety climate scales were extracted: management commitment to safety; supervisor support, co-worker support; employee participation; competence level. These factors were extracted accordingly because they showed adequate discriminant power and very good evidence on construct validity. In longitudinal survey aimed at improving safety in the construction industry, findings by Larsson *et al*. (2008) suggested direct and indirect relations between safety climate and safety-related behaviours among 189 blue-collar workers. The factors extracted are: role clarity; influence at work; possibilities for development; predictability; sense of community; social support; feedback at work; quality of leadership.

In a similar vein, while testing a Bayesian Network Model on improving safety behaviours among 4719 construction industry workers, Zhou *et al*. (2008) identified the following as the most important safety climate factors that are capable of eliciting high safety-related behaviours: systems and procedures; management commitment to safety; safety attitudes; workmates influences; employee involvement. In another longitudinal, cross-sectional study among 3310 and 8567 the oil and gas sector workers, Tharaldsen *et al*. (2008) examined the psychometric potentials of a safety climate questionnaire. Exploratory and confirmatory factor analysis suggested the following as the most relevant safety climate factors: safety prioritization, safety management and involvement, safety versus production, individual motivation and system comprehension.

In the same year as the above, a safety climate tool was developed as a safety management requirement in the construction industry in the United Kingdom. Seven safety climate factors were extracted based on their ability to elicit high safety performance outcomes. The factors are: management commitment for OSH, resources for safety and their effectiveness, risk taking behaviours and perceptions of risks at work, safety rules and procedures, involvement in safety and health, safety promotion and communication, safe working attitude and co-workers' influence (OSHC, 2008).

In another study of blue-collar workers in Italy, work setting, Cavazza and Serpe (2009) tested a causal relationship aimed at explaining the effects of safety climate on safety norm violations (safety compliance). The following are the safety climate factors that were extracted: company safety concern, senior managers' safety concern, supervisor's attitude towards safety, work pressure, safety communication and safety training. They further established that a reduction in the tendency to break safety norms was associated with lower levels of ambivalence. In the railway industry, Morrow *et al*. (2010) confirmed the relationship between psychological safety climate and safety behaviour among 421 workers. Three factors of safety climate were noted to have had a relationship with safety—related behaviours. They are, management safety, co-worker safety, and work-safety tension.

Safety management practices (SMPs) are offshoots of family climate in a lower level of abstraction (Vinodkumar & Bhasi, 2010). In a study of these safety climate/SMPs, they identified the following as the most important factors that are capable of eliciting high safety performance outcomes in a high hazard industry in India: management commitment to safety, safety training, workers' involvement in safety, safety communication, safety rules and procedures and safety promotion policies.

They further submitted that these factors better explain safety-related behaviours through safety knowledge and safety motivation as mediators. Furthermore, they noted that, of all the factors so tested, safety training was the most important factors that had a better significance level with the determinants and components of safety performance.

In an organizational level study among OHSAS 18001 certified organizations, Fernández-Muñiz *et al*. (2012) analysed the situation of safety climate in these 131 companies with the aim of proposing a structural model showing the antecedents and consequences of safety-related behaviours. The following factors were examined; management commitment to safety, incentives, work pressure and communication. Of these structures however, their findings showed that management commitment and communication had an effect on safety behaviour and other organizational level performance outcomes like safety, employee satisfaction and firm competiveness. Also, in a study aimed at measuring the perceptions of employees in elderly homes on safety, Yeung and Chan (2012) identified the following as having statistical significance with safety performance indicators: management commitment and concern for safety, safety communication and awareness and safe work attitudes. However, while the above showed higher scores in the factor extraction, perception of safety rules and procedures had the lowest score.

In another industry, high reliability industry, Bosak and colleagues sought to understand the interactive relationship between three dimensions of safety climate and risk-taking behaviours among 623 chemical manufacturing workers in South Africa. The dimensions of safety climate examined in this study are: management commitment to safety, priority of safety and pressure for production. The relationship was significant (Bosak *et al*., 2013). In another work setting, Tholen *et al*. (2013) conducted a multi-level investigation aimed at understanding the causal relationship between safety climate and safety behaviour among 289 construction workers. Results from their study showed a relationship between safety climate and safety behaviour. More interesting in their findings is a reversed relationship between safety behaviour and safety climate. The safety climate factors investigated in this study are: management safety priority, management commitment to safety, safety communication and safety involvement.

In another study among 4725 construction workers, Cigularov *et al*. (2013) did a cross-sectional study on measurement equivalence of safety climate factors with the aim of identifying which are most important in eliciting high safety performance outcomes. The following factors revealed strong measurement equivalence; management commitment to safety, safety practices, supervisory support and work pressure. In two separate studies conducted by Hon *et al*. (2012, 2014) among RMAA workers, three important safety climate factors were able to elicit safety performance outcomes, namely, management commitment to safety, safety rules and safety responsibility.

In cross-validating a safety climate measurement tool across two different cultures among 738 and 616 workers in the United States and Italy respectively, a recent study by Barbaranelli *et al*. (2015) showed the following safety climate factors had statistical relations with safety motivation and safety knowledge and by extension safety compliance and participation. Based on the above presentations, some issues relating to the dimensionality of safety climate factors will now be discussed, and then the selected safety climate factors for the present study will also be discussed on their own merit and based on their ability to elicit high safety performance outcomes across industries, organizations and work settings.

One important point to note at this stage of the literature review is that safety climate is the most important determinant of safety behaviours across industries and geographical settings. This has been proven beyond reasonable doubts owing to the number of empirical underpinnings so available (Gitlleman *et al*., 2010; Bosak *et al*., 2013; Maslen & Hopkins, 2014; Barbaranelli *et al*., 2015). However, of all the studies on the measurements and dimension of safety climate to cited and referred to, it can be noted that there is a paucity of research investigating the safety-climate safety-performance relationship in the oil and gas and related service industry. Howbeit, a few studies have selected and examined some safety climate and organizational-level factors and their ability to elicit safety performance outcomes in the oil and gas and related service industry (Zohar & Luria, 2003; Mearns & Reader, 2008; Mearns & Yule, 2009; Cavazotte *et al*., 2013; Dahl & Olsen, 2013; Sneddon *et al*., 2013; Maslen & Hopkins, 2014; Wold & Lauman, 2015).

Consequently, a study that captures a comprehensive number of factors in measuring the level of safety performance in the oil and gas and related sector with safety climate as an exemplar, and within the context of the present study is unavailable. More worrisome is that, to the best of the researcher’s knowledge, no study has been sighted in the Nigerian setting, as most studies cited were done in more Eastern and Western work settings with well-developed work systems and practices as compared to Nigeria. Therefore this study would not have come at a better time than now, and in view of the recurring number of accidents in the sector, contribution to theory and better explanation of the safety-climate safety-performance relationship. This study is therefore worthwhile for the purpose it is going to serve upon completion.

Another important point to note at this point of this literature review is that, though lots of studies done with the aim of explaining the safety-climate safety-performance relationships in various countries, industries and contexts, their findings are not generalizable (Cooper & Phillips, 2004) and might not be the pre-eminent exemplification of safety climate (Beus *et al*., 2010b). Zohar (2010) also suggested that it would be better to have industry-specific and context-reliant safety climate factors so as to have deeper understanding of workers' perceptions accordingly, since safety climate has different meanings to different cultural and organizational backgrounds (Lin *et al*., 2008; Bahari & Clarke, 2013). Specifically, Bahari and Clarke (2013) argued that it would be worthwhile conducting a similar study like theirs in a culturally related setting. This therefore provides additional justification for conducting this study in Nigerian being a developing country.

Consequently, since safety climate studies have been examined above, and the various factors that make up its dimensions across various studies in diverse socio-demographic milieu, the researcher will now discuss the selected safety climate factors that are examined as second-order, higher order constructs in the context of the present study. The factors selected for the present study were so selected because of their frequent inclusion in safety climate studies and based on their relevance to the industry in focus. The factors were also selected because of their ability in predicting safety behaviours and beyond alternative safety dimensions (Bosak *et al*., 2013). More specifically, the researcher narrowed down to safety climate factors most frequently used in oil and gas and other highly volatile industries due to the related level of risks and possibilities of accidents. Pousette *et al*. (2008) also suggested that it will be worthwhile to see how specific dimensions of safety climate influence safety behaviours.

2.5.6.1 Management Commitment to Safety

Management commitment to safety is the extent to which top-level management demonstrate commitment to improving workplace safety which is often times noted in the safety-related encouragement and support accorded employees under them (Hsu, Lee, Wu, & Tanako, 2008). This commitment from top-level management helps to shape the perception of employees who eventually work in as safe manners as possible, and by extension improving on their safety-related behaviours in the form of reduction in accidents, injuries and fatalities rates (Yule, Flin & Murdy, 2007).

On a similar note, management commitment to safety has been identified as a key determining factor of safety behaviours across organizations (Zohar, 1980; Mearns *et al*., 2003). However, management's level of commitment is evidenced by their involvement in safety committees, job trainings for employees and the consideration accorded safety in the phase of job design (Zohar, 1980). Some studies have examined management commitment to safety in relation to its stand-alone ability in explaining safety-related outcomes which occur as a result of human behaviours

(Abudayyeh, Fredericks, Butt, & Shaar, 2006; Feng, Acord, Cheng, Zeng, & Song, 2011; Huang *et al*., 2012). Interestingly also, the construct has often been examined as a safety climate factor (Jiang *et al*., 2010; Zohar & Luria, 2010; Fernández-Muñiz *et al*., 2012; Tholen *et al*., 2013) and / or a dimension of safety management practices (Vinodkumar & Bhasi, 2010). Some studies done in this regard will now be discussed by the researcher.

In a study by Abudayyeh *et al*. (2006) on the import of management's commitment to safety on improving safety outcomes in construction sites, from 40 completed surveys, results indicate a clear statistical correlation between management commitment to safety and safety outcomes. However, the safety outcomes in the study were injury and illness rates which are resultant effects of poor safety behaviours. In another study, Huang *et al*. (2012) sought to understand the relationship between management commitment to safety, safety training and their relationship with future injuries. From an analysis of 419 employees in a restaurant work setting, the results from a confirmatory factor analysis shows high correlation between management commitment to safety and association with future injuries.

Similarly, Feng *et al*. (2011) sought to understand the relationship between management commitment to safety and patient's safety culture in a Chinese hospital. Analysis of data from 248 registered nurses revealed a high statistical significance on the relationship between management commitment to safety and patience safety culture. Furthermore, Michael *et al*. (2005) tried to identify the relationship between management commitment to safety and non-safety outcomes in wood manufacturing employees. Results indicated that there are varying outcomes on how workers perceived management commitment to safety and how this affects both safety and non-safety outcomes. In further expanding the concept of management commitment to safety as a safety climate dimension, some studies reviewed by the researcher will now be discussed. Also studies specifically examining this safety climate dimension in relation to safety behaviours are to be considered owing to its relevance to the context of the present study.

In a study aimed at identifying strategies on improving workplace safety behaviours from the employee point of view, Zhou *et al*. (2008) tested a Bayesian Network Model among 4719 construction workers and reported that safety climate successfully predicted human behaviours. Management commitment to safety was one of the safety climate factors. Lin *et al*. (2008) also found similar relationships among 1026 industry workers in China. Similarly, in another study aimed at identifying specific factors affecting safety performance of 176 and 148 workers of medium and large companies in Jordan, Al-Refaie (2013) reported that though management commitment to safety did not have any statistical significance with safety performance (compliance and participation) in medium companies, the relationship significant in large companies.

Other studies where management commitment to safety have been examined as a component of safety climate and have been found to significant relate to and/or influence safety behaviours in the form of compliance and participation are, Glendon and Litherland (2001), Mearns *et al*. (2003), Larsson *et al*. (2008), Melia *et al*. (2008), Beus *et al*. (2010), Fugas *et al*. (2012), Bahari & Clarke (2013), Bosak *et al*. (2013), Hon *et al*. (2014), Barbaranelli *et al*. (2015). However, of importance to note here is that the studies cited above were done in countries with advance operational, work and technological systems as compared to the systems in the scope of the present study. A theoretical gap is this created. A study intended to address this issue and contribute to the existing literature in this field of study will be worthwhile.

2.5.6.2 Safety Training

Safety training has been identified as one of the most important safety climate factor that is capable of explaining or eliciting high safety performance outcomes across industries and has been so reported (Cooper & Phillips, 2004; Lu & Shang, 2005; Huang *et al*., 2006; Choudhry *et al*., 2008). Safety training in organizations are done in the form of formal orientation programs, on-going capacity building programs (Huang *et al*., (2006) which are basically factors used in measuring workers safety behaviour indices. Furthermore, the strength of safety training in explaining safety performance outcomes have been further highlighted by researchers in that it is a veritable means of predicting accidents, and by extension shaping workers safety behaviours (Randles, Jones, Welcher, Szabo, Elliott, & MacAdams, 2010). It is in view of the above that safety training was defined as the transfer of knowledge relating to safety and how this knowledge so acquired can make workers work in as safe manners as possible and with no exposures to their well-being (Law, Chan & Pun (2006). This is the definition that will be used in the context of this study.

Safety training has been identified as a very important tool for determining general organizational success and the success of OSH programs (Vinodkumar & Bhasi, 2010). Reasons adduced to this submission is that improvements in behavioural skills and attitudes which are catalysts to accident causation are shaped by various safety related training programs. Furthermore, improvements in safety-related outcomes in organizations are a function of systematically planned comprehensive OSH programs for new recruits, mentorship and succession planning programs, orientation for new staff and improvements in OSH systems (Vredenburgh, 2002). More so, organizations known for reporting low accidents and injuries rates have been adduced to the effectiveness of organizational safety programs (Lee, 1998; Tinmannsvik & Hovden, 2003; Brahm & Singer, 2013). Some empirical endeavours on safety training and how it relate to improvements in safety outcomes across organizations and work settings will now be reviewed by the researcher.

In a construction industry setting, Choudhry *et al*. (2008) noted that safety training was among the best practices that determines improvements construction safety behaviours in a study done among 1022 construction workers. In another study by Brahm and Singer (2013) among 2787 Chilean miners, empirical support was found for the relationship between training and accidents reduction. They study further emphasised the need for more engaging training on accidents reduction for employees of organizations. In a related study done in the Nigerian construction work setting, Okoye and Aderibigbe (2014) established a significant correlation between safety climate factors and safety behaviours among 861 workers.

In the hazardous industrial work setting, Vinodkumar and Bhasi (2010) noted that safety training was most important in predicting safety knowledge and motivation, and by extension safety compliance and participation. The study was conducted among 1566 hazardous industrial company. In another study among 419 restaurant workers, Huang *et al*. (2012) reported that perception of employees about training is one of the factors capable of determining safety injuries occurrence and safety behaviours (compliance and participation). In another study by Cabrera *et al*. (2007) among 229 participants from a myriad of work settings reported that irrespective of the cultural orientations of the participants of the study, safety training programs was significantly related to reduction in injuries and accident prevention. Their position was further supported by the submission of Khdair *et al*. (2011) who noted that the effectiveness of training programs lies developing training needs assessments, conducting training accordingly, and by extension modifications in work procedures.

While import of safety training in eliciting high safety performance outcomes have been noted above and across industries, similar studies done in this regard are, Cooper and Phillips (2004), Sinclair *et al*., (2010), Hare and Cameron (2011), Hassan & Jha (2013). However it is important to note that there is paucity of research on how safety training influence safety behaviours especially in the Nigerian work setting and more especially in the oil and gas industry.

2.5.6.3 Safety Communication and Feedback

Safety communication and feedback has been identified as an important factor that is capable of improving safety performance outcomes in organizations (William, 2003). Safety communication is a process which allows an interaction of people, tasks, processes and systems with a view to achieving improved safety-related behaviours. However, Vecchio-Sadus (2007) remarked that though safety communication can lead to improved safety behaviours, but that the way and/or the mechanisms through which this communication is done will determine the level of impact it will have on the employees which will be displayed in their level of participation and compliance in safety related activities.

From the management perspective, Vredenburgh (2002) noted that feedback is another co-joined relative to communication and the process. She noted that by having a sound communication and feedback system, hazards conditions which can cause accidents can be averted as the behaviour of workers are dependent on new occurrences. Furthermore, in improving safety performance outcomes in the form of safety-related behaviours, Goetsch (2011) noted that safety managers should ensure the prompt dissemination of safety-related information to employees across board.

Specifically he noted that this can be done by way or regular and on-going safety meetings, management walk-abouts, publications in newsletters, e-mails, etc. More so, when feedback on safety-related issues are brought to the notice of management, resolutions can be put on sign posts, caution signs and directions. This has been described as a two-way safety communication system which has been adjudged as best in improving safety-related behaviours among employees (Vecchio-Sadus & Griffiths, 2004; Vinodkumar & Bhasi, 2010). Some studies done on the ability of safety communication and feedback as a stand-alone construct, a dimension of safety climate, or safety management practices will not be reviewed by the researcher.

In two cross-organizational survey conducted among offshore oil installations, Mearns *et al*. (2003) reported that safety communication and feedback is one of the safety management practices that has a strong statistical significance with safety related outcomes. In another study conducted among 229 employees from different industrial sectors, Cabrera *et al*. (2007) reported that workplace communication and feedback is one of the six organizational values that improved workplace safety. In a different work setting, Stave *et al*. (2008) reported that safety communication is one factor that improves safety behaviours in the farming sector. Furthermore, in another study aimed at validating a safety climate measurement among 1026 industrial sectors workers, Lin *et al*. (2008) identified safety communication as one of the safety climate factors with a 70.5% variance.

In another study conducted in the healthcare industry, Abdullah *et al*. (2009) noted that the perception of employees about safety communication was important in safety performance outcomes. Though safety communication was not statistically significance in their study, it is noted to be an important component of safety climate that explains safety performance outcomes. In the construction industry, Ling, Liu and Woo (2009) attempted to develop and evaluate 41 strategies intended for the reduction of accidents and fatalities. A key outcome of their study highlighted the need for improvements in communication between management and workers. The role of workers in the success of any safety management system has also be noted (Hon, Chan & Chan, 2011). In another study among 235 union construction workers, Cigularov *et al*. (2010) reported that positive safety communication was an important contributor to improving safety performance outcomes in the workplace.

While exploring the antecedents and consequences of safety climate in 131 OHSAS certified organizations in Spain, results from the study by Fernández-Muñiz *et al*. (2012) shows that communication have an effect on safety behaviour and other safety performance outcomes in the form of employee satisfaction and firm competiveness. A few other studies done in this regard are Evans *et al*. (2007), Kines *et al*. (2010), Yeung and Chan (2012), Wold and Laumann (2015). Sequel to the above, it is important to reiterate that this dimension of safety climate was selected due to its ability in explaining safety performance outcomes. Nonetheless, a huge paucity of research examining this variable within the gamut of the Nigerian work context and within the scope of the present study is thus noted, and another theoretical gap is thus created.

2.5.6.4 Safety Systems (Rules and Procedures)

Safety rules and procedures is another safety climate dimension that is capable of influencing safety performance outcomes across industries and have been so noted. The definition of safety rules and procedures emanates from the duty of care legislation which stipulates that employers should maintain safe work environments to the extent that hazards are as low as is reasonably practicable (Hopkins, 2007). Consequently, Lu & Yang (2011) defined safety rules and procedures as the extent to which organizations create clear missions, assign clear roles and responsibilities, set up standards for monitoring employee behaviours and also instituting systems for correcting workers unsafe behaviours. Vinodkumar and Bhasi (2010) are however of the opinion that the functionality of safety rules and procedures in organizations rests on the shoulders of management who must see to the implementation of the set up rules and procedures rather than allowing them on paper only.

On another note, it has been suggested that the implementation of safety rules and procedures by management of organizations is actually a demonstration of their level of commitment in ensuring workplace safety (Fernández-Muñiz *et al*., 2007). Hence, behaviours that are acceptable and how these behaviours affect safety outcomes in organizations is a function of the effectiveness of the organization's safety rules and procedures. While the ability of the construct in discuss in eliciting safety performance outcomes, empirical endeavours that supports this position will now be reviewed by the researcher.

In a study aimed a explaining a multilevel model of safety climate among 3952 production workers, Zohar & Luria (2005) reported a meaningful group-level variation in a single organization. One the reasons attributed to this finding is the role supervisors played in implementing safety-related procedures. However, injuries and accidents were used in measuring safety performance. In another study done among 500 miners, Laurence (2005) noted that the absence of procedures was directly responsible for the number of accidents so recorded therein. The importance of this construct in affecting behaviours and by extension reducing accidents in workplaces cannot be over-emphasized.

In a study among 155 employees of a passenger ferry company in Taiwan, Lu and Yang (2011) used a series of data analysis technique to establish that safety policy was related to safety compliance. Though findings from their study was statistically insignificant, they further reiterated the need for the implementation of safety policies in improving safety behaviours. The findings of Lu and Yang (2010) is in conformity with findings of Leggat, Bartram and Stanton (2011) who used a mixed method research technique to submit that high performing works systems were as a result of the implementation of safety rules and procedures.

In the petroleum industry setting, Dahl (2013) noted the importance of workers' knowledge of rules and procedures and how such knowledge affect their safety-related behaviours. In a survey of 651 elderly homes, Yeung and Chan (2012) took note of the importance that should be attached to the implementation of safety rules and procedures. Other studies where this construct have been examined as a stand-alone or as a dimension of another large construct are, Wills, Watson and Biggs (2009) and Vinodkumar and Bhasi (2010).

2.6 LEADERSHIP AS AN ANTECEDENT OF SAFETY CLIMATE

The relationship between safety climate and safety behaviours is established and has been so empirically proven in a myriad of studies across numerous work settings and socio-demographic milieu (Neal & Griffin, 2006; Larsson *et al*., 2008; Turnberg & Daniell, 2008; Agnew *et al*., 2010; Morrow *et al*., 2010; Fugas *et al*., 2012; Cui *et al*., 2013; Tholen *et al*., 2013; Hicks, Buttigieg, & Cieri, 2016; Zhang & Liu, 2016). However, of importance to the researcher is to identify which is the most important factor that has an impact of the level or strength of safety climate (Zohar & Luria, 2010) and how this relationship can lead to better safety performance indicators.

In a seminal paper by Zohar (2010) on the direction for future studies on safety climate, he noted that the relationship between safety climate and safety behaviour is well established. Researchers were thus advised to develop better theoretical understanding of the antecedents, moderators and mediators of this relationship (Eid *et al*., 2012). Interestingly, quite a few studies have been suggested and/or done in this regard. For example, organizational climate (Neal & Griffin, 2000), organizational tenure (Beus *et al*., 2010), symbolic social interactions (Stryker, 2008; Zohar, 2010), foundation climates (Wallace, Popp, & Mondore, 2006), trust (Luria, 2010), and leadership (Dragoni, 2005; Barling *et al*., 2002; Zohar & Tenne-Gazit, 2008; Kapp, 2012; Clarke, 2013; Nielsen *et al*., 2013).

Consequently, leadership is selected as an antecedent of safety climate because it is theory-driven. According to Lewin *et al*. (1939), leaders create climate. More so, leaders who promote safety also create a positive safety climate among their followers (Kelloway & Barling, 2010). The presence of a strong relationship between leaders and their followers, climate perceptions are positively influenced (Kozlowski & Doherty, 1989; Dragoni, 2005). Also, when safety systems fail, the eventual outcomes of such failures have been attributed to failures in leadership styles (Amorse & Anderson-Butcher, 2007; Taj, Abdolvahabi, Naghavi, Rahmati, & Naini, 2010).

Interestingly, yet surprising, there is no consensus as to how safety behaviours are influenced by leadership, especially among employees in highly regulated work settings (Martinez-Corcoles, Gracia, Tomas & Peiro, 2011). Consequently, while it is well-established that different leadership styles influence safety behaviours differently (Clarke, 2013), very little has been done in terms of theoretical development and research specifically exploring the fundamental mechanisms on how different leadership styles affect safety behaviours differentially (Kark, Katz-Navon, & Delegach, 2015). A research gap is thus created and intended to be filled by the researcher.

2.7 SAFETY CLIMATE AS A MEDIATOR IN THE LEADERSHIP AND SAFETY BEHAVIOUR RELATIONSHIP

The relationship between leadership and safety behaviour is well-established and has been noted in previous sections of this chapter. However, the mechanisms through which this relationship occurs or should be further explained is still short of empirical underpinnings (Kelloway *et al*., 2006). Consequently, in order to have a better and/or deeper understanding (Mathieu, DeShon, & Bergh, 2007; Wu & Zumbo, 2008) of such established relationships, the introduction of a mediator is justified (Baron & Kenny, 1986). More so, when researchers sought to have additional understanding of how and why such relationships occur, and especially in an intermediary process (Muller *et al*, 2005), the introduction of a mediator should will be worthwhile.

On another note, MacKinnon (2008) suggested that the introduction of mediators in statistical relationships is for seeking more clarification on the nature of the relation between an independent and a dependent variable. Since scholars are now directing their empirical endeavours on gaining better understanding of established findings, Cohen, Cohen, West and Aiken (2013) suggested that the introduction of a mediator and its subsequent analyses are used to understand a well-known relationship.

Characteristically, previous sections of this chapter has explained the relationship between safety climate and safety behaviour. However, the key thrusts of this study is understanding how safety climate is able to mediate the relationship between leadership and safety behaviours, especially with the selected leadership styles. As noted by Zohar (2010) on the need for empirical endeavours aimed at understanding the antecedents of safety climate, it is the position of the researcher that the relationship between leadership and safety behaviour can be mediated by safety climate. Reasons adduced to this position will now be explained by the researcher.

Consequently, since leaders create climate (Lewin *et al*., 1939), by inference, leaders can also create safety climate (Kelloway & Barling, 2010), and safety climate eventually explains safety behaviours (Fugas *et al*., 2012; Cui *et al*., 2013; Tholen *et al*., 2013). Succinctly put, climate perceptions which is a representation of an individual's cognitive understanding of organizational practices and the attendant priority given to safety vis-à-vis competing operational demands, is actually formed by leader/supervisory practices (Zohar, 2002; Zohar, 2003; Zohar & Luria, 2004; Clarke, 2013).

In giving further credence to the above positions, Neal and Griffin (2004) submitted that unconcealed behaviours from management in relation to safety will significantly influence the shaping of safety climate and by extension safety-related behaviours. Safety climate is thus selected as it is known to be the most important and ultimate solution for improving safety behaviours (Bahari & Clarke, 2013; Bosak *et al*., 2013; Barbaranelli *et al*., 2015). It is also noted to have the greatest influence on safety performance (Cigularov *et al*., 2013).

A few studies have been done examining the mediating role of safety climate in the leadership-safety behaviours relationship (Barling *et al*., 2002; Clarke & Ward, 2006; Kelloway *et al*., 2006; Clarke 2010; Clarke, 2013). However, Clarke (2013) noted that more studies are still needed owing to the painfully limited number of studies so done in this regard. Also, more research is warranted due inconsistencies in findings resulting from nomenclature differences, statistical and methodological disparities (Martinez-Corcoles *et al*., 2011; Clarke, 2010). Additionally, the leadership styles being examined in the present study have been hardly examined in relation to safety climate as a mediator and by extension the safety behaviours dimensions selected for this study. Additionally, the limited number of studies so cited also indicates a huge theoretical gap in that only a limited number of industries have been examined. No study has also been done in the Nigerian work setting.

In discussing the relationship between the variables of the present study, it is important to posit as follows:

- Extant literature in the leadership and safety management research area have noted the importance of leadership as a critical antecedent safety climate and safety behaviours.

- However, most studies only examined general transformational and transactional forms of leadership. Little have been empirically done on how this relationship occurs with the authentic leadership style as a pointer. More so, to the best of the researchers' knowledge no study has been done in this regard with inclusive leadership as a pointer.

- The relationship between safety climate and safety behaviours is in no doubt one of the most researched relationship in the safety research area. However, the review of the literature suggests over-dependence on safety compliance and safety participation as the core components of safety behaviours. A huge paucity was noticed in terms of explaining safety behaviours from the point of view of risky behaviour. In fact, no study have examined this dimensionalization from a tripartite point of view with safety compliance, safety participation and risky behaviour in a single empirical framework.

Characteristically, Figure 2.1 illustrates gaps in the literature reviewed for the present study.

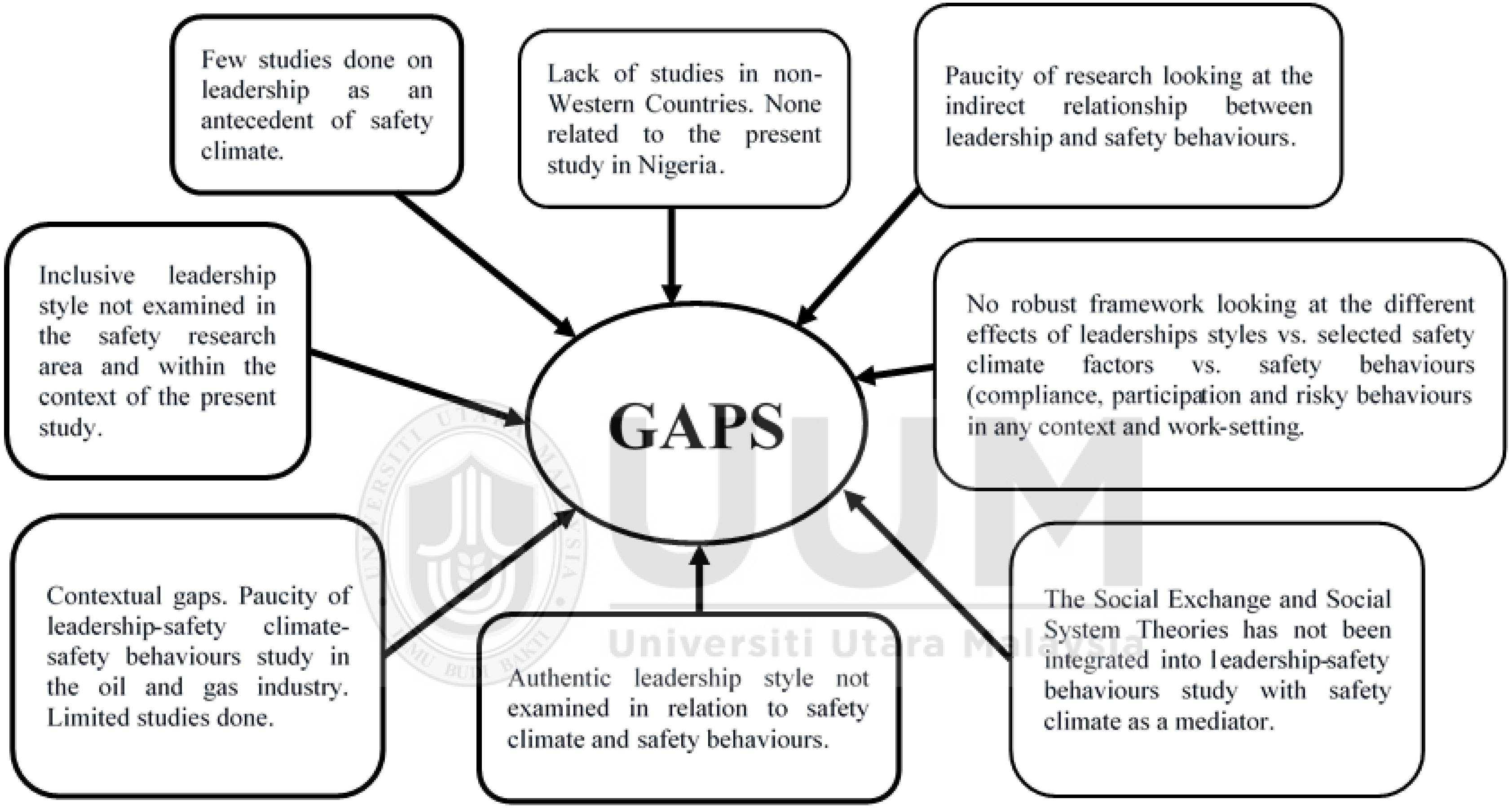

Figure 2.1.
Summary of gaps in the literature

2.8 UNDERPINNING THEORIES

A few theories can be used to explain and/or underpin first, the relationship between leadership and safety behaviour. Secondly, the relationship between safety climate and safety behaviour, and thirdly, the relationship between leadership and safety climate. The theories so suggested are the Social Exchange Theory (Gouldner, 1960; Blau, 1964) and the Social System Theory (Getzels & Guba, 1957; Parsons, 1970). The theories will now be explained accordingly.

2.8.1 Social Exchange Theory (SET)

The SET predates modern-day empirical endeavours in the management and behavioural sciences, as it is noted to be one of the most critical and leading conceptual models in gaining insights into the behaviour of workers (Cropanzano & Mitchell, 2005). The SET is predicated upon the doctrine and norm of reciprocity (Gouldner, 1960; Blau, 1964) as it is used to describe how persons go into relationships that are not inescapably economical, but associated with social obligations. The fundamental conventions of this principle are that, people should help those that have helped them and that people should not cause undue harm to those that have helped them in one way or the other.

However, though reciprocity occurs mainly between and among individuals, reciprocity is also developed between individuals, groups and the various organizations they are employed (Rosseau, 1989; Shore, Sy, & Strauss, 2006). The SET further stresses that in circumstances where somebody fails to fulfil an obligation, or unjustly treats another, an avenue is thus opened for negative reciprocity. Relating the above position to employee-employer settings, it can be posited that workers can react to unfair work conditions by getting involved in behaviours that can cause harm to co-workers and by extension the work environment and the organization at large.

The SET is appropriate in explaining the relationship between socio-psychological organizational factors and how these factors enhance the work performance of employees (Cheung & Law, 2008). Furthermore, the SET has been largely used underpinning the relationship between leaders and their subordinates (Liden, Wayne, & Stilwell, 1993; Settoon, Bennett, & Liden, 1996), and specifically in the safety research area (Hofmann & Morgeson, 1999; Flin & Yule, 2004; Eid *et al*., 2012; Clarke, 2013; Yorio, Willmer, & Moore, 2015; Zhang & Li, 2015). However, while relating the above positions to the present study, workers perception about their leaders can actually impact on their perceptions about safety in their organizations, and by extension shaping their safety-related behaviours. Workers just simply give back to their organizations by complying with safety rules and procedures, actively participating in safety related activities and positively shape their risk-taking behaviours. Good leader behaviours should eventually be reciprocated by good follower behaviours.

Consequently, the use of this theory in the present study is thus justified. When a antithetical relationship occurs between leaders and their subordinates, it is expected that negative behaviours will be displayed by the employees thereby compromising the workplace and vice versa. This position is expected to be empirically examined and will form the basis for understanding how leadership influences safety climate and how this influence explain workers safety-related behaviours.

2.8.2 The Social System Theory (SST)

It is the position of the social system theory that social behaviours are a manifestation of interactions between the role and expectations of organizations and the personality and needs of individuals (Getzels & Guba, 1957; Parsons, 1970; Omstein & Hunkins, 1993). Specifically, in organizations, noticeable organizational-level behaviours arise from interactions between organizational-level and individual-level factors. In view of this, leadership is the independent variable, safety behaviour is the dependent variable, while safety climate is the mediator.

Interestingly, a mediator is usually considered a catalyst intervening between a stimulus and a response (Wu *et al*., 2008). Specifically, safety climate is a catalyst which intervenes between leadership (stimulus) and safety behaviour (response). Relating the above position to the submission of Baron and Kenny (1987), the influence of an independent variable on a dependent variable is mediated by various alteration processes internal to the mediator. In giving credence to the above position, Kotter and Heskett (1992) opined that conspicuous organizational-level leadership could lead to a positive organizational climate, which in turn leads to the creation of an excellent organizational performance.

Since it is a widely held view that organizations are social systems, the symbiotic relationship that exists between individuals and various units in the organizations' hierarchy cannot be over-emphasised (House, Rosseau & Thomas-Hunt, 1995; Klein, Dansereau & Hall, 1994; Kozlowski & Klein, 2000). Also, since safety management system is an offshoot of the general organizational management system, a cause-and-effect relationship could probably exist in further explaining the leadership, safety climate and safety performance relationship (Wu *et al*., 2008).

Relating the above position to the gamut of the present study, it can be opined that leaders play key roles in shaping organizational culture, climate and workers' attitudes (Grojean, Resick, Dickson, & Smith, 2004; Mulki, Jaramillo, & Locander, 2009). Also, an interaction between employees and their leaders and how employees eventually interpret this interaction, vis-à-vis with competing organizational outcomes, facet-specific climates are formed (Zohar & Tenne-Gazit, 2008). Based on the above lines of thought and in relation to the framework of this study, it can be opined that a certain level of safety climate is achieved among employees based on the behaviours of their leaders. This eventually determines and/or explains employee attitudes and attendant safety-related behaviours in the form of complying with organizational safety procedures, participating in safety-related activities and risk-taking behaviours.

The above relationship has also been explained as a social learning process based on group-level characteristics (Dragoni, 2005; Zohar, 2010) and with the institutional theory (Scott, 1995) by Shin, Sung, Choi and Kim (2014) who noted that management plays an important role in shaping the culture and climate of organizations and also employee attitudes (Grojean, Resick, Dickson, & Smith, 2004; Mulki, Jaramillo, & Locander, 2009).

2.9 CHAPTER SUMMARY

The review of literature clearly indicates that authentic and inclusive leadership styles is related safety behaviours. More so, this relationship is noted to be mediated by safety climate. The literature also reveals that the above relationship is novel especially within the gamut of safety management. This is because of the most of the studies were conducted in the construction, manufacturing industries. Additionally, most of the studies were done in countries with developed structures and systems. The researcher also notes that there is a huge paucity of research examining the authentic and inclusive leadership styles with safety climate as mediator. Succinctly put, a diagrammatic representation of the gaps in the literature have been presented in addition to the underpinning theories supporting the framework of this study.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This chapter presents a description of the methodology used in this research. Specifically, the chapter begins with an explanation of various research paradigms. Thereafter, the theoretical framework, statement of hypotheses, the research design, population, sampling, data collection process, measurement of variables and instrumentation and procedures for data analysis are presented accordingly.

3.2 RESEARCH PARADIGMS

Several dichotomies and paradigms have been used to explain prevailing phenomena in the social sciences research area. Predominantly, the paradigms explored are, positivism versus interpretivism, quantitative versus qualitative, induction versus deduction, and exploratory versus confirmatory (Fitzgerald & Howcroft, 1998; Denscombe, 2014). However, Guba and Licoln (1994) and Cohen, Manion and Morrison (2013) did another categorization of the research paradigms into four broad-based perspectives of positivism, critical theory, realism and constructivism. They further submitted that the paradigms are made up of assumptions that are epistemological, ontological and methodological. Characteristically, epistemology is a process of knowing the relationship that occurs between the researcher based on what is known and what is to be known. Ontology basically refers to knowing what and how a phenomena does exist. Similarly, methodology entails the process to be used by the researcher to investigate that which is to be known (Guba & Lincoln, 1994; Zikmund, 2003; Zikmund, Babin, Carr, & Griffin, 2013).

The basic essences of research paradigms are, to guide researchers on identifying critical issues needed to be addressed in a discipline, a development of the model and attendant theories that permit addressing the issues as identified, establishment of criteria for tools to be used for the methodology of the research and related data collection procedures, and provision of the principles, procedures and methodology to be used in explaining a possible occurrence of related phenomena (Filstead, 1979, as cited in Deshpande, 1983). However, Table 3.1 illustrates the principal research paradigms and views associated with each of the paradigms based on the submissions of Perry, Riege and Brown (1999) and Guba and Lincoln (1994).

Table 3.1
Principal Research Paradigms and Related Views

	Positivist Paradigm	Constructivism Paradigm	Critical Theory Paradigm	Realism Paradigm
Known as	Quantitative Paradigm	The combination is also known as the qualitative or the interpretive paradigm	The combination is also known as the qualitative or the interpretive paradigm	
Ontology	Science is able to discover the true nature of reality. Apprehensive reality whose nature can be known and characterized.	Relativism-Truth is subjective, resulting in a state of multiple realities.	Social realities are apprehensible based on Historically situated structures.	Critical Realism – reality is apprehensible but can only be imperfectly comprehended.
Epistemology	There is a single apprehensible reality whose nature can be characterized	Relativism-truth is subjective, resulting in a state of multiple realities.	Focuses on transformation of social, political, cultural, economic, ethnic and gender values.	Critical Realism - Reality is apprehensible but can only be imperfectly comprehended.
Common methodologies and process	Quantitative methods	Principally qualitative	Principally qualitative	Principally quantitative

Source: Perry, Riege and Brown (1999); Guba and Lincoln (1994).

3.2.1 The Positivist Paradigm

This research paradigm to examining human and social behaviour originated in reaction to metaphysical speculation (Easterby-Smith, Thorpe, & Lowe, 1991). Interestingly, it has been posited that in order to have a well-grounded understanding of human behaviour vis-à-vis the psychology of their individual differences, it is critical to build a scientific and established foundation (Lubinski, 1996). The positivist paradigm which is quantitative in nature assumes a separation between the researcher and reality. Interestingly, extant empirical underpinnings done over the years in the social sciences were done from the positivist point of view (Morgan, Gliner, & Harmon, 1999; Lubinksi, 1996). Additionally, quantitative research emphasizes how large data sets collected from possible respondents are numerically analysed in plausible response to a phenomena (Blaxter, Hughes, & Tight, 2006).

Comparing the positivist paradigm to the interpretivist paradigm, while positivism submits that the researcher and that reality are two separate entities, interpretivism opines that the researcher and reality are inseparable. From an epistemological point of view, positivism assumes that objective reality is beyond the human mind, while interpretivism argues in support that knowledge of the world is purposefully built though lived experiences with social foundations. On the phenomena being investigated, positivism presumes that the objects being examined have special in-built characteristics independent of the researcher, while interpretivism assumes that objects are interpreted based on meanings structured by live experiences of the researcher.

3.2.2 Constructivist Paradigm

This research paradigm sees the truth as a creation that refers to a certain belief system held in a particular context. That is, the constructivist paradigm argues in favour of the truth being subjective rather than objective (Perry, Alizadeh, & Riege, 1997). Also, from the constructivist point of view, realities appear in multiple ways based on social intangible mental state of people (Guba & Lincoln, 1994). Put in another way, meaning has more value that measurement, with perception being the most important reality. From an epistemological point of view, in this research paradigm, the researcher is an involved party (Perry *et al.*, 1997). However, this paradigm is noted as appropriate because it lays much emphasis on the attitude and behaviour of constitutional bodies rather than on the feelings and emotions of humans.

3.2.3 The Critical Theory Paradigm

This research paradigm was developed in response to critically assessing and transforming socio-economic, political, cultural, ethnic and gender values (Guba & Lincoln, 1994). From an epistemological point on view, this paradigm establishes a close connection between the researcher, the object of the research and the phenomena being researched. Mainly, the interpretive ability of the researcher plays a critical role. With the above in mind, it is posited that the critical theory paradigm does not allow a generalization of findings as its focus is targeted towards a certain organization or entity who share same homogenous characteristics. In view of this, this research paradigm was not considered for the present study.

3.2.4 The Realist Paradigm

The foundation of this paradigm is predicated upon the knowledge about external reality by trying to understand and explain why people behave differently based on their experiences (Easterby-Smith *et al*., 1991). Though this paradigm is quantitative in nature, it posits that reality is a function of social construction rather than objective determination. Realists are of the opinion that there is something 'real' in phenomenological context even if it is only probabilistically apprehensible and defective (Merriam, 1988; Guba & Lincoln, 1994). The realist paradigm deals with a real world and a complex situation and characteristically get information from those involved with the subject area. This paradigm recognizes that while there is only one reality, an objective account of events is predicated upon the triangulation of a number of perceptions of reality so as to have a better idea of the occurrence being examined (Perry, Alizadeh, & Riege 1997). This paradigm is however qualitative in nature, and does not relate to the context of the present study.

3.2.5 Qualitative versus Quantitative

The qualitative and quantitative paradigms are based on positivism and interpretivism juxtapositions. Characteristically, the quantitative paradigm is founded on positivism, who ontological position advocates for the existence of one truth that is independent of human perceptions. Relatedly, the qualitative paradigm is built on interpretivism with an ontological view that advocates the existence of multiple realities based on the construction of reality by a person. Tables 3.2 and 3.3 illustrates the priority-sequence model and assumptions of both paradigms.

Table 3.2
The Priority-sequence Model

	Priority Decision	
	Principle Method: Qualitative	**Principle Method: Quantitative**
Complementary Method: ***Preliminary***	1. Qualitative Preliminary Purpose: Smaller qualitative study helps guide the data collection in a principally quantitative study • Can generate hypotheses; develop content for questionnaires and interventions, etc. Example: use of focus groups to help develop culturally sensitive versions of technology acceptance questionnaire.	2. Quantitative Preliminary Purpose: Smaller quantitative study helps guide the data collection in a principally qualitative study • Can guide purposive sampling; establish preliminary results to pursue in depth, etc. Example: A survey of different managerial level of an IT intensive site for more extensive stratified data collection.
Sequence Decision		
Complementary Method: ***Follow-up***	3. Qualitative Follow-up Purpose: Smaller qualitative study helps evaluate and interpret results from a principally quantitative study Can provide interpretation for poorly understood results; help explain outliers. Example: In-depth interviews help to explain why one organization generates higher level of employee technology satisfaction / adoption.	4. Quantitative Follow-up Purpose: Smaller quantitative study helps evaluate & interpret results from a principally qualitative study Can generalize results to different samples; test elements of emergent theories, etc. Example: An industry survey of different level of information technology department pursues earlier results from a case study.

Source: Morgan (1998) with example adaptation to reflect research in IT domain.

Table 3.3
Assumptions of Quantitative and Qualitative Methodologies

Assumption	Question	Quantitative	Qualitative
Ontological	What is the nature of reality?	Reality is objective and singular, apart from the researcher.	Reality is subjective and multiple as seen by participants in a study.
Epistemological	What is the relationship of the researcher to that researched?	Researcher is independent from that being researched.	Researcher interacts with that being researched.
Axiological	What is the role of values?	Value-free and unbiased.	Value-laden and biased.
Rhetorical	What is the language of research?	Formal. Based on set definitions. Impersonal voice. Use of accepted quantitative words.	Informal. Evolving decisions. Personal voice. Accepted
Methodological	What is the process of research?	Deductive process. Cause and effect. Static design-categories isolated before study. Context-free. Generalizations leading to prediction, explanation and understanding. Accurate and reliable through validity and reliability.	Inductive process. Mutual simultaneous shaping of factors. Emerging design- categories identified during research process. Contest-bound. Patterns, theories developed for understanding. Accurate and reliable through verification.

Source: Creswell (1994; 2014).

3.3 APPROACH ADOPTED BY THE PRESENT STUDY

Characteristically, it is critical for researchers to acknowledge paradigmatic differences in selecting research methods that suits the purpose of their study (Hall & Howard, 2008). Therefore, empiricists are advised to adopt research paradigms that are compatible with the interest of their research while taking into cognizance opportunities that abound in other related paradigms (Orlikowski & Baroudi, 1991). In the present study, the researcher applied the positivist ontology, empirical epistemology and quantitative methodology in investigating the phenomena in discuss. Basically, this paradigmatic approach is selected because it generates accurate, quantitative and statistical data from large sample sizes, and findings from such approaches can be relied up, are generalizable and can be replicated to related populations from the population examined (Maxwell & Delaney, 2004).

Evidently, some direct reasons for using this approach in the present study will now be discussed. Firstly, most of the studies on leadership, safety climate and safety behaviours have been done from the focal lens of positivism (Peus *et al*., 2012; Martinez-Corcoles *et al*., 2013; Bahari & Clarke, 2013; Clarke, 2013; Cavazotte *et al*., 2013). Hence, there is already a substantial body of literature, recurrent variables and related theories that was adapted to suit the context of the present study. Secondly, the main focus of this study is to test relational hypotheses based on the model under examination. Hence, the researcher will greatly rely on objective measures to support the findings of this study and to avoid issues of speculation and bias that are prevalent in interpretive research (Wicks & Freeman, 1992). The use of this paradigm also stresses that a quantitative approach verifies hypotheses which provides strong reliability and validity.

Finally, the present study could be replicated in future studies for the purposes of verification and to further expand the underpinning theories adopted herein. Hence, with the support of the positivist paradigm, a new avenue for research in the Nigerian context with respect to leadership, safety climate and safety behaviours is brought to light. Therefore, in light of the paradigm adopted by the researcher assumed the variables under examination were identified and measured objectively, hence the use of a survey. From an epistemological standpoint, the variables were measured using selected psychometric constructs and quantitative data, as the relationships between the variables have been somewhat established before the researcher decides to take a further look into such relationships. On rhetoric, the language used in this study is impersonal and formal. More so, all the variables were operationally defined based on adapted previous measures from related empirical endeavours.

3.4 THE RESEARCH PROCESS

A detailed research process was used in the present study, as it is common in related empirically based examinations. Basically there are seven main stages and are as illustrated in Figure 3.1.

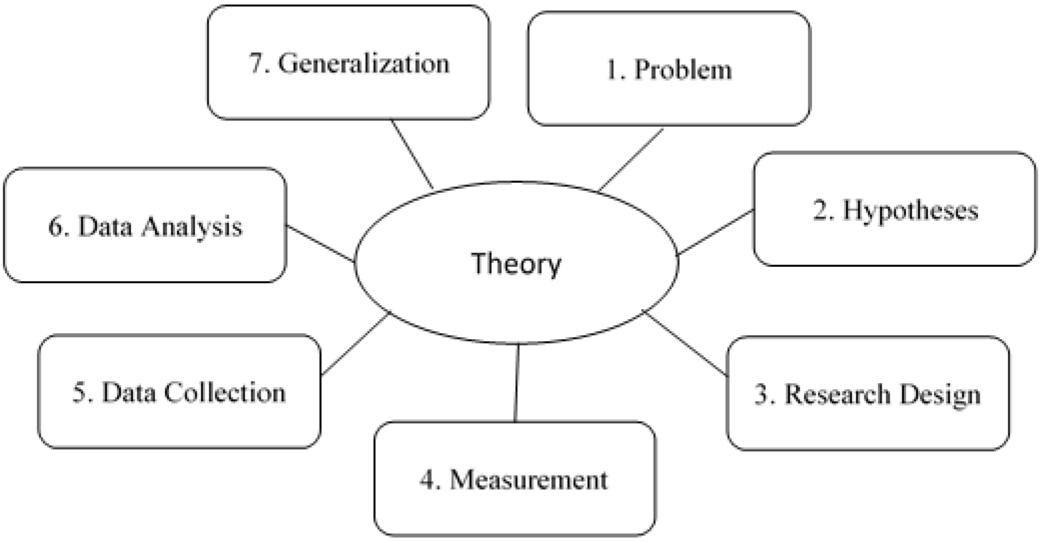

Figure 3.1.
The main stages of the research process

Source: Frankfort-Nachmias and Nachmias (1992)

Characteristically, in Chapter One, the researcher presented the general idea of the phenomena to be examined in the background of the study. This was followed by the problem statement that clearly presented the theoretical and practical gaps. The research questions, the research objectives, the scope of study and significance of the study were also presented in Chapter One. In Chapter Two, a review of relevant literature was done and it formed the basis on which the theoretical framework and hypotheses for the present study were developed. Also presented in Chapter Two is the underpinning theories and a brief of the occupational safety and health framework in Nigeria.

In chapter three various research paradigms were discussed and a justification of the paradigm employed in the present study was done. The theoretical framework, hypotheses, the research design, measurement and operational definitions of the variables of the study was done. Also presented in this chapter is the questionnaire design, population, sampling and sampling procedures, issues of reliability and validity, and techniques of data analysis.

Chapter Four presents the two phases of data analysis. The first phase involved the preliminaries, which was done to clean the data, and present the socio-demographic characteristics of the respondents. The second phase involved assessing the measurement and structural models of the study with the use of the PLS-SEM technique. In Chapter Five, being the final stage of the study, the interpretation of the findings of the study was presented. This was followed by the practical and theoretical implications of the study, and then the directions for future studies was presented.

3.5 RESEARCH FRAMEWORK

A research framework is noted to be a guide of how a researcher theorizes or makes some logical sense of relationships that exist between and among several factors and/or variables identified as key to achieving the objectives of a research (Gay, Mills, & Airasian, 2009). On a related note, Zikmund, Babin, Carr and Griffin (2010) opined that a theoretical framework discusses the interrelationships among variables that are considered fundamental to the dynamics of the phenomena under investigation. Based on the premise noted above, testable hypotheses are then developed and eventually tested to confirm certain relationships for better understanding of occurrences or a phenomena (Hair, Black, Babin, Andersen, & Tatham, 2010).

Based on the Social Exchange and Social System theories, some form of reciprocal interchanges occurs between employees and their organizations based on the influence of some unspecified obligations. More so, noticeable behaviours at a higher level in the organizational hierarchy and how these behaviours shape the climate at the lower level of the organizational hierarchy, are as a result of interactions between organizational-level and individual-level factors (Cigularov *et al*., 2010). Subsequently, the above interactions determine the form of behaviours that are eventually noticed at the employee level.

Taking a cue from the theoretical foundations cited above and in view of the literature so reviewed, it is noted that leadership is one of the most important socio-psychological organizational factors that explains safety behaviours (Barling *et al*., 2002; Taj *et al*., 2010; Zohar, 2010; Fernández-Muñiz *et al*., 2012; Kapp, 2012; Clarke, 2011; 2013; Hoffmeister *et al*., 2014). Specifically, the authentic and inclusive leadership styles are distinct leadership styles that have been adjudged to be able to significantly able to elicit high safety-related outcomes among employees (Mullen & Kelloway, 2009; Carmeli *et al*., 2010; Gardner *et al*., 2011; Nielsen *et al*., 2013; Wuffli, 2016). Reasons adduced for specifically examining the selected leadership styles in this study have been explained in the previous chapter of this report, though some highlights will also be presented in this chapter.

While the relationship between leadership and safety behaviours is noted, researchers are of the view that this relationship can be better explained via specific mechanisms (Kelloway *et al*., 2006; Kelloway & Barling, 2010). These mechanisms are for better, clearer and deeper understanding of established empirical relationships (Mathieu, DeShon, & Bergh, 2007; Wu & Zumbo, 2008). To this end therefore, and in aligning with the provisions and postulations of the Social Exchange and Social System Theories, safety climate is introduced as a mediator in further explaining the leadership-safety behaviours relationship. In addition to the theoretical foundation on the introduction of safety climate as a mediator in the leadership-safety behaviours relationship, some empirical premise can be suggested based on precedence.

Interestingly, leadership explains safety behaviours (Kapp, 2012) and the relationship between safety climate and safety behaviours is well-established (Beus *et al*., 2010; Gittleman *et al*., 2010; Young, 2010; Zohar & Luria, 2010; Cigularov *et al*., 2013; Bosak *et al*., 2013; Barbaranelli *et al*., 2015). Also, leadership has been identified as one of the most important antecedents of safety climate (Kelloway & Barling, 2010; Zohar, 2010; Clarke, 2013). To this end therefore, safety climate is being introduced to further explain the leadership-safety behaviour relationship based on the aforementioned theoretical foundations.

The theoretical link between leadership and safety behaviours with safety climate as a mediators is presented in a schematic model Figure 3.1, clearly showing an overview of the variables to be examined in this study. The independent variables are the authentic and inclusive leadership styles. The mediator variable is safety climate, which is to be examined as a second-order, higher order construct composed of management commitment to safety, safety training, safety communication, and safety rules and procedures. The dependent variable is safety behaviours with safety compliance, safety participation and risky behaviours as dimensions. It is expected that leadership will explain safety behaviours through safety climate.

Characteristically, the framework of the present study includes 11 hypotheses. Hypotheses 1 – 5 tests the direct relationship between authentic leadership, inclusive leadership and safety climate. It also tests the relationship between safety climate, and the three components of safety behaviours. Hypotheses 6 – 11 tests the mediating effect of safety climate on the relationship between authentic and inclusive leadership styles on the dimensions of safety behaviours. Hence, the research framework is as presented in the Figure 3.2 hereunder.

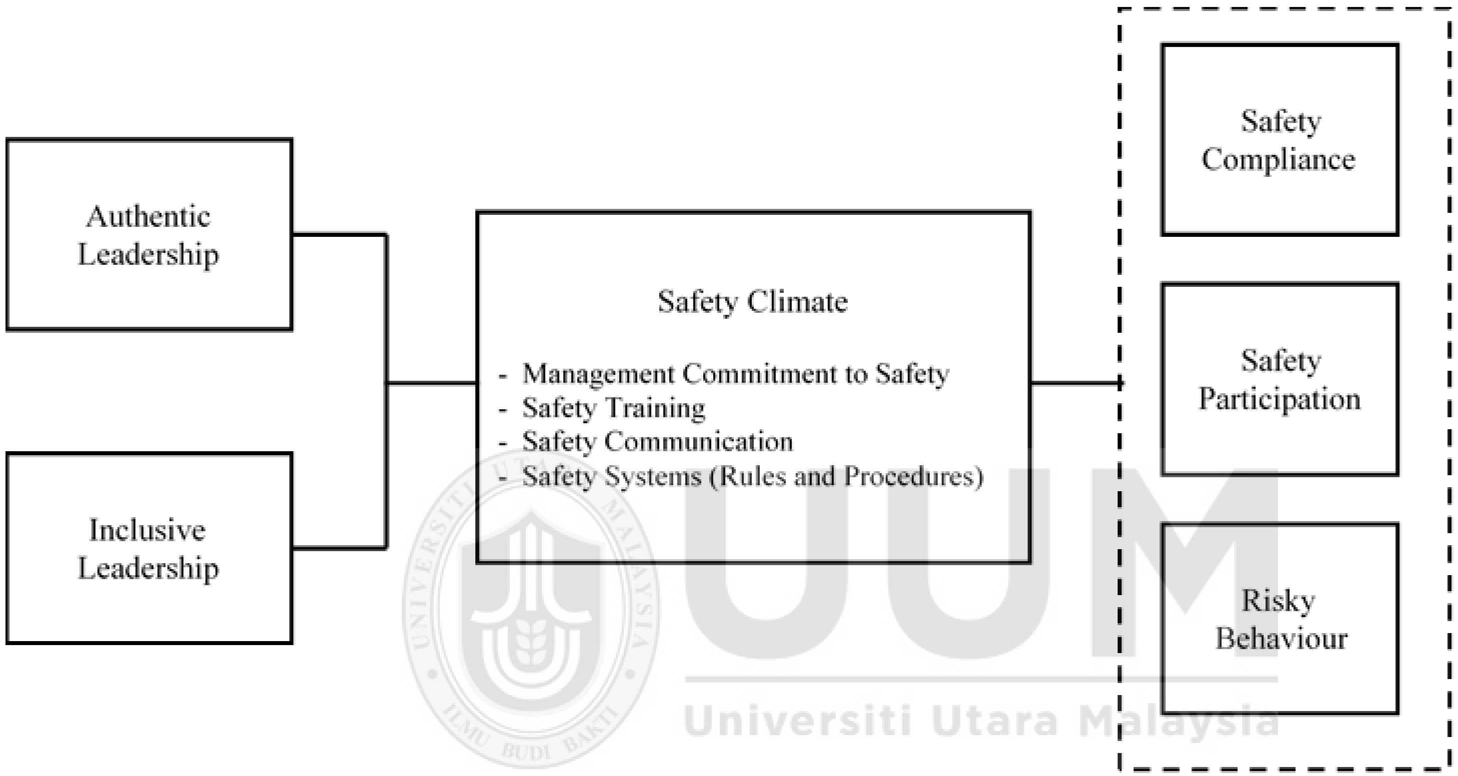

Figure 3.2.
Research Framework

3.6 STATEMENT OF HYPOTHESES

The main aim of this study is to examine the relationship between authentic leadership, inclusive leadership and safety behaviours with safety climate as mediator. Empirical underpinnings presented in Chapter Two points to the fact that, the relationship between leadership and safety behaviours, as well as the relationship between safety climate and safety behaviours are well-established across a myriad of work settings and socio-demographic milieu.

Succinctly put, a number of empirical underpinnings supporting the significant relationship between leadership and safety behaviour does exist in the safety literature (Nembhard & Edmondson, 2006; Clarke, 2013; Lievens & Vlerick, 2013; Fernández-Muñiz *et al*., 2014). Furthermore, some of the industries and work settings where this proven are, construction (Kapp, 2012; Kines *et al*., 2010; Hoffmeister *et al*., 2014), health care (Squires *et al*., 2010; Lievens & Vlerick, 2013), nuclear power plants (Martinez-Corcoles *et al*., 2013), oil and gas (Dahl & Olsen, 2013). Generally, findings from the above studies suggest that leadership is able to elicit high safety performance outcomes in the form of safety behaviours (safety compliance, safety participation and risky behaviours). The selected leadership styles for the present study are the authentic and inclusive leadership styles. These styles are selected because of their distinct characteristics which are explained briefly hereunder.

The authentic leadership style explicitly emphasizes personal and social identification processes, role modelling and value-based leadership (Avolio & Gardner, 2005) which are key factors in engaging, motivating, involving and committing subordinates in achieving high performance outcomes (Avolio & Walumbwa, 2006). It emphasizes the idea of exemplary leadership (Avolio, Gardner, Walumbwa, Luthans, & May, 2004), and in terms of eliciting the best safety performance outcomes based on subordinate behaviours, it is considered a much more fruitful style to examine (Eid *et al*., 2012). On a related note, inclusive leadership emphasizes the need for leaders to display openness, availability and accessibility by sharing the view, opinions and inputs of their subordinates (Carmeli *et al*., 2010).

The relationship between safety climate and safety behaviour is noted and has been empirically submitted across diverse industries and socio-demographic milieu. For example, in the chemical industry (Hofman & Stetzer, 1996; Bosak *et al*., 2013), offshore oil and gas (Mearns *et al*., 2003), blue-collar jobs (Larsson *et al*., 2008), construction (Zhou *et al*., 2008; Cigularov *et al*., 2013; Tholen *et al*., 2013), railway (Morrow *et al*., 2010), amongst others. It was further stressed that safety climate is the most fundamental and ultimate solution while considering improvements in safety behaviours (Beus *et al*., 2010). Also, a positive safety climate is considered a factor with the sole greatest impact on safety performance (OSHA, 2009; Cigularov *et al*., 2013).

While leadership is identified as an important factor capable of explaining safety behaviours, the role of safety climate in determining safety behaviours is also noted. However, the thrust of this research is to understand and further explain the relationship between leadership and safety behaviour with safety climate as a mediator. While it has been conceptually noted that leadership is a foremost antecedent of safety climate (Zohar, 2010; Eid *et al*., 2012), only a few empirical endeavours have been done in this regard (Clarke & Ward, 2006; Zohar & Tenne-Gazit, 2008; Kelloway *et al*., 2006, Clarke, 2013).

Consequently, the theoretical link explaining the role of safety climate in the leadership-safety behaviour relationship is predicated upon the submission that leaders create safety climate (Kelloway & Barling, 2010). Leader behaviours play an important role in shaping the perception of workers (individual-level facet-specific climate) with regards the priority given to safety related issues vis-à-vis other competing operational demands (Zohar, 2002; Zohar & Luria, 2004; Nahrgang *et al*., 2006). When leaders demonstrate that safety is of high priority in the organization, safety climate perceptions are built among the employees which in turn makes them comply with and participate in safety-related activities (Cheyne *et al*., 1998; Neal *et al*., 2000). Therefore, as leadership behaviours influence safety climate, employee perceptions are then framed in manners that are reflected in their safety-related behaviours.

Clarke and Ward (2006) hypothesized that safety climate will mediate the relationship between leader influence tactics and safety performance (participation). Results from their study shows that safety climate partially mediated the relationship between leadership behaviours (transformational and transactional tactics) and safety performance. In the study by Zohar (2002), it was reported that the relationship between transformational leadership and safety behaviour was mediated by a safety climate scale (preventive action). In a related study by Wu *et al*. (2008), it was reported that safety climate partially mediated the leadership-behaviour relationship. Other studies where safety climate mediated the leadership-safety behaviour relationship are, Barling *et al*. (2002), Kelloway *et al*., 2006; Martinez-Corcoles *et al*., 2011; Clarke, 2013; Nielsen *et al*., 2013).

Relating the above positions to the gamut of this study, it is expected that authentic leadership and inclusive relates positively with safety climate. Put in another way, authentic leadership and inclusive leadership are antecedents of safety climate. Safety climate is widely noted to be one of the most critical factors in determining safety behaviours. Hence, safety climate will mediate the relationship between authentic leadership, inclusive leadership and safety behaviour. In view of the submissions above, the following hypotheses are therefore proposed:

H1: *Authentic leadership is positively related to safety climate.*

H2: *Inclusive leadership is positively related to safety climate.*

H3: *Safety climate is positively related to safety compliance.*

H4: *Safety climate is positively related to safety participation.*

H5: *Safety climate is positively related to risky behaviour.*

H6: *Safety climate mediates the relationship between authentic leadership and safety compliance.*

H7: *Safety climate mediates the relationship between authentic leadership and safety participation.*

H8: *Safety climate mediates the relationship between authentic leadership and risky behaviour.*

H9: *Safety climate mediates the relationship between inclusive leadership and safety compliance.*

H10: *Safety climate mediates the relationship between inclusive leadership and safety participation.*

H11: *Safety climate mediates the relationship between authentic leadership and risky behaviour*.

3.7 RESEARCH DESIGN

Research design specifically illustrates how a research is carried out with a view to accomplishing the objectives of the research and answering of the research questions.as defined by Zikmund, Babin, Carr and Griffin (2010), research design is a master plan that outlines the methods and procedures that is used to collect and analyse data. Consequently, the present study is a cross-sectional sample survey field study as data were collected at a single point in time. A survey is thus defined as a measurement process that employs a tool known as a questionnaire in gathering data (Cooper & Schindler, 2008). Surveys attempts to describe a certain phenomenon and why such phenomena occurs (Zikmund *et al.*, 2010). Certainly, the questionnaire is the most widely used technique for collecting information from a study that is survey-based (Cooper & Schindler, 2008).

In the present study, the survey method was used because the interest of the researcher is to get opinions of the respondents of the study on a particular issue of interest. Basically, the present study is intended to assess the perception of subordinates on who select leader behaviours help shape their safety climate perceptions and how these perceptions determine their safety behaviours. Also, the survey method was employed in the present study because it could maximise the representative sampling of population units examined, thereby improving the generalizability of the results obtained from the analysis conducted (Scandura & Williams, 2000).

The research design of this study is explained via two directions. First, the descriptive method, which is conducted to determine and describe the features of the variables, namely leadership (authentic and inclusive leadership styles), safety climate (management commitment to safety, safety training, safety communication, safety rules and procedures), and safety behaviours (safety compliance, safety participation and risky behaviours). The study is being done to articulate the whole phenomena for improved understanding of the main issue in study. Secondly, the hypothesis testing which aids empiricists to discover inferred causal relationships among variables (Sekaran & Bougie, 2010) was done.

Specifically, the description of the nature of the known relationships among the variables was done by estimating the variance to be explained by the independent, dependent and mediating variables. Additionally, the present research is correlational as the researcher predicted the relationship between authentic and inclusive leadership styles and safety behaviour will be mediated by safety climate. In summary, the present study will be conducted using a quantitative design approach by way of a survey based experiment using adapted and modified questionnaire item scales. As suggested by Zikmund and Babin (2010), the use of a questionnaire is appropriate when testing hypotheses formulated from the research.

3.7.1 Unit of Analysis

In addressing the issues raised in the problem statement, it is expected that researchers explain their unit of analysis (Sekaran & Bougie, 2010; Zikmund, Babin, Carr, & Griffin, 2010). The unit of analysis refers to the unit used by the researcher in measuring the variables of study (Sekaran, 2003). Researchers usually conduct their studies based on individual, group, dyad, business unit, and/or organizational unit of analysis. In this study, the researcher used the individual level of analysis, as the study is aimed at explaining the relationship between authentic and inclusive leadership styles and safety behaviours, with safety climate as a mediator based on the perspective of individual employees. Data collected from the O & G employees are aggregated at the individual level.

3.8 POPULATION, SAMPLE, AND SAMPLING TECHNIQUE

This section discusses the population and sampling of the study. There are basically four parts which will highlight the population of this study, the sampling, the sampling technique, and then the sample size.

3.8.1 Population

This term is used to refer to a whole group of people, events, or things of interest a researcher wishes to investigate (Sekaran, 2003; Sekaran & Bougie, 2010). According to Zikmund *et al*. (2010), population is "any complete group of entities that share the same common set of characteristics" (p.387). It has been further illustrated that the target population is the elements of objects from which a researcher obtains the requisite information and draw conclusions (Malhotra, 2004, 2008).

Based on the above definitions, the target population of this study are employees of O & G companies operating in Rivers State, Nigeria, and who are highly exposed to work-related occupational accidents. Specifically, the following group of O & G employees make up the targeted population: technicians/millwrights, welders, riggers, engineers, HVAC personnel, drillers, pipe/steel workers, operators, plant maintenance personnel, equipment handlers, and related personnel. Interestingly, the O & G industry is being targeted because of the high risks involved in their operations, and when accidents occur, the outcomes are usually catastrophic resulting in direct and indirect costs to such organizations (Kane, 2010; Bergh *et al*., 2014). Also, Rivers State is proposed to be the geographical scope of this research because it produces more than 60% of Nigeria's crude oil and gas output (Osaghae, 1995; Abu & Nwosu, 2009), accounts for the highest number of O & G industry workers, and in fact houses the only gas liquefaction plant in Nigeria (OilRevenue, 2013; Nigeria Liquefied Natural Gas, 2015).

As at March 2016, there are 23 identifiable oil and gas and related services companies in Rivers State, Nigeria with an estimated population of about 35,000 workers. Interestingly, the Ministry of Labour and Productivity, the Nigeria Union of Petroleum and Natural Gas Workers (NUPENG), and the Petroleum and Natural Gas Senior Staff Association of Nigeria (PENGASSAN) noted that junior and intermediate workers constitute about 80% of the total workforce in the industry, and also in terms of the workforce with highest level of exposures to workplace accidents. Specifically, Table 3.4 presents the number of O & G companies in Rivers State and an estimated number of workers in the companies. The total population for this study, as estimated is 27, 271, being employees with the highest workplace risk exposures and under a supervisor.

Table 3.4
Estimated Staff Population of O & G and Related Companies in Rivers State, Nigeria.

S/N	Company	Nature of Operations	Estimated Population	Population highly exposed to risk (80% of main population)
1	Shell Petroleum Nigeria + Sub contractors	Oil Exploration	5890	4712
2	Nigeria LNG Limited + Sub Contractors	Gas Production, Engineering, Maintenance, etc	6950	5560
3	Saipem Nigeria	Services, Design, Engineering	2900	2320
4	Chevron/Texaco Nigeria + Sub contractors	Oil & Gas, Exploration and related services	4860	3888
5	Mobil Producing Nigeria + Sub contractors	Oil & Gas, Exploration and related services	4950	3960
6	Nigeria Agip Oil Company + sub-contractors	Oil & Gas	3670	2936
7	Easykrest Engineering Services Limited	Engineering, drilling and logistics	480	384
8	Calmy Oil & Gas Limited	Services, Maintenance	350	280
9	Oiltech Engineering Services Limited	Engineering Services, Maintenance	159	127
10	Pivot GIS Nigeria Limited (Bonny Operations)	Technical Services, Rigging, Plant Maintenance	425	340
11	Dowell Schlumberger Oilfield Services Limited	Exploration Maintenance	412	330
12	Drilling Fluids Limited	Drilling, Exploration	153	122
13	Enrique Petroleum Limited	Drilling, Maintenance, etc	235	188
14	Drilllog Petro-Dynamics	Drilling, Exploration	170	136
15	Global Offshore Drilling	Drilling	155	124
16	Halliburton Energy Services Nig. Limited	Drilling, Exploration and related services	387	310
17	Lonestar Drilling Nigeria	Drilling	175	140
18	Mallard Bay Drilling Nigeria Limited	Drilling	290	232
19	Milpark Drilling Fluids	Drilling	145	116
20	Nigerian Logging And Support Services Limited	Services, Maintenance Drilling	398	318
21	Osimini Worldwide Drills Limited	Engineering, Maintenance	250	200
22	Santa-Fe Drilling Nigeria Limited	Drilling	296	237
23	Sedco Forex Nigeria	Services, Maintenance	389	311
	Totals		**34089**	**27271**

Source: Nigeriagalleria/Researcher

On arriving the field for actual data collection, only nine O & G companies accepted to participate in the study. The population and sample are illustrated in Table 3.5

Table 3.5
Estimated Staff Population of O & G and Related Companies Reachable to Participate in the Study

S/N	Company	Nature of Operations	Estimated Population	Population with high risk exposures (80% of total population)
1	Easykrest Engineering Services Limited	Engineering, drilling and logistics	480	384
2	Calmy Oil & Gas Limited	Services, Maintenance	350	280
3	Oiltech Engineering Services Limited	Engineering Services, Maintenance	159	127
4	Pivot GIS Nigeria Limited (Bonny Operations)	Technical Services, Rigging, Plant Maintenance	425	340
5	Dowell Schlumberger Oilfield Services Limited	Exploration Maintenance	412	330
6	Drilling Fluids Limited	Drilling, Exploration	153	122
7	Enrique Petroleum Services Limited	Drilling and well services	235	188
8	Milpark Drilling Fluids	Drilling	145	116
9	Nigerian Logging And Support Services Limited	Services, Maintenance Drilling	398	318
	Totals		**2757**	**2206**

3.8.2 Sample Size

According to Zikmund *et al*. (2010), sample is defined as "a subset, or some part, of a larger population" (p.387). Sampling is a process used in describing the picking of suitable number of elements from a particular population frame, so that the characteristics of the properties of the sample can be used to generalize what should be obtainable for the whole population (Sekaran, 2003). Consequently, a sample is a set of elements selected from the general population to be used for a survey (Salant & Dillman, 1994). In other to minimize the cost of sampling errors, it is important that optimal samples are selected, as too small samples will be not a true representation of the entire population (Salkind, 2006; Pallant, 2007). Statistically, when samples are too small, they may cause type II errors, which will probably lead to wrongly rejecting certain findings that should normally be accepted (Sekaran, 2003).

Interestingly, determining the sample size of a study of this nature can be done via two routes. First, Cohen (1988) submitted that in determining an appropriate sample size of a given population, a suitable statistical power test should be used. Secondly, the use of the Krejcie and Morgan (1970) table for sample size determination. Specifically, the power of a statistical test is seen as the likelihood of rejecting a null hypothesis or rejecting a specific effect size of a particular sample size at a particular alpha level (Cohen, 1988; Faul, Erdfelder, Lang, & Buchner, 2009). Though other methods have been used to determine the sample size of a particular empirical endeavour, the use of the power analysis is still suitable so as to prove the probable detection of the effects of different sample sizes (Lipsey, 1990; Faul *et al*., 2009).

Evidently, a sample size is said to be ideal if it is dependent on a suitable power of statistical test. According to Borenstein, Rothstein and Cohen (1997), it is an important prerequisite to balance the power of statistical test with the significance level of a test, the sample size reviews as well as the size effect of a population in order to obtain an ideal sample size. The common power of statistical test is at least 95% with an alpha level of 5% (Borenstein *et al*., 1997). Consequently, the researcher used the G*Power 3.1 software to compute the sample size for the study. Calculating the sample size for this study is based on the population effect size ($f2$), required significance level (α), the desired statistical power (1-β), and the total number of predictors in the research model (Faul, *et al*., 2009).

To determine the sample size for this study, six predictor variable equations were used. Interestingly, aligning with the submissions of Cohen (1988), the researcher used the following standards in calculating the sample size: effect size (f 2= 0.15); significance alpha level (α= 0.05); desired statistical power (1-β = 0.95); and total number of six predictors (AL, IC, and SC - MCS, SFT, SCOM, SRP). Based on the analysis done, a minimum sample size of 138 was determined. In line with the submission of Cohen (1977), the statistical power for detecting effect sizes is in line with the recommended 0.95 value.

Also, according to the rule of thumb suggested by Roscoe (1975), in a research, a sample bigger than 30 and less than 500 is suitable. Figure 3.3 shows the result of the power test. On another note, Hair *et al*. (2010) stated that a sample size should be several times (10 or more times preferred) larger than the variables in a multivariate research. Interestingly, in this study, there are two independent, one multi-dimensional mediating and also one multi-dimensional dependent variables which should give a sample size of 100 and more. This rule of thumb was fulfilled based on the power analysis done above. However, in order to get a much more sizeable sample size, or for an appreciable level of response rate, it has been suggested that at least an additional 50% of the minimum sample size determined should be added to get as much as enough sample for further analysis (Bartlett, Kotrilik, & Higgins, 2001).

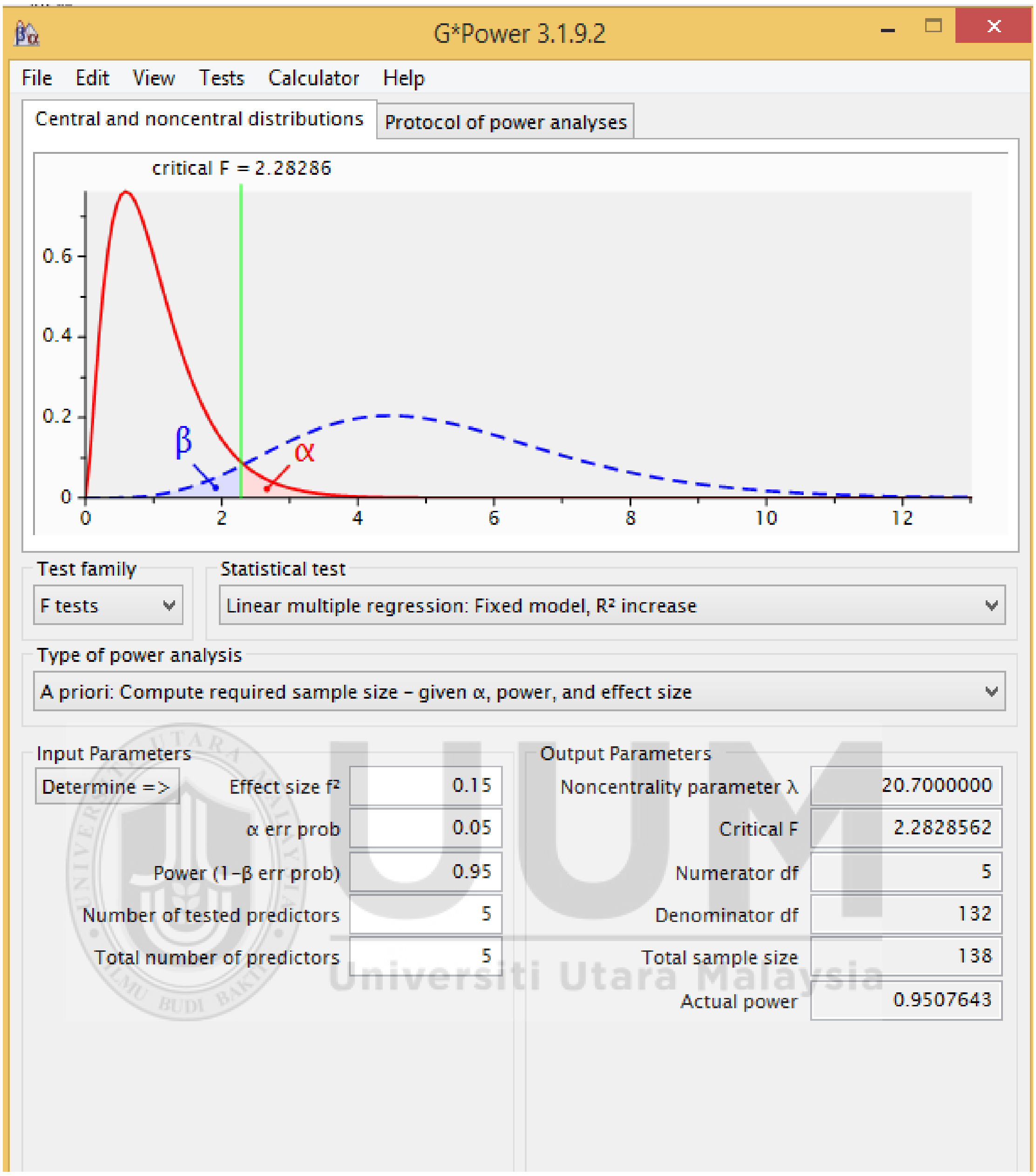

Figure 3.3
Power analysis for medium effect

Additionally, other measures suggested for computing an appropriate sample size for a given population was noted. For example, according to Krejcie and Morgan (1970), for a population of 2206, the sample size is 327. It is also suggested that the minimum sample size required in using the Structural Equation Modelling technique for analysis, 100 samples would be sufficient save there are five or less latent constructs with more than three items (Hair, Black, Babin, & Anderson, 2010). Based on the above submissions, a sample size ranging from 100 to 320 is deemed acceptable for the present study. However, based on the sampling technique employed in the present study, 520 questionnaires were distributed so as to ensure the achievement of an ideal sample size and a higher response rate.

3.8.3 Sampling Technique

In order to have an appropriate representation of the O & G workers across the companies in Rivers State, the area sampling technique, which is the most popular type of cluster sampling was used. The essence of area sampling is to get the sample in a manner that is as economical as possible, while maintaining the uniqueness of a probability sample in view of the clusters so selected (Zikmund *et al.*, 2010). Also, when some form of heterogeneity exists in the clusters to be selected, the area sampling technique is advised (Bowen & Starr, 1987; Zikmund *et al.*, 2010). More so, when the research design is intended to capture many geographical clusters, the use of the area sampling technique is advised (Sekaran, 2003). The various units and O & G worksites in Rivers State, Nigeria are made up of employees with very heterogeneous characteristics, with diverse socio-demographic make-ups.

Subsequently, Gay and Diehl (1992) proposed five steps in actualizing the area sampling process.

The following are the steps:

1. Define the population. In this study, the population is 2206. See Table 3.3.
2. Define the sample size. The sample size is 327 as determined by Krejcie and Morgan (1970).
3. Define a logical cluster. The logical cluster in this study is the O & G companies in Rivers State, Nigeria. As noted in Table 3.3, the nine companies that accepted to participate in the study constitute the logical cluster.
4. An average number of the population elements per cluster was then estimated by dividing the population size (2206) by the number of clusters (9). This resulted in 245.1 elements per cluster.
5. The number of clusters was determined by dividing the determined sample size (327) by the estimated size of a cluster (245.1), which results in 1.33 clusters or at most two companies.

Consequently, one company (a cluster) was randomly selected and questionnaires were distributed to all the targeted population. The random selection was done by writing the names of the companies (cluster) on a piece of paper each, then selection followed. Based on the rate of return of administered questionnaires, the researcher will (should there be a need) conducted another round of random sampling till the desired sample size is achieved. Consequently, two companies were randomly selected. Thereafter, 520 questionnaires were distributed. However, of the 520 questionnaires that were distributed, only 341 questionnaires were returned. Further explanation on the response rate is done in Chapter Four.

3.9 OPERATIONALIZATION AND MEASUREMENT OF VARIABLES

This section discusses how each variable in the present study was measured. As illustrated in Figure 3.1, there are two independent variables (authentic leadership and inclusive leadership), one mediating variable (safety climate – management commitment to safety, safety training, safety communication, safety rules and procedures), and one multi-dimensional dependent variables (safety behaviours - safety compliance, safety participation and risky behaviours). The measures were adapted from suitably validated measures from past literature. The measures were reworded to suit the context of the study, where necessary. In addition to the above, demographic variables were also considered.

Specifically, a five-point Likert-type interval scale ranging from "1" – strongly disagree to "5" – strongly agree was used to measure all the non-demographic variables of the study. However, the demographic variables were measured with categorical scales. The use of an interval scale in this study is based on the recommendation of Zikmund and Babin (2010). They noted that when an interval scale is used, it enhances the possibility of performing strong statistical calculations like standard deviation, variance, etc. Additionally, the use of the five-point interval scale is based on the recommendation of Krosnick and Fabrigar (1997) who established that questionnaire items that used scales in this range tended to associate more with questions measuring conceptually related variables. Also, Gwinner (2006) noted that it is most common scaled-response from used in recent researches. In an earlier submission however, Stevens and Galanter (1957) noted that there is a likelihood of departure from the assumption of normality (which is a requirement for many statistical tests) if fewer number of interval rating points are used in measurements. Nunnally (1978) also noted that using a five-point scale tends to be a good balance between having enough point of discrimination without having to maintain too many response options.

3.9.1 Authentic Leadership

Authentic leadership is a form of leadership behaviour where leaders are absolutely familiar with their values and belief system, are confident in themselves, genuine in their attitudes, display reliability and trust-worthiness in their push towards building the psychological strengths of their followers (Gardner *et al.*, 2005; Nelson et al., 2014). It is a form of leader behaviour that encourages positive psychosomatic capabilities, ethical climate, greater self-awareness, internalized moral perspective, balanced processing of information and relational transparency between them and their followers (Walumbwa *et al.*, 2008; Leroy et al., 2015).

Specifically, the 16-scale AL inventory by Neider & Schreisheim (2011) was used in the present study. This AL inventory is adjudged the most reliable, comprehensive and most widely accepted across a myriad of studies focusing on authentic leadership behaviours (Gardner *et al.*, 2011; Laschinger *et al.*, 2012; Bierkeland-Nielsen *et al.*, 2013; Fallatah & Laschinger, 2016). Also, validity and reliability of this instrument has been noted as having a Cronbach Alpha ranging from 0.82 to 0.95 (Nielsen *et al*., 2013).

According to Walumbwa *et al*. (2008), it is proper to measure the authentic leadership style with items like, “my manager/supervisor says exactly what he/she means”, “my leader openly admits mistakes”, “my leader acts in accordance with his/her stated beliefs”, my leader uses core values to make decisions”, “my leader seeks out opinions that challenge personal views”, my leader considers an array of data in decision making”, “my leader asks for feedback to improve interpersonal interactions”, understands how his/her actions affect others”.

3.9.2 Inclusive Leadership

Inclusive leadership is used to describe a holistic and/or broad-based leadership style that encourages diversity in fostering better leader-follower relationship (Wuffli, 2016). Inclusive leadership, originally christened by Nembhard and Edmondson (2006) refers to leaders who are open, accessible and available in the course of interacting with their subordinates (Carmeli *et al*., 2010).

Specifically, a nine-item questionnaire constructed by Carmeli *et al*. (2010) will be used in assessing the three components of inclusive leadership. Of importance to note here is that, though an effort has been in developing an inclusive leadership questionnaire (Nembhard & Edmondson, 2006), its validity and reliability has not been tested across studies. Also, the items were developed specifically for the healthcare sector and thus does not capture the essence of a core management research. Another reason for the non-use of other suggested inclusive leadership items are that they are not relevant within the context of the study in discuss (Echols, 2009; Yin, 2013). More so, the inclusive leadership scale items has a Cronbach alpha value of 0.94 in the study by Carmeli *et al*. (2010), hence the proposed use of their instrument. Some examples of the inclusive leadership scales are, "the manager is open to hearing new ideas", "the manager is available for consultation on problems", and "the manager is accessible for discussing emerging problems."

3.9.3 Safety Climate

Safety climate is regarded as employees' perception of well-being or the extent to which the work environment is perceived as personally beneficial or detrimental based on the true priority given to safety by management (Johnson, 2007; Larsson *et al*., 2008; Morrow *et al*., 2010). While some researchers have argued that safety climate should be measured as a uni-dimensional construct (Neal *et al*., 2000), others have opined that in order to have a feel of how the components of safety climate individually explain safety behaviours, the use of a multi-dimensional measurement approach is encouraged (Cooper & Phillips, 2004; Huang *et al*., 2006; Hon *et al*., 2012; Cigularov *et al*., 2013; Hon *et al*., 2014; Barbaranelli *et al*., 2015). As widely accepted and researched as this position may be, there are still inherent disputes as to the number of dimensions that should make up the safety climate construct. In view of this, researchers are allowed to select safety climate constructs based on content-context characteristics (Tharaldsen *et al*., 2008; Cavazza & Serpe, 2009).

Safety climate is widely defined as the perceptions of workers about safety in the workplace (Lin *et al*., 2008). Hence, these perceptions may be about different aspects of the work environment in terms of work characteristics and organizational practices (Morrow *et al*., 2010). Furthermore, since there is no consensus as to the number of dimension required in measuring safety clime, or which of its factors are most effective, the differences in factor structures is understandable and researchers are allowed to apply discretion in selecting structures that fit and/or better explain their research directions (Lin *et al*., 2008; Bosak *et al*., 2013; Barbaranelli *et al*., 2015).

Consequently, the researcher examined safety climate with the following dimensions; management commitment to safety, safety training, safety communication, safety rules and procedures. These dimensions were chosen because they are commonly used in safety climate researches and have been noted to have great statistical significance in explaining safety behaviours (Razuri *et al*., 2007; Hsu *et al*., 2007; Vinodkumar & Bhasi, 2009; Jiang *et al*., 2010; Brondino *et al*., 2012; Huang *et al*., 2012). However, though these dimensions are noted, the safety climate construct will be analysed as a second-order higher-order construct. Specific dimensions of safety climate are noted below:

3.9.3.1 Management commitment to safety

Management commitment to safety is a demonstration of the level of commitment to the safety as evidenced by the extent to which the organization's top management exhibits positive and supportive attitudes towards the safety of its employees (Hsu *et* *al*., 2007). Specifically, six items adapted from Cheyne *et al*. (1998) are used to measure the perception of workers on how management is committed to their safety. Other studies have used these scales in measuring management commitment to safety, reporting internal reliability of 0.60 to 0.81 Cronbach alpha values (Cox & Cheyne, 2000; Vinodkumar & Bhasi, 2010). The above values are in line with the rule of thumb proposed by Nunnally (1978), Hair, Anderson, Tatham, & Black, 1998) and Tuckman (1999). Some examples of the items to be used in measuring management commitment to safety are: "safety is given high priority by the management", "safety rules and procedures are strictly followed by the management", "corrective action is always taken when the management is told about unsafe practices", "when near-misses accidents are reported, my management acts quickly to solve the problems."

3.9.3.2 Safety Training

Safety training refers to knowledge of safety passed on to workers to elicit safe working behaviours and with no danger to their state of health (Guldenmund, 2007). For measuring this construct, five items scales refined by Mearns *et al*. (2003) were adapted and used accordingly. Some studies that used the scales and reported significant Cronbach alpha value ranging from 0.7 to 0.91 are, Neal and Griffin (2006), Vinodkumar and Bhasi (2010), Colley et at. (2013) reported a Cronbach's alpha of 0.82 on the above scales. Since the above agrees with the rule of thumb as suggested by Nunnally (1978) on the Cronbach alpha value, these items were used for this study. Some examples of the items include, "my manager/supervisor ensures comprehensive training to the employees in workplace health and safety issues", "my manager/supervisor ensures newly recruits are trained adequately to learn safety rules and procedures", "my manager/supervisor ensures safety issues are given high priority in training programmes", "my manager/supervisor encourages the workers to attend safety training programmes".

3.9.3.3 Safety Communication and Feedback

Safety communication and feedback refers to the process of interaction of people, processes and systems with the aim of reducing workplace injuries and ensuring safety for all (Bentley & Haslam, 2001; Vecchio-Sadus, 2007). The measures of safety communication and feedback were adapted from Byrom and Corbridge (1997). Five items were adapted and modified to suit the context of the present study. Although, other studies that used the scales reported reliability of between 0.63 and 0.70, which is within acceptable limits as suggested by Nunnally (1978) and Hair *et al*. (1998). The studies are, Razuri *et al*. (2007), Abdullah *et al*. (2009), Vinodkumar and Bhasi (2010). Some of the items that will make up the questionnaire are, "my manager/supervisor ensures company does have a hazard reporting system where employees can communicate hazard information before incidents occur", "my manager/supervisor ensures open communications about safety issues in this workplace."

3.9.3.4 Safety Rules and Procedures

Safety rules and procedures refers to the degree to which an organization creates clear mission, work roles, responsibilities and goals, setting up of standards of behaviour for employees, and the establishment of a safety system that control workers behaviours (Lu & Yang, 2010). A five-item scale was used to measure safety rules and procedures was adapted from the work of Glendon and Litherland (2001). In further accessing the validity and reliability of their scales, subsequent studies reported high Cronbach Alpha of between 0.71 and 0.82 (Coyle, Sleeman & Adams, 1995; Cox & Cheyne, 2000; Vinodkumar & Bhasi, 2010). The reported internal reliability also agrees with the rule of thumb as suggested by Nunnally (1978) and Hair *et al*. (1998). Some examples of the measures are “my manager/supervisor ensures the safety rules and procedures followed in my company are sufficient to prevent incidents occurring”, “my manager/supervisor always try to enforce safe working procedures”, “my manager/supervisor ensures safety inspections are carried out regularly”.

3.9.4 Safety behaviours

Safety behaviours have been conceptualized to suit the safety research area by Neal and colleagues (Neal & Griffin, 1997; Neal *et al.*, 2000; Neal & Griffin, 2006) based on the theories of job performance proposed by Borman and Motowildo (1993). The two principal components of job performance as suggested by Borman and Motowidlo (1993) are task performance and contextual performance. They submitted that task performance is formal and involuntary work-related activities that contributes to set organizational goals and objectives while contextual performance is actually voluntary activities that contribute to the socio-psychological principles of the organization. Consequently, safety compliance refers to obeying safety rules and procedures and working in a safe manner (Neal *et al*. 2000). Five items which were adapted from Neal and Griffin (2006) were used to measure safety compliance. Examples are, "I use all necessary safety equipment to do my job", "I follow correct safety rules and procedures while carrying out my job."

Similarly, safety participation represents the behaviour of employees in ways that increase the safety and health of fellow workers and the organization at large (Hagan, Montgomery & O'Reilly, 2001). A total of five items of safety participation adapted from Neal and Griffin (2006) were measured accordingly. Some of which are, "I help my co-workers when they are working under risky or hazardous conditions", "I feel that it is necessary to put efforts to reduce accidents and incidents at workplace".

Relatedly, risky behaviour is a deviation from regular organizational practices, procedures and anticipation which do not metamorphose to instantaneous severe consequences (Ramanujam & Goodman, 2003; Martinez-Corcoles *et al*., 2013). Nine items of risky behaviours adapted from Mearns *et al*. (2001) were used to get responses from respondents. Some of the items are, “I take chances to get the job done”, “I ignore safety regulations to get the job done”, “I take shortcuts that involve little or no risk”.

The adaptation of the scales of the dimensions of safety climate and safety behaviours is based on their validity and reliability level in the studies of the original developers and as re-/cross-validated in previous studies (Cheyne et al., 1998; Fugas *et al*. 2012; Vinodkumar & Bhasi, 2010; Zhou *et al*., 2008; Zacharatos, Barling & Iverson, 2005; Martinez-Corcoles *et al*., 2011, 2013). However, some items that were dropped did not fit into the context of the present study. Accordingly the items that were used for the present study reported internal reliability (Cronbach Alpha) for safety behaviour-related scales to range from 0.71 to 0.91, which is above 0.70 as suggested by Nunnally (1978). Therefore, Table 3.6 presents a summary of the study constructs, the number of questionnaire items, where the items were adapted and some studies where the scales have been used.

Tables 3.6
Summary of Study Instrument Items

Constructs	No. Items	Adapted from	Some previous studies using scales
Authentic Leadership	16	Neider & Schreisheim (2011)	Gardner *et al*. (2011); Laschinger *et al*. (2012); Nielsen *et al*. (2013); Fallatah and Laschinger (2016).
Inclusive Leadership	9	Carmeli *et al*. (2010)	Carmeli *et al*. (2010); Hollander (2012).
Safety Climate			
- **Management Commitment to Safety**	8	Cheyne *et al*. (1998)	Cox and Cheyne, 2000; Wu and Lee (2003); Hsu *et al*. (2007); Vinodkumar and Bhasi (2010).
- **Safety Training**	5	Mearns *et al*. (2003)	Neal and Griffin (2006), Vinodkumar and Bhasi (2009, 2010).
- **Safety Communication**	4	Byrom and Corbridge (1997)	Cox and Cheyne (2000); Razuri *et al*. (2007), Abdullah *et al*. (2009), Vinodkumar and Bhasi (2010).
- **Safety Systems (Rules & Procedures)**	4	Neal *et al*. (2000); Glendon and Litherland (2001)	Coyle, Sleeman and Adams (1995); Cox and Cheyne (2000); Vinodkumar and Bhasi (2010).
Safety Behaviours			
- **Safety Compliance**	4	Neal *et al*. (2000); Griffin and Neal (2000)	Zacharatos, Barling and Everson (2005); Neal and Griffin (2006); Zhou *et al*. (2008); Vinodkumar and Bhasi (2010); Fugas *et al*. (2012)
- **Safety Participation**	4	Neal *et al*. (2000); Griffin and Neal (2000)	Zacharatos, Barling and Everson (2005); Neal and Griffin (2006); Zhou *et al*. (2008); Vinodkumar and Bhasi (2010);Fugas *et al*. (2012)
- **Risky Behaviour**	9	Mearns *et al*. (2001)	Neal and Griffin (2006); Martinez-Corcoles *et al*. (2011; 2013).

3.10 QUESTIONNAIRE DESIGN

The measurement items of the main study variables of this study were adapted from previous studies and as used in diverse empirical endeavours within the context of several socio-demographic milieu. However, the items were reworded to suit the context of the present study. Characteristically, a well-structured self-administered questionnaire consisting of nine demographic questions and 64 closed ended multi-choice questions for the variables of the independent, mediating and dependent variables were administered. The English language is used in wording the questions, since it is the official language of communication in the Federal Republic of Nigeria.

Section A consist of the nine socio-demographic questions of gender, marital status, age, level of education, work experience in the present company, work experience in the O & G industry, occupation, frequency of attendance of safety trainings, and number of times an employee has been involved in a workplace accident in the last 12 months. Section B consist of 45 items of authentic, and inclusive leadership styles, and the factors of safety climate selected for this study. Specifically, 16 questions to measure authentic leadership, nine questions measure inclusive leadership, 20 questions to measure safety climate factors. Finally, section C consist of questions that will measure safety behaviours – 5 questions for safety compliance, 5 questions for safety participation and 9 questions for risky behaviour.

The survey instrument was designed in a booklet form with a covering letter from the researcher. The design was done properly so as to improve the success of the data collection process (Creswell, 2003) and increase the response rate (Trochim, 1999). The items are illustrated thus in Table 3.7.

Table 3.7
Questionnaire Items

Constructs	Source	Previous studies using scales	All items
Authentic Leadership (16 items)	Neider & Schreisheim (2011) -ALI	Gardner *et al*. (2011); Laschinger *et al*. (2012); Nielsen *et al*. (2013); Fallatah and Laschinger (2016)	**My Leader…** 1. solicits feedback for improving his/her dealings with others. 2. clearly states what he/she means. 3. shows consistency between his/her beliefs and actions. 4. asks for ideas that challenge his/her core beliefs. 5. describes accurately the way that others view his/her abilities. 6. admits mistakes when they occur. 7. uses his/her core beliefs to make decisions. 8. carefully listens to alternative perspectives before reaching a conclusion. 9. shows that he/she understands his/her strengths and weaknesses. 10. openly shares information with others. 11. resists pressures on him/her to do things contrary to his/her beliefs. 12. objectively analyses relevant data before making a decision. 13. is clearly aware of the impact he/she has on others. 14. expresses his/her ideas and thoughts clearly to others. 15. is guided in his/her actions by internal moral standards. 16. encourages others to voice opposing points of view.
Inclusive Leadership (9 items)	Carmeli *et al*. (2010)	Carmeli *et al*. (2010); Hollander (2012).	**My Leader…** 1. is open to hearing new ideas. 2. is attentive to new opportunities to improve work processes. 3. is open to discuss the desired goals and new ways to achieve them. 4. is available for consultation on problems. 5. is an ongoing ‘presence’ in this team—someone who is readily available. 6. is available for professional questions i would like to consult with him/her. 7. is ready to listen to my requests. 8. encourages me to access him/her on emerging issues. 9. is accessible for discussing emerging problems.

Table 3.7 (Continued)

Management Commitment to Safety (6 items)	Cheyne *et al*. (1998)	Cox and Cheyne, 2000; Wu and Lee (2003); Hsu *et al*. (2007); Vinodkumar and Bhasi (2010)	**My Leader…** 1. gives high priority to safety in the workplace. 2. takes corrective action when told about unsafety practices. 3. shows interest in the safety of workers. 4. considers safety to be equally important as production/work targets. 5. attends safety meetings. 6. acts quickly to solve the problems when near-miss accidents are reported.
Safety Training (5 items)	Cheyne *et al*. (1998); Mearns *et al*. (2003)	Neal and Griffin (2006), Vinodkumar and Bhasi (2009, 2010)	**My Leader…** 1. ensures comprehensive training is given to the employees in workplace health and safety issues. 2. ensures newly recruits are trained adequately to learn safety rules and procedures. 3. gives high priority to safety in training programmes. 4. encourages workers to attend safety training programmes. 5. ensures the safety training given to employees is adequate to enable them assess hazards in work areas.
Safety Communication (5 items)	Byrom and Corbridge (1997)	Cox and Cheyne (2000); Razuri *et al*. (2007), Abdullah *et al*. (2009), Vinodkumar and Bhasi (2010)	**My Leader…** 1. ensures that employees can communicate hazard information before incidents occur through hazard reporting system. 2. ensures that the company's open door policy on safety issues is practiced. 3. ensures there is sufficient opportunity to discuss and deal with safety issues in meetings. 4. ensures the target and goals for safety performance in the organization is clear to workers. 5. ensures open communication about safety issues in this workplace.
Safety Systems (Rules & Procedures) (4 items)	Neal *et al*. (2000); Glendon and Litherland (2001)	Coyle, Sleeman and Adams (1995); Cox and Cheyne, 2000; Vinodkumar & Bhasi, 2010	1. ensures the safety rules and procedures followed in the company are sufficient to prevent incidents occurring. 2. ensures the facilities in the safety department are adequate to meet the needs of the organization. 3. always try to enforce safe working procedures. 4. ensures participation of employees in regular safety inspections.

Table 3.7 (Continued)

Safety Compliance (5 items)	Neal *et al*. (2000); Griffin and Neal (2000)	Zacharatos, Barling and Everson (2005); Neal and Griffin (2006); Zhou *et al*. (2008); Vinodkumar and Bhasi (2010); Fugas *et al*. (2012)	1. I use all necessary safety equipment to do my job. 2. I carry out my work in a safe manner. 3. I follow correct safety rules and procedures while carrying out my job. 4. I ensure the highest levels of safety when I carry out my job. 5. It is always practical to follow all safety rules and procedures while doing a job.
Safety Participation (5 items)	Neal *et al*. (2000); Griffin and Neal (2000)	Zacharatos, Barling and Everson (2005); Neal and Griffin (2006); Zhou *et al*. (2008); Vinodkumar and Bhasi (2010); Fugas *et al*. (2012)	1. I help my co-workers when they are working under risky or hazardous conditions. 2. I always point out to the management if any safety related matters are noticed in my company. 3. I put extra effort to improve the safety of the workplace. 4. I voluntarily carryout tasks or activities that help to improve workplace safety. 5. I encourage my co-workers to work safely.
Risky Behaviour (9 items)	Mearns *et al*. (2001)	Neal and Griffin (2006); Martinez-Corcoles *et al*., 2011; Martinez-Corcoles *et al*., 2013	1. I ignore safety regulations to get the job done. 2. I break work procedures. 3. I take chances to get the job done. 4. I bend safety rules to achieve a target. 5. I get the job done better by ignoring some rules. 6. Conditions at the workplace keep me from working according to the rules. 7. I take shortcuts that involve little or no risk. 8. I break rules due to management pressure. 9. I am pressured by my workmates to break rules.

3.11 PRE-TEST PROCEDURE

It has been argued that, in order to ensure that there is no problem with wording or measurement of questionnaire, a pre-test will be useful (Babbie, 2004; Sekaran & Bougie, 2010). Therefore, a pre-test allows a researcher to assess and have a feeling of the reliability and validity of the final questionnaire before the main data collection. First, though the instruments adapted for the present study has been widely validated and noted to be reliable, the researcher involved 3 faculty members of the Faculty of Management Sciences, Rivers State University of Science and Technology, Port Harcourt, and 2 senior safety personnel in the O & G industry.

Their involvement in this process is to review the construction of the questionnaire design, which includes the layout, wording, sequencing and the language used. The essence of this process is to assess the face validity and/or content validity of the questionnaire. The outcome of the pre-test resulted in a few adjustments preparatory to the final questionnaire. Specifically, nine items of management commitment to safety adapted from Cheyne et al. (1998) were not completely used in the present study. Only six of the items were used as the remaining three did not suit the context of the present study. A similar action was taken by Vinodkumar and Bhasi (2010) that selected items based on the context of their study.

The second pre-test, 70 questionnaires were distributed to a set of randomly selected and targeted personnel from one the companies in Table 3.2. However, only 44 questionnaires, representing a 62.9% response rate was eventually analysed for the pre-test. Interestingly, the Statistical Package for Social Science (SPSS) Version 20 was used in ascertaining the Cronbach's alpha values of the constructs. On the appropriateness of the sample size, for a pre-test, Cooper and Schindler (2008), suggested that approximately 25 to 100 respondents will be suitable.

Reliability test was conducted on the refined questionnaires. Evidently, reliability denotes the stability and consistency of the measurement instrument, and the predominant statistical test of reliability if the Cronbach's alpha (Hair *et al*., 2010; Zikmund *et al*., 2010). The results as presented in Table 3.8 hereunder indicate that all, but one (safety training) of the construct measurements fulfil the minimum reliability requirement of 0.70 as suggested by Nunnaly (1978). Howbeit, Cronbach's alpha values of 0.80, 0.70 and 0.60 are considered good, acceptable and poor, respectively (Sekaran & Bougie, 2010). However, the researcher conducted a confirmatory factor analysis in the data analysis chapter to assess the validity of the constructs. Basically, convergent validity and discriminant validity will be assessed.

Table 3.8
Reliability of the Constructs

Constructs	Number of Items	Cronbach Alpha
Authentic Leadership	16	0.727
Inclusive Leadership	9	0.792
Safety Climate Factors		
• **Management Commitment to Safety**	6	0.791
• **Safety Training**	5	0.692
• **Safety Communication**	5	0.743
• **Safety Systems (Rules and Procedures)**	4	0.756
Safety Behaviours		
• **Safety Compliance**	5	0.610
• **Safety Participation**	5	0.875
• **Risky Behaviour**	9	0.928

3.12 DATA COLLECTION PROCEDURE

Though there are several methods of collecting data, such as personal interview, telephone survey, fax, e-mail, web survey, and mail survey (Churchill, 2005), the present study adopt the administration of questionnaire as it is a quantitative survey. This is because it allows respondents to answer questions in the questionnaire using a stated range of scales. Interestingly, a questionnaire is a pre-written set of questions that respondents are required to answer within close defined alternatives (Sekaran, 2003). The use of a questionnaire is necessary as it the researcher is aware of the requirements of the researcher and the variables intended to be measured. Howbeit, since personally administered questionnaires are more valid that low-cost interviews, less errors should be expected (Creswell, 2012) and there will be a reduction on response bias (Sekaran & Bougie, 2010; Zikmund *et al*., 2010). Hence, in the present study, the researcher personally administered the questionnaires and retrieved same based on convenience between the Human Resources (HR) Department of the randomly selected companies and the researcher.

Before the researcher administered the questionnaires, a telephone conversation was done, and subsequently a face-to-face meeting was done with the HR managers of the companies. This was to further intimate them on the purpose of the research and to share the contents of the questionnaires with the HR managers (this was a criteria agreed before the researcher can be allowed administer the questionnaires to the workers). Upon agreeing with the HR managers, the researcher was on advised on the best time to administer the questionnaires as the targeted workers needed to be informed. More so, it was agreed that the researcher should and can only distribute the questionnaires during the daily safety briefing and tools-box meetings of various lines and work-units.

Specifically, the period used for the protocols of getting permissions, advocacy and briefing meetings, telephone calls, reminders, readiness, actual administration of questionnaires, retrieval and de-briefing lasted for 12 weeks (June, 2016 – August, 2016) for both companies randomly selected for the present study. It is however important to note the following points during the data collection process:

- The researcher formed a work team of four members (research assistants) who helped in distributing and collecting the questionnaires because of the large number and spread of the targeted respondents. These research assistants, who are graduates of management sciences have already been briefed on the purpose and general plan of the research.

- Distribution of the questionnaires across the work units commenced from 6:30am – 7:30am which is the usual time for daily safety briefing and tools-box meetings in the companies. The targeted respondents have been pre-informed of the research, hence getting to them was not a challenge. However, the researcher attached a ball pen to each of the questionnaires, and returning the pens were actually at the behest of the respondents. The researcher was on ground to respond to any queries as may be posed by the respondents. Each of the questionnaires were responded to in about 10 minutes.

- Since the sample size required was not achieved in the first company, another round of random sampling process was done, and questionnaires were administered and retrieved accordingly.

3.13 DATA ANALYSIS

The analysis of the demographic variables of the study was done with the SPSS Version 20. However, the researcher used the structural equation modelling (SEM) technique to assess the measurement and structural models of the study. SEM is “a family of statistical models that seek to explain the relationship among multiple variables” (p.634). Specifically, SEM examines the structure of interrelationships articulated in a series of equations where these equations demonstrate the relationship among constructs based on the theoretical framework of a study (Hair, 2010). More so, SEM is founded on two common multivariate analysis techniques, that is, factor analysis and multiple regression (Hair, 2010). A few reasons have been adduced as to why SEM is a better preferred choice for data analysis, as against other multivariate techniques.

Firstly, SEM allows an assessment of multiple interrelated dependence relationships (Hair *et al.*, 2010). Succinctly put, it permits separate simultaneous model interdependencies between numerous exogenous and endogenous latent variables by specifying the structural model employed by the statistical application (Hair *et al.*, 2010). Secondly, in order to simultaneously provide an overall test of model fit and individual parameter estimate tests, the SEM is noted to be capable. The SEM is actually set to test a set or relationships being represented by multiple equations. In order to understand how well a theory explains the input data, the model fit statistics generated by SEM comes in handy (Hair *et al.*, 2010). Finally, in order to measure a second order higher order construct (multi-dimensional latent variable), and for complex models with mediators and moderators, SEM is most recommended (Hair *et al*., 2010; Hair, Ringle, & Sarstedt, 2011).

3.13.1 The Use of Partial Least Squares Structural Equation Modeling (PLS-SEM) Analysis

In efforts directed towards overcoming the weaknesses of the first generation multivariate data analysis technique, SEM is considered as a second generation multivariate data analysis method (Hair *et al*., 2014). This effort led to the development of two types of SEM applications that are being used in the social sciences research area. They are, covariance-based (CB-SEM) and variance-based SEM – PLS-SEM (Hair *et al*., 2014). Characteristically, the CB-SEM is used in theory confirmation while the variance-based SEM is used to develop a theory. However, it is noted that the CB-SEM and variance-based are different but complimentary statistical methods for SEM (Hair, Sarstedt, Pieper, & Ringle, 2012). Interestingly, in determining the appropriateness of the SEM to use for data analysis, Hair, Ringle and Sarstedt (2010) provided a rule of thumb as illustrated in Table 3.9.

Table 3.9

Rules of Thumb for Selecting a SEM to use for Data Analysis

Criteria	PLS-SEM	CB-SEM
Research Goals	1. If the goal is predicting key target constructs or identifying key driver 2. If the research is exploratory or an extension of an existing structural theory	1. If the goal is to test theory or to compare a theory with an alternative theory
Measurement Model Specification	1. If formative measured constructs are part of the structural model	1. If error terms require additional specification, such as co-variation
Structural Model	1. If the structural model is complex (many construct and many indicators)	1. If the model is non recursive
Data Characteristics and Algorithm	1. If CB-SEM cannot be met (i.e: model specification, non-convergence, data distributional assumptions) 2. If sample size is relatively low 3. If data to some extend non-normal	1. If data meet the CB-SEM assumption exactly
	1. With large data sets, CB-SEM and PLS-SEM results are similar. PLS-SEM results are a good approximation of CB-SEM results.	
Model Evaluation	1. If latent variable scores are required in subsequent analysis	1. If a global goodness of fit criterion are required 2. If a test for measurement model invariance are required

Source: Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011)

In the present study, the variance-based SEM (PLS-SEM) is deemed more appropriate for data analysis based on the following reasons:

1. The primary essence of this research is to identify and ascertain key leadership styles as key determinants of safety climate, and by extension safety behaviours. Based on the submissions of Zohar (2010) and Clarke (2010) and predicated on the Social Exchange and Social Systems Theories, the researcher tried to identify the mediating role of safety climate in the relationship between authentic leadership, inclusive leadership and safety behaviours factors that affect safety. Rule of thumb A in Table 3.7 is thus fulfilled.
2. The structural model of the present study has one formative construct, which is safety climate. It is measured by four formative constructs of management commitment to safety, safety training, safety rules and procedures, and safety communication. These formative constructs however has reflective indicators, which is also referred to as Type II hierarchical variable models. It is submitted that in running such models, latent variable scores function as the manifest variables for the higher order constructs in the succeeding analysis. Thus, rule of thumb B in Table 3.7 is this fulfilled.

In the use of the PLS-SEM for data analysis, it is submitted that a two-stage analysis should be conducted, namely, the measurement model and the structural model. Characteristically, the measurement model assesses the reliability and validity of the constructs, while the structural model assesses the path co-efficient, the determination of co-efficient and the predictive relevance of each of the exogenous constructs on the endogenous constructs.

3.13.2 Measurement Model Analysis using the PLS-SEM

In this level of analysis, the relationship between constructs and items, and the correlational relationships between the constructs are assessed. Firstly assessed is the formative relationship between items and constructs in which the indicators themselves causes the latent variables and are not interchangeable among themselves. According to Petter *et al*. (2007), if any single indicator is removed, it alters the meaning of the latent construct. In a measurement model diagram, the formative relationship between items and constructs is illustrated by arrow pointing from the items to the construct. On the reflective relationship, the indicators themselves represent the latent variable, and are greatly correlated and substitutable. As such, removal of any single indicator does not alter the meaning of the latent construct (Petter *et al*., 2007). In the measurement model diagram, the reflective relationship is depicted by an arrow pointing from the constructs to the items. The next section will now discuss the specific analyses that will be conducted with the constructs in the measurement model.

3.13.3 Construct Reliability

Reliability denotes the extent to which a variable or set of variables is/are consistent in what it is/are intended to measure (Hair *et al*., 2010). Basically, the internal reliability and construct reliability are used to assess reliability of constructs in PLS-SEM. For internal reliability, the Cronbach's Alpha value should be 0.7 or higher. However, for construct reliability, a score of 0.6 and 0.7 could be considered a good indicator in as much as other indicators of a model's construct validity are good.

3.13.4 Convergent Validity

Convergent validity denotes the extent to which indicators of a certain construct converge or share a highly common proportion (Hair *et al*., 2010). The Average Variance Extracted (AVE) and the factor loadings are used to assess the convergent validity. Accordingly Hair *et al*. (2010) defines AVE as a summary measure of convergence among items that represent a construct. It is the average percentage of variance extracted among the items of a construct. Construct validity is achieved when the AVE is at least 0.5 (AVE ≥0.5). Similarly, high factor loadings on a certain factor is an indication that items within a construct converge highly. It is suggested that factor loadings should be 0.5 or higher.

3.13.5 Discriminant Validity

Discriminant validity is defined as "the extent which a construct is truly distinct from other construct" (Hair *et al*., 2010 p.689). In a measurement model, each of the constructs should have high discriminant validity in order to show their uniqueness that makes them different from other constructs. Basically, there are three criteria used in assessing the discriminant validity of constructs, namely, cross-loadings, the

Fornell and Larcker (1981) criterion, and the heterotrait-monotriat ratio of correlation (HTMT).

On the cross-loadings, it is posited that the difference of cross-loadings by 0.1 is a demonstration of discriminant validity over another (Vinzi, Chin, Henseler, & Wang, 2010). Furthermore, Hair *et al*. (2014) posits that to achieve discriminant validity, the loadings of a particular construct must be high on itself as against other constructs. On the Fornell and Larcker (1981) criterion, it is advocated that the AVE values of two factors must be larger than the square of the correlation estimate of the two factors, that is, AVE>r2 (Hair *et al*., 2010). Also, recent empirical underpinnings by renowned statistical pundits opines that the Fornell and Larcker (1981) criterion for assessing discriminant validity is seriously faulty. Evidently, and based on a Monte Carlo simulation exercise by Henseler, Ringle and Sarstedt (2014), the insensitivity to detect a lack of discriminant validity by the Fornell and Larcker (1981) criterion was revealed. Hence, they introduced the HTMT which exhibited an astonishingly high level of sensitivity in detecting a lack of discriminant validity. Henseler *et al*. (2014) submitted that discriminant validity can be achieved if the HTMT score, which is generated from the bootstrapping procedure have a confidence interval between -1 and 1 (-1<HTMT<1). Succinctly put, a confidence interval that contains 1 and -1 is an indication of a lack of discriminant validity. In this report, the researcher used all the criteria mentioned above to assess discriminant validity. The indices for assessing discriminant validity is further illustrated in Table 3.10.

Table 3.10
Indices for Measurement Model Analysis using PLS-SEM

Assessment Test	Name of Index	Level of Acceptance	Literature Support
Reliability	Internal Consistency	Cronbach Alpha >0.7 Composite Reliability	Robinson, Shaver, & Wrightsman (1991) Hair *et al*. (2010); Hair *et al*. (2014)
Convergent Validity	Average Variance Extracted (AVE)	AVE score >0.5	Hair *et al*. (2010); Hair *et al*. (2014)
	Factor Loadings	Loadings for indicators >0.708	Hair *et al*. (2014)
Discriminant Validity	Cross-loadings Assessment	Cross-loadings scores differ by 0.1	Vinzi, Henseler, Chin and Wang (2010)
	Fornell and Larcker (1981) criterion	AVE > r^2	Hair *et al*. (2010); Hair *et al*. (2014)
	HTMT criterion (2014)	-1<HTMT<1	Henseler *et al*. (2014)

3.13.6 Structural Model Analysis using PLS-SEM

The development and assessment of a structural model is the final stage of the PLS-SEM analysis. However, before the development and assessment of the structural model, it is imperative that all the individual constructs satisfy the provisions of the measurement model analysis, which are, the construct reliability, convergent validity and the discriminant validity. Basically, the structural model is developed as a representation of a theory that explains the relationship between and among constructs in a given framework, and as depicted in a visual diagram. Howbeit, the following are the primary focus of a structural model evaluation:

1. The collinearity of the inner model
2. The path coefficient assessment (hypothesis testing)
3. The assessment of the direct and indirect effect of exogenous on endogenous variable
4. The squared correlation (r^2) assessment and effect size (f^2)
5. The assessment of the predictive relevance of the model (Q^2).

However, Table 3.9 illustrates the various rules of thumb in the assessment of the structural model.

Table 3.11
Indices for structural model analysis using PLS-SEM

Assessment Test	Name of Index	Level of Acceptance	Literature Support
Collinearity	Variance Inflator Factor (VIF)	VIF < 3.3/VIF < 5.0	Diamantopoulos and Sigouw (2006), Hair *et al*. (2014)
Path Co-efficient	Path Co-efficient	p value < 0.05, t value > 1.96	Hair *et al*. (2014)
R^2	Co-efficient of determination	0.75 – substantial 0.50 – moderate 0.25 – weak	Hair *et al*. (2014)
F^2	Effect size to R^2	0.35 – large effect size 0.15 – medium effect size 0.02 – small effect size	Hair *et al*. (2014)
Q^2	Stone-Geisser Q^2 Predictive Relevance	Value higher than 0 indicates that exogenous constructs have predictive relevance over endogenous construct	Hair *et al*. (2014), Stone (1974), Geisser (1974)

3.14 CHAPTER SUMMARY

This chapter outlined various research paradigms and a justification for the paradigm employed in the present study. Also outlined in this study is the research design and methodology used to conduct this research. Specifically, the target population, the calculation of the sample size, the operationalization of variables, instrumentation, data collection procedure and the procedure for data analysis. The next chapter will present the analysis of data for this study.

CHAPTER FOUR

RESULTS

4.1 INTRODUCTION

This chapter specifically present the results of the data analysis carried out based on the hypotheses developed for the study. Characteristically, the chapter commences with an overview of the response rate, data screening data cleaning and socio-demographic features of the respondents. This was followed by the descriptive analysis of the variables of the study, the evaluation of the measurement model, via various reliability and validity measures. Subsequently, the structural model and all hypotheses of the study were then assessed, results reported and a brief conclusion of the chapter was done.

4.2 RESPONSE RATE

According to Zikmund *et al*. (2010), response rate is the percentage of persons that respond to a survey. Mathematically, response rate is calculated as:

$$\frac{\text{\# of completed surveys}}{\text{\# of respondents contacted}} = \text{Response Rate}$$

In order to achieve a good response rate from the respondents of the study, the following measures were put in place. First, the Human Resource department of the company (ies) selected based on the cluster sampling method employed for the study were contacted. They were briefed on the purpose of the research, how the results generated therefrom will be used and assurance of anonymity and confidentiality. The survey instrument was worded in simple English with clear and easy-to-follow instructions on how to respond to the items therein (Punch, 2003). Also, the instrument was designed with lightly shaded background colours with adequate spacing for respondents to respond accordingly (Wright, 2005; CDC, 2010). Three weeks to the commencement of the administration of the questionnaires, a reminder letter was sent to the focal person in the HR department on the actual day the researcher will be coming to administer the questionnaires.

Following the above measures and with the provisions of the cluster sampling technique, 520 questionnaires, were distributed to all the respondents (being the sum total of all employees with high exposures to occupational risks in the selected clusters) of the study. The response rate noted in Table 4.1 is in view of the fact that the researcher self-administered the questionnaires and retrieved same. Specifically, 319 questionnaires were eventually retained for analysis. Table 4.1 describes the response rate of the study.

Table 4.1
Summary of the Questionnaires and Response Rate

Item Description	Frequency	Percentage (%)
Questionnaire distributed	520	100
Questionnaires returned	341	65.6
Questionnaires rejected	22	4.2
Questionnaires retained	319	61.3

Source: Researcher

It is a well-known fact in the statistical sciences that a good sample must properly represent the population of study as it makes the sample statistic fit for population parameter under consideration. With that in mind, the cluster sampling method, which is a component of area sampling was used to identify and estimate the sample of the study and data collected accordingly. Based on Table 4.1, the response rate obtained is considered adequate in view of the following reasons. Firstly, the data collected was done in a self-administered manner from the employees of O & G companies.

Secondly, the total number of questionnaires retrieved and eventually readied for further analysis was greater that the threshold suggested by Bartlett, Kotrllk and Higgins (2001) who argued that for a regression type analysis, the sample size should be in the range of five and ten time the number of independent variables. Thirdly, empirical underpinnings in the social sciences posits that a response rate of at least 50% is considered adequate for analysis and reporting (Babbie, 2007). Additionally, though the sample size of a particular is achieved, it is still worthwhile to note that the present study achieved the provisions of the G*Power analysis as systematically reported in the previous chapter of this report.

Characteristically, the 61.3% response rate obtained in this study is further considered adequate when compared to others studies that examined the O & G industry. For example, Mearns and Reader (2008) reported a response rate of 35%, Hsu *et al*. (2008) reported a response rate of 74% and 86% for samples in two countries, Dahl and Olsen (2013) reported a response rate of between 52% and 86% at different times, and Li *et al*. (2013) reported a response rate of 71%. These examples confirms the adequacy of the response rate for this study in addition to other criteria noted above.

4.3MISSING DATA SCREENING AND MISSING VALUES TREATMENT

Before conducting the analysis of the study, the data collected from the respondents were edited so as to ensure completeness, and where incomplete, the data is treated for missing values (Schumacker & Lomax, 2004). This is a prerequisite for the use of SEM in conducting data analysis. Characteristically, the SEM analysis will not be able to function should there be any missing data in the data set to the analyzed (Kline 2005; Tabachnick & Fidell, 2007). Succinctly put, it is posited that the quality of data analysis is a fundamental function of how organized a set is, and its eventual transformation into a standard prior to analysis (Kristensen & Eskildsen, 2010).

According to Sekaran and Bougie (2010), cases of missing data arise when respondents are unable to understand the questions, find it difficult to answer the questions, and / or are unwilling to answer the questions in the instrument. However, a few suggestions have been made on how to treat missing data. Tabachnick and Fidell (2007) suggested an outright dropping of an affected case. Also, Graham *et al*. (1997) suggested the use of Expected Maximization (EM). That notwithstanding, this research relied on the recommendation of Hair *et al*. (2010) who opined that the mean in the SPSS can be used to replace the missing values for as long as there is a lower level of missing responses. Interestingly, as noted in section 4.2 of this chapter, the researcher already dropped 22 cases that had serious missing values issues. However, eight cases had very minor missing data issues (Case ID: 13, 23, 47, 68, 102, 163, 212, and 301), having at most three missing cases. They were eventually treated by replacing the missing values with the mean preparatory for further analysis.

4.4 RESPONDENTS PROFILE

In order to have an articulate and balanced explanation of the results and findings of this study, having a clear understanding of the socio-demographic profile of the respondents is appropriate. Specifically, personal and organizational demographic characteristics of the respondents are described in Table 4.2. They include gender, marital status, age, level of education, experience in the present company, experience in the oil and gas industry, occupation, safety training attendance, involvement in accidents.

Table 4.2
Respondents Profile

Demographic	Characteristics	Frequency	Percentage
Gender	Male	288	90.3
	Female	31	9.7
	Total	319	100.0
Marital status	Single	92	28.8
	Married	205	64.3
	Divorced	12	3.8
	Widowed	10	3.1
	Total	319	100.0
Age of respondents	Less than 20	4	1.3
	21-24	17	5.3
	25-29	66	20.7
	30-34	105	32.9
	35-39	77	24.1
	40-44	36	11.3
	45-49	10	3.1
	50 and above	4	1.3
	Total	319	100.0
Level of education	High School	57	17.9
	Technical/Diploma	217	68.0
	Bachelors	42	13.2
	Masters and Above	3	0.9
	Total	319	100.0
Respondents experience in present company	0-5	157	49.2
	6-10	136	42.6
	11-15	26	8.2
	Total	319	100.0
Experience in the oil and gas industry	0-5	101	31.7
	6-10	181	56.7
	11-15	37	11.6
	Total	319	100.0

Table 4.2 (continued)

Demographic	Characteristics	Frequency	Percentage
Occupation	Technician/Millwright	44	13.8
	Engineer	6	1.9
	Equipment Handler	27	8.5
	Scaffolder	18	5.6
	Electrician	33	10.3
	Operator	23	7.2
	Pipe/Steel Worker	10	3.1
	HVAC Operator	9	2.8
	Plant Maintenance	50	15.7
	Mechanic	13	4.1
	Welder	7	2.2
	Driller	39	12.2
	Rigger	8	2.5
	Safety Personnel and First Aider	5	1.6
	Concrete Worker	11	3.4
	Transportation and Logistics	13	4.1
	Others	3	0.9
	Total	319	100.0
Safety training attendance	Sometimes	17	5.3
	Often	151	47.3
	Always	151	47.3
	Total	319	100.0
Accident involvement	0-5	274	85.9
	6-10	45	14.1
	Total	319	100.0

The study finally considered 319 responses for final data analysis. The illustration from Table 4.2 shows that majority of the respondents are males, 288, representing 90.3% of the total respondents of the study. This is quite typical of the Nigerian oil and gas industry, especially for the category of workers targeted in this study. Of the total respondents, majority (64.3%) are married, while others are either single (28.8%), divorced (3.8%) and widowed (3.1%). On age of the respondents, majority of the respondents are in the age bracket of 30-34 years representing 32.9% of the sample. The frequency and percentage of other age brackets are noted in the Table 4.2. On respondent's level of education, majority of the respondents are technical/diploma degree holders with 68.0% of the total respondents. Workers with Master's degree and above had the lowest representation of 0.9%, that only three of the personnel. On respondents' years of work experience in the present company they work, majority (90.0%) have worked there for between 0 – 10 years. On respondents' experience in the oil and gas industry, majority of the workers (56.7%) have 6-10 years working experience in the O & G. other categorizations are noted in Table 4.2.

On occupation of the respondents, it is further indicated in Table 4.2 that most of the workers are plant maintenance personnel accounting for 15.7% of the total respondents. Technicians and millwrights had the next highest representation of 13.8% and followed by 12.2%. Other occupations in the companies examined for this study are as noted accordingly in Table 4.8. On the frequency of safety training attendance, majority of the respondents (94.6%) agree that they attend and/or safety trainings are organized for them often and always and on a regular basis. Finally, on accidents involvement, majority of the respondents had quite a considerably, yet not-too-alarming accidents rate. Specifically, 85.9% of the respondents have been involved in a workplace accident/incident at least once over the last 12 months. Though accidents rates are not so high, the mere occurrence of accidents further calls for studies aimed at reducing accidents rates in the industry. This statistics also goes to confirm the position of the researcher on the need to study the O & G industry and as succinctly discussed in the background of the study in Chapter One.

4.5 DESCRIPTIVE ANALYSIS OF THE STUDY VARIABLES

In order summarize and explain the key characteristics of the data as collected from the respondents on each of the study variables, a descriptive analysis was performed. This analysis is usually done through the means, standard deviation, variables, etc. so as to give the researcher an overview of how respondents responded to the instrument used for the survey (Sekaran & Bougie, 2010).

Table 4.3
Descriptive Statistics of the Variables

Construct	**Minimum**	**Maximum**	**Mean**	**Standard Deviation**
Authentic leadership	1	5	3.9771	.67097
Inclusive leadership	1	5	3.8185	.79433
Management commitment to safety	1	5	3.4211	.45668
Safety training	1	5	4.0608	.66328
Safety communication	1	5	3.9925	.69802
Safety rules and procedures	1	5	3.9342	.48297
Safety compliance	1	5	3.8351	.45807
Safety participation	1	5	3.8176	.52791
Risky behavior	1	5	2.3201	.68293

Source: Researcher (based on SPSS output)
Five-points scale: 1 = strongly disagree – 5 = strongly agree

As presented in Table 4.11, the results of the descriptive statistics shows that all the variables had mean values ranging from 2.3201 to 4.0608. This is in exception of the risky behaviour construct that is slightly below the average value. However, the standard deviation values for all the constructs are considered acceptable. Consequently, in view of the opinions of the respondents, it is established that all the dimensions of the study namely, authentic leadership, inclusive leadership, management commitment to safety, safety training, safety communication, safety rules and procedures, safety compliance, safety participation and risky behaviour all reflect a satisfactory level of implementation in the companies examined in the present study.

4.6 COMMON METHOD BIAS

Common method bias is one of the principal sources of measurement errors which are usually cause by some external forces related to measurements. According to Conway and Lance (2010), these errors occur based on the manner in which questions are constructed, asked and largely due to the relationship that exist between self-reported variables. Interestingly, a generally acceptable technique that has been suggested and widely used to address cases of common method bias is as proposed by Podsakoff *et al*. (2003). In view of the above, an un-rotated exploratory factor analysis was done and the results therefrom indicated a total variance explained of 68.7%. Interestingly, the first factor explained only 26.4% of the total variance explained. The implication of this findings is that the respondents were able to clearly differentiate among the scales, hence, no bias, and the absence of a general factor in the un-rotated factor structure. The data so generated are devoid of common method errors.

4.7 THE PLS - SEM APPROACH

The rationale for using the SEM approach in analyzing the data of this study, based on the proposed theoretical framework has been explained in the previous chapter of this report. However, in view of the objectives of the study and the nature of data so collected, researchers are left with the choice of adopting the covariance based (AMOS, LISREL) or the variance based (Partial Least Squares) approach in testing the hypotheses of their empirical endeavour. Categorically, the CBSEM is used for confirming and / or testing an already established theory, while the PLS-SEM tilts towards predicting, and facilitating the development of theory.

For lack of factor indeterminacy or convergence concerns (Henseler, 2010), relatively easier distributional assumptions (Reinartz, Haenlein, & Henseler, 2009), and to be able to measure formative constructs (Haenlein & Kaplan, 2004), researchers argue in support of the use the CBSEM approach. Specific empirical underpinnings in this regard are, Chin (1998), Ringle, Sarstedt, and Straub (2012), Tenenhaus, Vinzi, Chatelin, and Lauro (2005), and Wold (1982). Consequently, in view of the framework of this study, made up of two independent variables, one mediating variable with four dimensions and one dependent variable with three dimensions, the researcher used the PLS-SEM approach – SmartPLS 3.0 (Hair, Hult, Ringle, & Sarstedt, 2016; Ringle, Wende, & Becker, 2014). This is to enable the researcher explore and explain the relationships that exist between the independent, mediating and dependent variables. In addition to the above positions, and in view of the model of this study, complex interrelationships between latent and manifest variables expected to be examined (Vinzi, Trinchera, & Amato, 2010), is better done with the PLS-SEM. Succinctly put, when measuring multi-dimensional constructs inclusive of second-order indicators and constructs, the PLS-SEM is most suitable and most recommended (Lowry & Gaskin 2014; Hair, Ringle, & Sarstedt, 2013).

It has been noted earlier that the PLS assumes minimal distribution, hence, normality tests like skewness, kurtosis, Kolgogorov-Smirnov tests are not actually needed to be performed (Hossain, 2013), thereby shielding the PLS-SEM approach from any estimation constraints. In addition to the above, Ringle *et al*. (2012) opined that the use of the PLS-SEM approach unifies two predominant approaches namely, the measurement model and the structural model. Characteristically, the measurement model is assessed by a factor analytical means, while the structural model is assessed via path analysis (Sarstedt, M., Ringle, C. M., & Hair, 2014). In this study, the researcher analyzed the data via PLS path modeling in three stages. First, the path model showing the relationship between the independent, mediating and dependent variables. Specifically, the mediating variable was modelled as a second order construct. Secondly, a second stage model was drawn, with the constructs of the mediating variable treated as formative latent variables. The outer model statistics were reported for both stages. While the factor loadings were used as part of the assessment for the first stage model, the weights were used in the second stage model measurement. Thereafter, the structural model was assessed based on the second stage path model and the hypotheses of the study were assessed accordingly. The succeeding sections of this chapter presents results obtained therefrom.

4.8 MEASUREMENT MODEL ANALYSIS

This section discusses the analysis of the measurement model. Meanwhile, it is noted in the previous section of this chapter that the measurement model is assessed before analysis can be done on the structural model. Specifically, the measurement model is assessed to ascertain the relationship between constructs and items, and the correlational relationships between constructs.

Prior to conducting the actual analysis, a pre-test of the measurement model was done so as to feel how appropriate the data is preparatory for further analysis. In line with the threshold of 0.708 suggested by Hair *et al*. (2014) on factor loadings, a few items were removed that did not meet the threshold suggested by Hair *et al*. (2014). Furthermore, in measuring reflective constructs, it is suggested that as long as the provisions of content validity is not violated, two items should be enough to measure a construct (Worthington & Whittaker, 2006; Yong & Pearce, 2013). Hence, the items retained preparatory to further analytical procedures are adequate enough to measure their respective constructs. More so, their presence exhibited a lack of convergent and discriminant validity which was occasioned by a low average variance extracted (AVE). Hence, Hair *et al*. (2014) opines that the deletion of indicators with low loadings will lead to an improvement of the AVE which in turn boosts the assessment on convergent and discriminant validity. Consequently, the model was then prepared and readied for further analysis. Figure 4.1 shows the revised measurement model that was used for succeeding analysis.

4.8.1 Content Validity

Content validity indicates how appropriate and able items of a construct measures the concept under study (Hair *et al*., 2010). The Principal Component Analysis (PCA) method is suggested to be used in assessing the factor structure of indicators of a construct (Vinzi, Lauro, & Tenenhaus, 2003). Interestingly, the Smart PLS is a tool built on the PCA for assessing factor loadings. While extant literature support the items in all the constructs of the study, it is however important to statistically establish this position. Also, it is critical to note that all indicators has to show highest loading values on their respective constructs as against other constructs. Items that do not meet 0.708 threshold suggested by Hair *et al*. (2014) were removed. Furthermore, the researcher was also careful in deleting items with low loadings so as not to defeat the concept of content validity. However, on the number of items that can measure a reflective construct, two items and above will suffice (Worthington & Whittaker, 2006; Yong & Pearce, 2013).

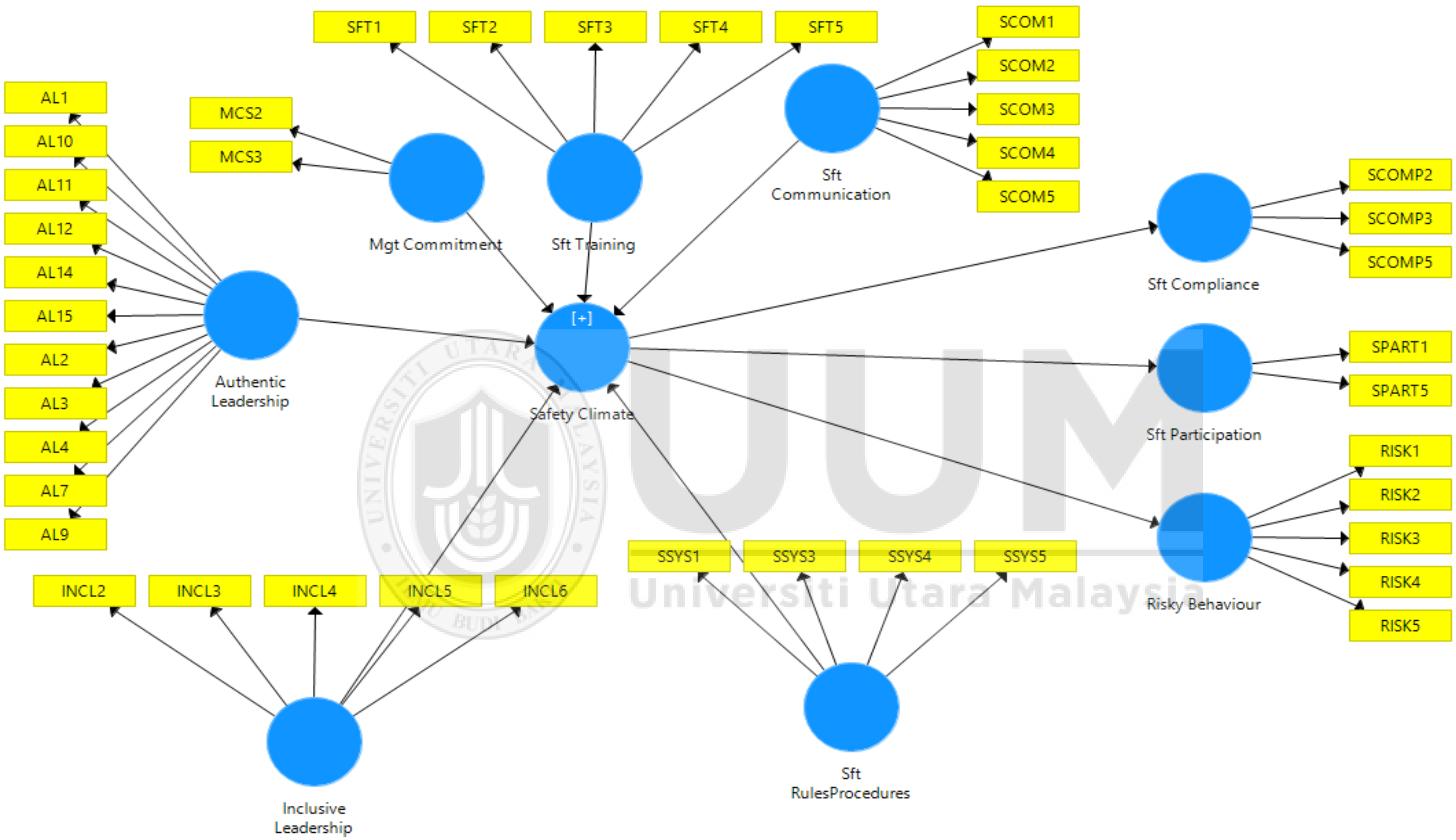

Figure 4.1.
The Measurement Model

4.8.2 Assessment of Construct Reliability

In assessing construct reliability, the Cronbach's Alpha has been habitually used by researchers. However, it is important to note that the Cronbach's Alpha presupposes that all items of a construct are equally reliable, that is, the loading of indicators on a construct are equal. Consequently, Hair *et al*. (2014, p. 101) argued that the individual indicator's reliability is of priority in PLS-SEM, and that the Cronbach's Alpha might not be appropriate in measuring reliability. They however suggested the use of Composite Reliability as an alternative measure of internal consistency based on the assertion that it measures individual indicator's reliability.

Table 4.4
Quality Criteria of First Order Constructs for Variables of the Study

Construct	Item	Loading	Composite Reliability	AVE	Convergent Validity (AVE > 0.5)
Authentic Leadership	AL1	0.746	0.941	0.591	Yes
	AL2	0.756			
	AL3	0.721			
	AL4	0.775			
	AL7	0.779			
	AL9	0.833			
	AL10	0.791			
	AL11	0.812			
	AL12	0.778			
	AL14	0.722			
	AL15	0.740			
Inclusive Leadership	INCL2	0.819	0.939	0.755	Yes
	INCL3	0.904			
	INCL4	0.786			
	INCL5	0.919			
	INCL6	0.906			
Management Commitment to safety	MCS2	0.823	0.832	0.712	Yes
	MCS3	0.864			
Safety Training	SFT1	0.830	0.930	0.727	Yes
	SFT2	0.919			
	SFT3	0.780			
	SFT4	0.869			
	SFT5	0.858			
Safety Communication	SCOM1	0.917	0.910	0.672	Yes
	SCOM2	0.706			
	SCOM3	0.887			
	SCOM4	0.833			
	SCOM5	0.736			

Table 4.4 (continued)

Construct	Item	Loading	Composite Reliability	AVE	Convergent Validity (AVE > 0.5)
Safety Systems (Rules and procedures	SSYS1	0.781	0.913	0.726	Yes
	SSYS3	0.900			
	SSYS4	0.887			
	SSYS5	0.834			
Safety Compliance	SCOMP2	0.879	0.863	0.679	Yes
	SCOMP3	0.847			
	SCOMP5	0.739			
Safety Participation	SPART1	0.950	0.901	0.821	Yes
	SPART5	0.860			
Risky Behaviour	RISK1	0.887	0.919	0.695	Yes
	RISK2	0.848			
	RISK3	0.819			
	RISK4	0.751			
	RISK5	0.858			

Source: Researchrer – based on PLS Output
Criteria: Composite Reliability > 0.708, AVE > 0.5 (Hair *et al*., 2010; Hair *et al*., 2014).

4.8.3 Assessment of Discriminant Validity

The discriminant validity assessment is assessed on the outer model to confirm that stand-alone constructs are actually different from each other. In essence, no two constructs in a given study should be found to be related to each other. In the present study, the discriminant analysis was conducted to determine that authentic leadership, inclusive leadership, safety climate factors (management commitment to safety, safety training, safety communication, and safety systems – rules and procedures), safety behaviour factors (safety compliance, safety participation and risky behaviour) were distinct in the differences, as has been noted from conceptual and theoretical stand-points.

In assessing the discriminant validity of constructs, two measures are used. Specifically, the square root of the average variance extracted (AVE) is examined with correlations among the constructs (Chin, 2010; Fornell & Larcker, 1981). Table 4.15 illustrates the cross-loadings between constructs. In using the cross-loadings as a guide, it is critical to note that each scale item should load high on its own construct as against other constructs. Based on Table 4.15, all items load high on their respective constructs, but low on other constructs which is an indication of discriminant validity.

In further assessing the discriminant validity, the Fornell and Larcker (1981) criterion was used. In PLS-SEM, discriminant validity is evaluated by comparing the square root of the AVE values for two factors against the correlation estimate (r) between the same factors. In order to achieve this, the square root of the AVE must be larger than the correlation estimate of the two factors. Consequently, Table 4.16 shows the assessment of the discriminant validity based on the criterion by Fornell and Larcker (1981).

Table 4.5

Loadings and Cross Loadings of Constructs to Assess Discriminant Validity

Items	Authentic Leadership	Inclusive Leadership	Management Commitment to Safety	Safety Training	Safety Communication	Safety (Systems) Rules and Procedures	Safety Compliance	Safety Participation	Risky Behaviour
AL1	**0.746**	0.577	0.373	0.310	0.360	0.238	0.257	0.316	-0.065
AL2	**0.756**	0.537	0.369	0.315	0.256	0.102	0.034	0.184	-0.110
AL3	**0.721**	0.580	0.462	0.406	0.389	0.249	0.119	0.342	-0.061
AL4	**0.775**	0.618	0.325	0.341	0.303	0.187	0.132	0.249	-0.098
AL7	**0.779**	0.536	0.368	0.431	0.447	0.210	0.205	0.384	-0.062
AL9	**0.833**	0.475	0.313	0.340	0.287	0.067	0.084	0.194	-0.091
AL10	**0.791**	0.468	0.403	0.324	0.283	0.123	0.167	0.187	-0.068
AL11	**0.812**	0.540	0.485	0.400	0.422	0.228	0.172	0.357	-0.019
AL12	**0.778**	0.474	0.415	0.334	0.286	0.089	0.137	0.207	0.039
AL14	**0.722**	0.463	0.277	0.269	0.286	0.214	0.220	0.280	-0.080
AL15	**0.740**	0.557	0.311	0.280	0.281	0.171	0.112	0.182	-0.118
INCL2	0.621	**0.819**	0.441	0.472	0.439	0.260	0.148	0.416	-0.046
INCL3	0.588	**0.904**	0.360	0.340	0.301	0.243	0.153	0.308	-0.096
INCL4	0.509	**0.786**	0.276	0.235	0.139	0.114	0.055	0.155	-0.041
INCL5	0.644	**0.919**	0.454	0.484	0.423	0.294	0.178	0.456	-0.105
INCL6	0.623	**0.906**	0.383	0.399	0.345	0.280	0.155	0.348	-0.133
MCS2	0.513	0.468	**0.823**	0.659	0.446	0.205	0.207	0.367	-0.039
MCS3	0.334	0.314	**0.864**	0.672	0.513	0.323	0.363	0.321	0.040
SFT1	0.405	0.344	0.615	**0.830**	0.466	0.246	0.221	0.261	-0.038
SFT2	0.393	0.451	0.635	**0.919**	0.621	0.402	0.283	0.478	-0.040
SFT3	0.340	0.408	0.576	**0.780**	0.459	0.229	0.185	0.341	-0.070
SFT4	0.442	0.426	0.727	**0.869**	0.647	0.420	0.391	0.525	-0.028
SFT5	0.351	0.364	0.793	**0.858**	0.561	0.294	0.315	0.413	0.007

Table 4.5 (Continued)

Items	Authentic Leadership	Inclusive Leadership	Management Commitment to Safety	Safety Training	Safety Communication	Safety (Systems) Rules and Procedures	Safety Compliance	Safety Participation	Risky Behaviour
SCOM1	0.399	0.394	0.539	0.611	**0.917**	0.465	0.373	0.486	-0.046
SCOM2	0.309	0.254	0.402	0.442	**0.706**	0.313	0.308	0.255	-0.069
SCOM3	0.453	0.472	0.533	0.652	**0.887**	0.526	0.365	0.587	-0.081
SCOM4	0.348	0.259	0.403	0.495	**0.833**	0.418	0.439	0.414	-0.029
SCOM5	0.282	0.263	0.439	0.449	**0.736**	0.721	0.766	0.617	-0.074
SSYS1	0.110	0.180	0.143	0.180	0.316	**0.781**	0.392	0.397	-0.072
SSYS3	0.150	0.166	0.185	0.229	0.495	**0.900**	0.674	0.591	-0.076
SSYS4	0.346	0.378	0.453	0.533	0.717	**0.887**	0.611	0.631	-0.088
SSYS5	0.117	0.209	0.208	0.256	0.427	**0.834**	0.626	0.552	-0.024
SCOMP2	0.094	0.044	0.212	0.202	0.479	0.737	**0.879**	0.503	-0.032
SCOMP3	0.299	0.234	0.397	0.404	0.546	0.424	**0.847**	0.559	-0.067
SCOMP5	0.083	0.143	0.227	0.205	0.312	0.542	**0.739**	0.460	0.012
SPART1	0.386	0.436	0.468	0.522	0.649	0.665	0.631	**0.950**	-0.027
SPART5	0.232	0.292	0.213	0.312	0.362	0.484	0.457	**0.860**	-0.059
RISK1	-0.099	-0.089	0.029	-0.001	-0.064	-0.110	-0.057	-0.080	**0.887**
RISK2	-0.061	-0.126	-0.039	-0.076	-0.087	-0.035	-0.028	-0.045	**0.848**
RISK3	-0.067	-0.079	0.025	-0.018	-0.028	-0.061	-0.008	0.016	**0.819**
RISK4	-0.075	-0.044	-0.007	-0.030	-0.055	-0.059	-0.041	-0.024	**0.751**
RISK5	-0.033	-0.039	0.055	0.003	-0.035	-0.069	-0.011	-0.005	**0.858**

Source: Researcher – based on PLS Output

Table 4.6
Discriminant Validity Assessment (Fornell & Larcker, 1981)

	AL	INCL	MCS	RB	SCOM	SCOMP	SPART	SSYSRP	SFT
Authentic Leadership	**0.769**								
Inclusive Leadership	0.696	**0.869**							
Mgt Commitment	0.495	0.457	**0.844**						
Risky Behaviour	-0.084	-0.101	0.004	**0.834**					
Safety Communication	0.441	0.409	0.570	-0.073	**0.820**				
Safety Compliance	0.200	0.169	0.343	-0.039	0.553	**0.824**			
Safety Participation	0.357	0.416	0.405	-0.043	0.590	0.617	**0.906**		
Sft Rules & Procedures	0.233	0.290	0.317	-0.078	0.606	0.686	0.651	**0.852**	
Safety Training	0.454	0.469	0.788	-0.038	0.653	0.334	0.483	0.381	**0.853**

4.8.4 Evaluation of the Overall Model

Characteristically, the essence of assessing the measurement model is to evaluate the relationship between the items and the constructs and also to identify if there are any correlational relationship between constructs so as to ensure the distinctiveness of each of the constructs. Specifically assessed are, the construct reliability, the convergent validity, and the discriminant validity. The threshold as posited in various statistical literature were all met (composite reliability score > 0.708; AVE > 0.5 and factor loadings of more than 0.708). In assessing the discriminant validity, the cross loadings comparison and the Fornell and Larcker (1981) criterion were used, and results show that each of the constructs in this study are distinct from one another. The next step in this chapter is to assess the structural model of the study.

Prior to assessing the structural model, it is imperative to explain the formation of the second order construct. This is because the model of this study is analyzed in two stages, hence the need to establish and test second-order constructs (Hair, Hult, Ringle, & Sarstedt, 2013). It is hypothesized in this study that safety climate (management commitment to safety, safety training, safety communication and safety systems – rules and procedures) will mediate the relationship between authentic leadership and safety behaviours (safety compliance, safety participation and risky behaviour), and also the relationship between inclusive leadership and safety behaviour dimensions. It is based on the complexity of these relationships that the model is examined as a second-order measurement model

At the first measurement stage, the dimensions of safety climate were all examined as first order constructs, and parameters required to test their further usability were explained accordingly. Thereafter, these dimensions were collapsed as higher second-order construct, and was eventually used for assessment of the structural model and related analyses. Table 4.17 illustrates the result of the assessment of the formative constructs, and an examination of the results show that only safety training was not significant. But since the four dimensions are formative constructs, no deletion was done.

Table 4.7
Second-order Formative Constructs Assessment

Construct	**Item**	**Weight**	**T-Value**	**Sig**
Safety Climate	Management Commitment	0.202	2.553	0.011
	Safety Training	0.067	0.770	0.442
	Safety Systems (Rules and Procedures)	0.636	10.684	0.000
	Safety Communication	0.299	4.280	0.000

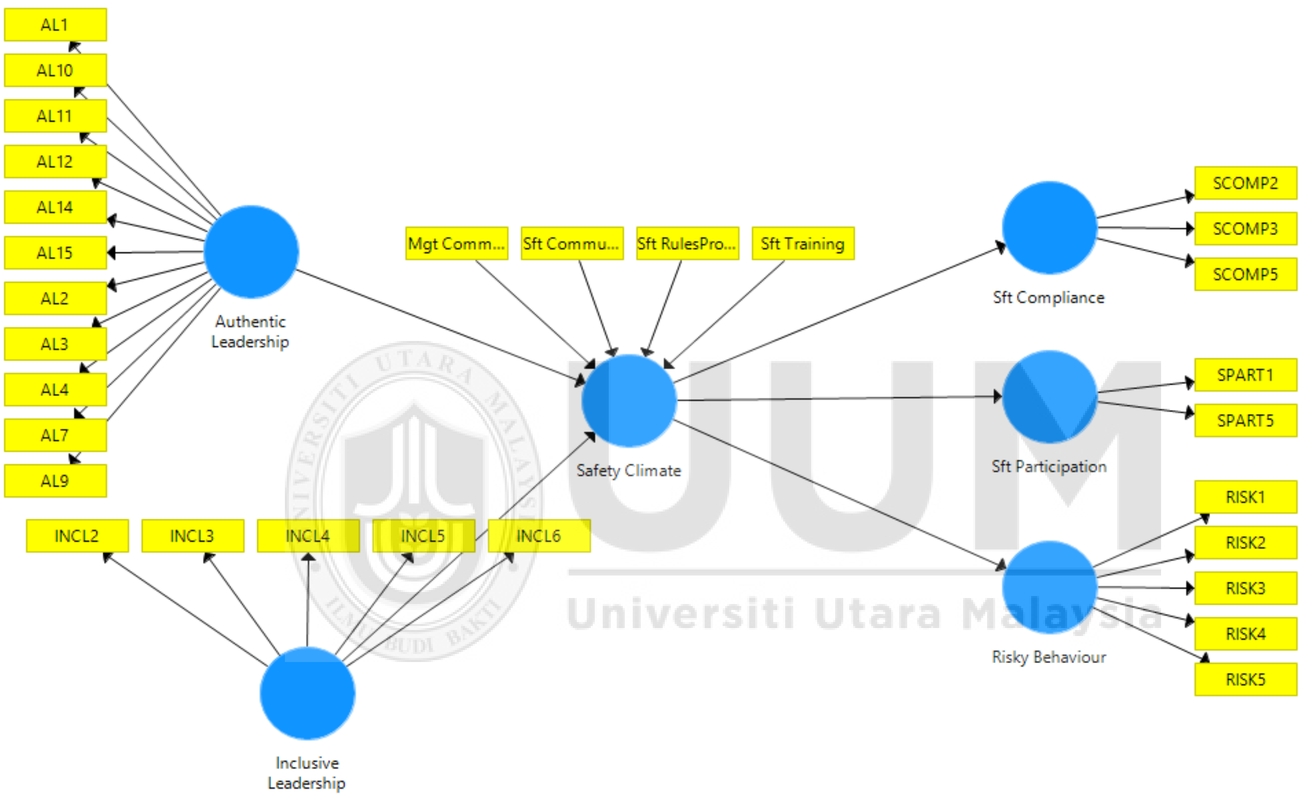

Figure 4.2.
Second stage formative constructs

4.9 ASSESSMENT OF THE STRUCTURAL MODEL

The figure below describes the procedures involved in assessing a structural model.

Step 1: Assess structural model for collinearity issues

⇓

Step 2: Assess the path co-efficient

⇓

Step 3: Assess the level of R^2

⇓

Step 4: Assess the effect size – f^2

⇓

Step 5: Assess the predictive relevance Q^2

Figure 4.3.
The five-step procedure for structural model assessment

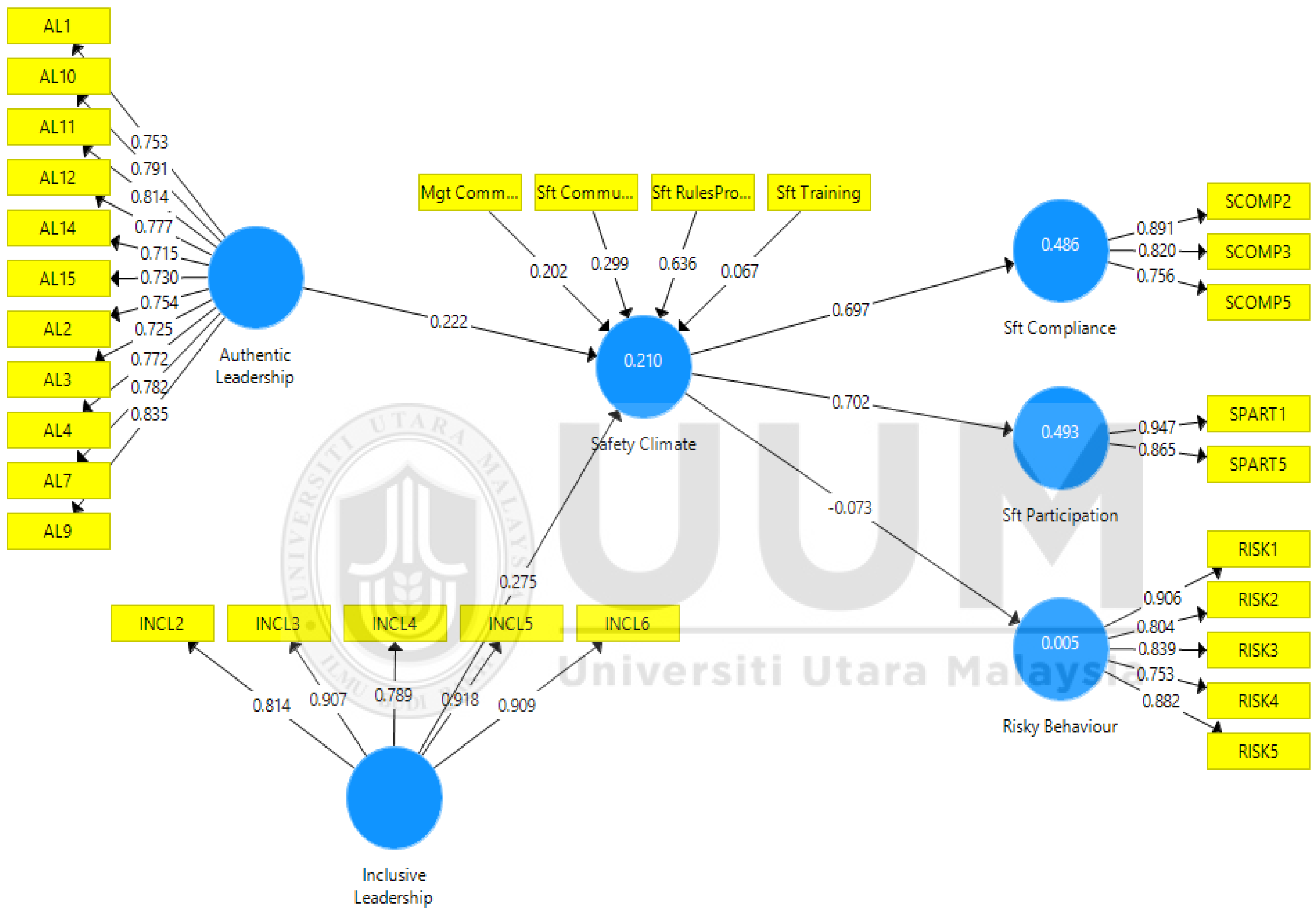

Figure 4.4.
The structural model with weights and R^2 values

4.9.1 Collinearity Assessment

Before evaluating the structural model, it is imperative to ensure the absence of collinearity issues in the formative constructs. Table 4.18 illustrates the outcome of the collinearity test. The results shows that the VIF score is lower than the upsetting and problematic 3.3 value as suggested by Diamantopoulos and Siguaw (2006). This is an indication that that there were no collinearity issues.

Table 4.8
Collinearity Assessment

	S.CLIMATE	SCOMP	SPART	RISK
Management Commitment to Safety	2.679			
Safety Training	3.151			
Safety Communication	2.390			
Safety Systems (Rules and Procedures)	1.582			
Safety Climate		1.000	1.000	1.000
Safety Compliance				
Safety Participation				
Risky Behaviour				

4.9.2 Path Co-efficient Assessment

The path-coefficient assessment is conducted in order to evaluate the significance of hypothesized relationships between variables. In this study, there are six latent variables namely, authentic leadership, inclusive leadership, safety climate, safety compliance, safety participation, and risky behaviour. The PLS Algorithm was run so as to generate the paths co-efficient. Thereafter, the bootstrapping was done with 500 bootstrap samples, which is quite larger than the actual sample of the study (Henseler, Fassott, Dijkstra, & Wilson, 2012; Hair *et al*., 2013), so as to generate the t-values.

Prior to testing the hypotheses do developed for this study, it is imperative to state the process through which second-order constructs were established. The model of this study is a higher-order model, and as suggested by Hair *et al*. (2013), such models are tested as second-order structures in two stages. Consequently, in the present study, and in line with prior studies, it was hypothesized to assess the overall mediating effect of safety climate as a second-order construct consisting of four dimensions (management commitment to safety, safety training, safety communication and safety rules and procedures). To calculate this, the latent variable scores of the dimensions of safety climate is considered as its indicators and then converted into formative, rather than reflective constructs.

In total, 11 hypotheses were developed to examine the relationships between the constructs. However, hypotheses with direct relationships are stated as follows:

H1: There is a positive relationship between authentic leadership and safety climate.

H2: There is a positive relationship between inclusive leadership and safety climate.

H3: There is a positive relationship between safety climate and safety compliance.

H4: There is a positive relationship between safety climate and safety participation.

H5: Safety climate will negatively predict risky behaviour.

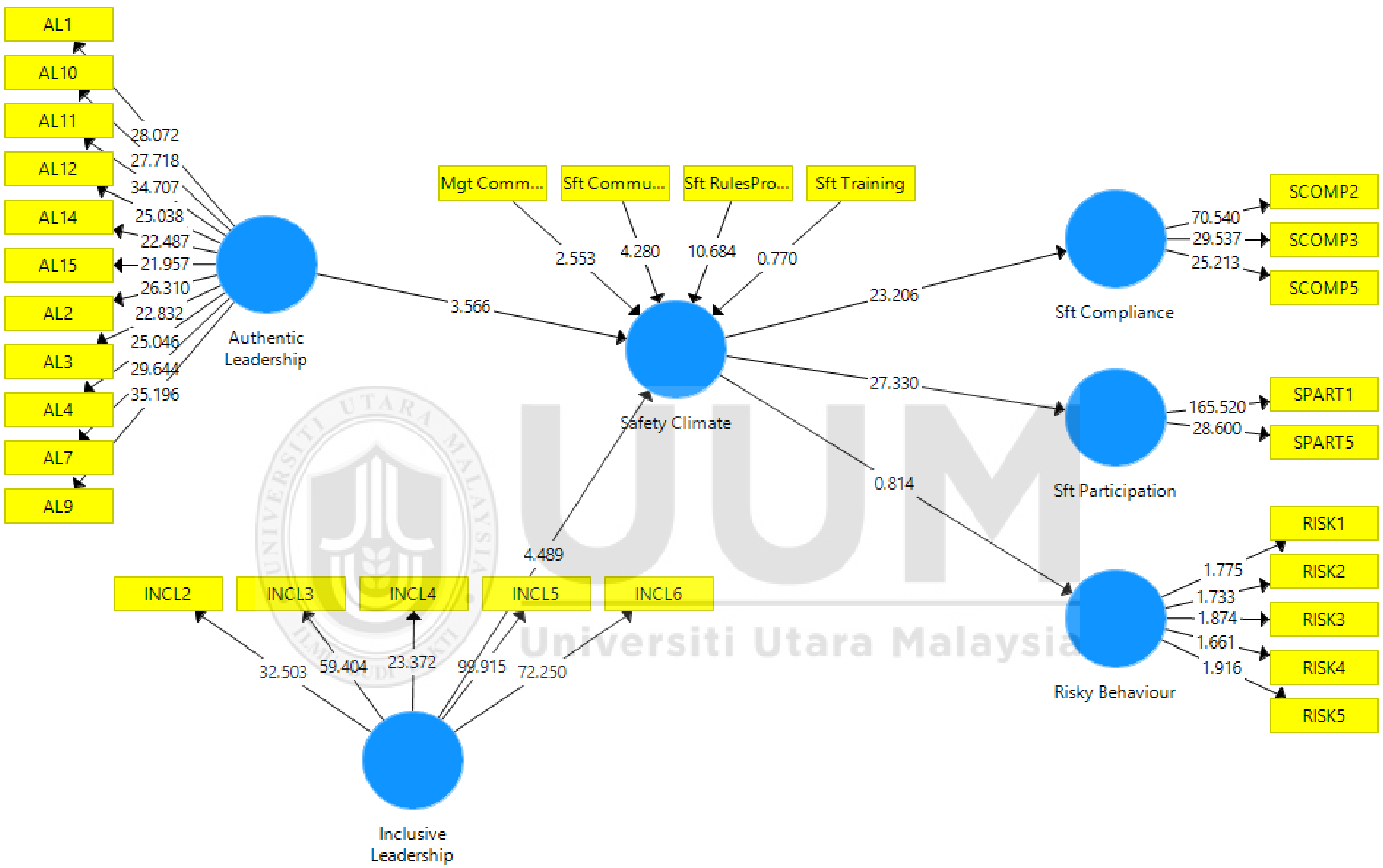

Figure 4.5.
Path model results (direct hypotheses)

Table 4.19 illustrates the result of the assessment of the path co-efficient for each of the hypothesized relationship. However, at this stage, only the results of the direct relationships were presented. That is, hypotheses H1 to H5.

Table 4. 9
Results of Hypothesized Direct Relationships

	Direct Effect (β)	Standard Error	T-Statistics	P-Value	Result
Authentic Leadership -> Safety Climate	0.222	0.062	3.566**	0.000	Significant
Inclusive Leadership -> Safety Climate	0.275	0.061	4.489**	0.000	Significant
Safety Climate -> Safety Compliance	0.697	0.030	23.206**	0.000	Significant
Safety Climate -> Safety Participation	0.702	0.026	27.330**	0.000	Significant
Safety Climate -> Risky Behaviour	-0.073	0.090	0.814**	0.416	Not Significant

**p< 0.01, *p<0.05

4.9.3 R^2 Level Assessment

The R^2 is also referred to as determination of co-efficient. It is a representation of the amount of variance in endogenous construct(s) as explained by all exogenous constructs connected to it (Hair *et al*., 2014). Characteristically, Table 4.10 demonstrates the R^2 value for the endogenous constructs of safety climate, safety compliance, safety participation and risky behaviour. The R^2 value for safety climate is 0.210, which is an indication that 21.0% of the variance of safety climate is explained by authentic leadership and inclusive leadership. Also, the R^2 values for safety climate to safety compliance, safety participation and risky behaviours are, 0.486, 0.493, and 0.005. The meaning of this is that safety climate explains 48.6%, 49.3% and 5% of the variance of safety compliance, safety participation and risky behaviour respectively.

In explaining the strength of these relationships, some threshold suggestions have been proposed. According to Falk and Miller (1992), R^2 values ≥ 0.10 is deemed as adequate. Cohen (1992) argues that R^2 values greater than 0.02, 0.13, and 0.26 can be categorized as weak, moderate and substantial respectively. In the position of Chin (1998), it is noted that R^2 values greater than 0.19, 0.33, and 0.67 can be regarded as weak, moderate, and substantial respectively. In the submission of Hair *et al*. (2011) and Hair *et al*. (2013) with specific focus on marketing research, R^2 values greater than 0.25, 0.50 and 0.75 are regarded as weak, moderate and substantial respectively.

While there is no clear-cut threshold for acceptable and unacceptable R^2 values, acceptability of R^2 is discipline-dependent. Within the context of the present study, it can be postulated that the relationship between authentic leadership, inclusive leadership and safety climate is adequate (Falk & Miller, 1992). While the relationship between safety climate, safety compliance and safety participation can be regarded as substantial (Cohen, 1992; Chin, 1998), the relationship between safety climate and risky behaviour is populated as weak (Cohen, 1992, Chin, 1998; Hair *et al*., 2013).

Table 4.10
Co-efficient of Determination

Variable	$\mathbf{R^2}$
Safety Climate	0.210
Safety Compliance	0.486
Safety Participation	0.493
Risky Behaviour	0.005

4.9.4 Assessment of effect size (f^2)

The f^2 is assessed to evaluate whether the removal of an exogenous variable from a structural model changes the R^2 values. Constructively, the essence of conducting the effect assessment is to ascertain if exogenous constructs have a substantive impact of endogenous constructs. Mathematically, effect size (f^2) is calculated with the formula by Hair *et al*. (2013):

$$f^2 = \frac{R^2\ included - R^2\ excluded}{1 - R^2\ included}$$

According to Cohen (1988), the guideline for assessing f^2 values are larger than, 0.02, 0.15, and 0.35, respectively, represent small, medium, and large effects (Hair *et al*., 2013). See Table 4.11 for illustrations on the effect size assessment. From the results it can be posited that both authentic leadership (0.032) and inclusive leadership (0.049) have small to medium effect sizes on safety climate. On a related note, safety climate has a medium to large effect sizes with safety compliance (0.946) and safety participation (0.972), but small effect size with risky behaviour (0.005). The implication of this results is that safety climate is critical to determining safety behaviours, especially safety compliance and safety participation, but not risky behaviour. Hence, removing safety climate from the model will drastically change the R^2 of the components of risky behaviour.

Table 4.11
Effect Size Assessment

Constructs	Effect Size (f^2)	Judgement
Authentic leadership – Safety Climate	0.032	Small – medium
Inclusive Leadership – Safety Climate	0.049	Small - medium
Safety Climate – Safety Compliance	0.946	Large
Safety Climate – Safety Participation	0.972	Large
Safety Climate – Risky Behaviour	0.005	Small

4.9.5 Assessment of Predictive Relevance Q^2

The essence of assessing the predictive relevance is to ascertain if the exogenous constructs have predictive power over the endogenous constructs with the use of the blindfolding technique. Characteristically, in order to evaluate the quality of a model, it has been suggested to researchers to rely on measures that demonstrate the predictive abilities of the model (Hair *et al*., 2010). Usually, the predictive quality of a model is evaluated (Fornell & Cha, 1994; Hair, Sarstedt, Ringle, & Mena, 2012) by cross-validated redundancy measure (Q^2), which is a commonly found sample re-use procedure (Geisser, 1974; Stone & Hollenbeck, 1984).

On the threshold for assessing the Q^2, Hair *et al*. (2014) suggested that it should be larger than 0 so as to indicate that the exogenous constructs have predictive ability on the endogenous constructs. Based on the illustration in Table 4.21, the Q^2 value for safety climate, safety compliance, safety participation and risky behaviour all show predictive relevance, though the result for risky behaviour is quite low.

Table 4.12
Predictive Quality Indicators of the Model

	R^2	Cross-Validated Communality	Cross-Validated Redundancy
Safety Climate	0.210	0.347	0.165
Safety Compliance	0.486	0.359	0.324
Safety Participation	0.493	0.416	0.381
Risky Behaviour	0.005	0.539	0.001

4.10 MEDIATING EFFECT ASSESSMENT

In this section, the mediating effect of safety climate was assessed. Six hypotheses were proposed accordingly as follows:

H6: Safety climate mediates the relationship between authentic leadership and safety compliance.

H7: Safety climate mediates the relationship between authentic leadership and safety participation.

H8: Safety climate mediates the relationship between authentic leadership and risky behaviour.

H9: Safety climate mediates the relationship between inclusive leadership and safety compliance.

H10: Safety climate mediates the relationship between inclusive leadership and safety participation.

H11: Safety climate mediates the relationship between inclusive leadership and risky behaviour.

Normally, bootstrapping technique was used to assess the mediating effect of safety climate in the relationship between the independent and dependent variables. The current approach suggested by Preacher and Hayes (2004, 2008) does not require the relationship between the independent and dependent variables to be tested as a precondition of a mediation test. This argument was further supported by Shrout and Bolger (2002) who stressed that the first condition of Baron and Kenny's (1986) approach, which needs the independent variable to show a significant effect on the dependent variable should not be a prerequisite for the existence of a mediation. As illustrated in Table 4.13, four of the indirect relationships were significant, and two were not significant. In the same vein, upon using the 95% bootstrapping confidence interval results (Preacher & Hayes, 2008), four of the indicators do not have a 0 overlap in between the upper and lower interval, hence a suggestion that a mediation occurred. Unfortunately, two of the indicators were not significant, suggesting no mediation. This is because they both have a zero overlap in between the upper and lower intervals.

Table 4.13
Indirect Effect Report

	Indirect Effect	**Standard Error (STERR)**	**T Statistics (|O/STERR|)**	**Confidence Interval Low**	**Confidence Interval Up**	**P-Values**	**Result**
Authentic Leadership -> Safety Climate -> Safety Compliance	0.155	0.043	3.607	0.068	0.239	0.000	Significant
Authentic Leadership -> Safety Climate -> Safety Participation	0.156	0.043	3.594	0.066	0.240	0.000	Significant
Authentic Leadership -> Safety Climate -> Risky Behaviour	-0.016	0.022	0.740	-0.037	0.047	0.459	Not Significant
Inclusive Leadership -> Safety Climate -> Safety Compliance	0.191	0.042	4.553	0.110	0.279	0.000	Significant
Inclusive Leadership -> Safety Climate -> Safety Participation	0.193	0.044	4.374	0.108	0.288	0.000	Significant
Inclusive Leadership -> Safety Climate -> Risky Behaviour	-0.020	0.027	0.757	-0.048	0.049	0.449	Not Significant

*p<0.05, **p<0.01

4.11 SUMMARY OF HYPOTHESES ASSESSMENT

The summary of the results of the hypotheses of this study is presented in Table 4.24 hereunder. Basically, the results of the path analysis was used to assess the direct relationships, while the bootstrapping technique was used to assess the indirect effects (mediation analysis).

Table 4.14
Summary of Hypotheses Assessment

	Hypotheses	**Outcome**
H_1:	There is a positive relationship between authentic leadership and safety climate.	Significant
H_2:	There is a positive relationship between inclusive leadership and safety climate.	Significant
H_3:	There is a positive relationship between safety climate and safety compliance.	Significant
H_4:	There is a positive relationship between safety climate and safety participation.	Significant
H_5	Safety climate will negatively predict risky behaviour.	Not Significant
H_6:	Safety climate mediates the relationship between authentic leadership and safety compliance.	Significant
H_7:	Safety climate mediates the relationship between authentic leadership and safety participation.	Significant
H_8:	Safety climate mediates the relationship between authentic leadership and risky behaviour.	Not Significant
H_9:	Safety climate mediates the relationship between inclusive leadership and safety compliance.	Significant
H_{10}:	Safety climate mediates the relationship between inclusive leadership and safety participation.	Significant
H_{11}:	Safety climate mediates the relationship between inclusive leadership and risky behaviour.	Not Significant

4.12 CHAPTER SUMMARY

This chapter presented that data analysis techniques and the results from the analysis conducted. Basically, the analyses and results of the response rate assessment, missing data screening, missing values treatment, descriptive analysis of the variables of the study, report of common method bias and then profiling of the respondents of the study were presented first. Thereafter, the measurement model, also referred to as the outer model in Smart PLS was assessed with various reliability and validity tests were presented. This assessment was further supported by the ascertaining the R^2, F^2 and Q^2 values of the relationships between the exogenous and endogenous variables. This was immediately followed by the assessment of the structural model which is primarily aimed at testing the hypothesized relationships of this study. Results therefrom were reported accordingly, and a summary was done in a tabular format to illustrate the results of the hypotheses and related decision.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

This study investigated leadership styles and safety behaviours with safety climate as mediator among workers in the O & G industry in Rivers State, Nigeria. Specifically, this chapter presents a critical discussion of the findings of the hypotheses of the study. Also presented in this chapter are, the impact of the findings and their contributions to practice, theory and concept. The limitations and directions for future research are subsequently presented.

5.2 DISCUSSION

The core purpose of this study is to examine the relationship between leadership styles and safety behaviours with safety climate as mediator in the oil and gas industry in Rivers State, Nigeria. Specifically, the study investigated how safety climate (management commitment to safety, safety training, safety systems rules and procedures, and safety communication) mediates the relationship between authentic leadership, inclusive leadership and safety behaviours (safety compliance, safety participation and risky behaviour). In view of the above, 11 hypotheses were developed and tested. Results show that eight of the hypotheses were supported, and three were not supported. Hence, the first part of this discussion will dwell on the direct relationships in the model. The succeeding section of this chapter will present the discussions on the indirect relationships. However, the level of safety behaviours among the oil and gas workers targeted for this study is discussed prior to discussing the findings of the hypotheses.

5.2.1 Level of Safety Behaviours

In the present study, the first research question sought to assess the level of safety behaviours among oil and gas workers in Rivers State, Nigeria. This question was measured by examining the mean value of the dimensions of safety behaviours (safety compliance, safety participation and risk behaviour). According to Schutte (2010), while safety compliance denote workers behaviours that focuses on meeting and maintaining safe standard work procedures and the use of personal protective equipment, safety participation refers to behaviours that incidentally does not contribute to the safety of workers themselves, but co-workers and general workplace safety, or as Martinez-Corcoles *et al*. (2013) posits, behaviours that supports process safety. Safety participation specifically involves voluntary activities like assisting co-workers with matters of safety, attending safety meetings, etc. (Neal & Griffin, 2006; Lu & Yang, 2010). Risky behaviour is thus used to denote behaviours which are a deviation from standard organizational practices, procedures and expectations which are likely to cause adverse consequences (Martinez-Corcoles *et al*., 2013).

The data collected and analyzed shows that the mean score and standard deviation (based on a 5-point scale) for safety behaviours are 3.835/0.458 for safety compliance, 3.818/0.528 for safety participation and 2.320/0.683 for risky behaviour.

These findings suggest that the level of safety behaviours in the Nigerian oil and gas industry, and specifically in Rivers State is satisfactory when compared to other related industries and with related level of exposures to occupational risks. For example, Martinez-Corcoles *et al*. (2013) reported high mean scores and standard deviation for safety compliance (4.56/0.60), safety participation (4.10/0.75) and risky behaviour (1.47/0.53) among employees from two nuclear power plants in Spain.

Additionally, in a major accidents hazard unit in India, Vinodkumar and Bhasi (2010) reported mean scores and standard deviation for safety compliance (3.88 and 0.70) and safety participation (3.80 and 0.61) respectively. In the Norwegian oil and gas industry, Dahl and Olsen reported a mean score and standard deviation of 4.77 and 0.71 for safety compliance. In two petro-chemical corporations in China, Jiang, Yu, Li and Li (2010) reported a mean scores and standard deviation of 4.83/0.82 and 4.33 and 0.94 for safety compliance and safety participation respectively. Additionally, in the UK and Norwegian continental shelves, Tharaldsen *et al*. (2010) reported mean scores and standard deviation of 4.73/0.55 and 4.08/0.81 for safety compliance and safety participation respectively.

Comparing the findings of the above studies to the present study, it can be further noted that a satisfactory level of safety behaviours was achieved. Plausible among the reasons that can be adduced to the reported scores is that, there is a high level of safety awareness amongst the workers. It is noted that the oil and gas industry is known for implementing best and result-oriented safety practices, procedures and protocols (Li *et al*., 2013), but the occurrence of accidents and possible attendant fatalities cannot be completely ruled off. Furthermore, a look at the demographic statistics of the respondents indicate that they have quite a considerable number of years of experiences in their present company and more especially in the oil and gas industry. They also noted that safety trainings, which may be done in different forms and manners are always conducted for them and on a regular basis in their workplaces. Hence, awareness is quite high, and thus translated to the need to comply with, and participate in practices and activities that improves workplace safety and in reducing the tendency of taking risks.

5.2.2 Main effect

The results presented in Table 4.9 in the previous chapter illustrates that hypotheses 1 to 4 were supported, while hypothesis 5 is not supported. The following sections will now explain the results of the hypotheses accordingly.

5.2.2.1 Relationship between authentic leadership and safety climate

In the present study, authentic leadership is operationalized as a form of leadership behaviour where leaders are absolutely familiar with their values and belief system, are confident in themselves, genuine in their attitudes, display reliability and trust-worthiness in their push towards building the psychological strengths of their followers (Gardner *et al.*, 2005; Neider & Schreisheim, 2011; Leroy et al., 2012). It is a form of leader behaviour that encourages positive psychosomatic capabilities, ethical climate, greater self-awareness, internalized moral perspective, balanced processing of information and relational transparency between them and their followers (Walumbwa *et al*., 2008). In the present study, it is hypothesized that there is a positive relationship between authentic leadership and safety climate (H1). The hypothesis received empirical support. By implication, the perception of employees in the O & G industry based on the authentic leadership behaviour of their leaders (immediate supervisor) positively shaped their safety climate perceptions. Put in another way, positive safety climate, which is a sine qua non for improved safety behaviours is positively shaped by the authentic leadership behaviour of their immediate supervisors.

Relying on classical theoretical positions of the importance of leadership in shaping and/or creating climates (Lewin *et al*., 1939; Kozlowski & Doherty, 1989; Dragoni, 2005), and especially safety climate (Kelloway & Barling, 2010), the authentic leadership behaviour, in view of its distinct characteristics is also noted as capable of determining safety climate (Spitzmuller & Ilies, 2010; Hyllengren *et al*., 2011; Eid *et al*., 2012). Consequently, the result of H1 as empirically supported is consistent with some related studies. For example, Borgersen, Hystad, Larsson and Eid (2014) reported a statistically significant relationship between authentic leadership and safety climate. Nielsen *et al*. (2011) also reported a positive association between authentic leadership and safety climate. In another submission, Hystad, Bartone and Eid (2013) reported a direct of authentic leadership on safety climate. Interestingly, the finding of Hystad *et al*. (2013) is in a work-setting as similar to the present study. Some plausible explanation can be adduced to this finding.

The authentic leadership style is noted to be a higher-order construct with interacting and behavioural characteristics (Walumbwa *et al*., 2010) is enhances communication between leaders and their subordinates. The relationship between authentic leadership and safety climate is positive, possibly because subordinates have better knowledge of, and enjoy some form of close proximity with their immediate supervisors (Hystad *et al*., 2013). By implication, it can also be argued that the proximity that exists between the leaders and their subordinates have strengthened interaction and communication processes that exist therein. Additionally, it has been theoretically assumed that when leaders are aware of their values, clearly communicate such values and act in accordance with those values, they display authentic leader behaviours which predicts and facilitates positive work attitudes among their subordinates (Peus *et al*., 2012). It is therefore expected that the authentic leadership style will enhance safety behaviours in the O & G industry.

Furthermore, Eid *et al*. (2012) noted that the authentic leadership style is characteristic of transparent, fair and ethical behaviours which promotes safety work climates. Hence, it is plausible to posit that the subordinates noticed and probably felt a demonstration of behaviours that are characteristic of transparency, fairness and ethical conduct from their immediate supervisors. The effect of these leader behaviours on their subordinates are thus noticed on their positive safety climate perceptions. Therefore, the authentic leadership style is expected to lead to improved safety behaviours in the O & G industry.

5.2.2.2 Relationship between inclusive leadership and safety climate

In the present study, inclusive leadership denotes a holistic and/or broad-based leadership style that encourages diversity in fostering better leader-follower relationship (Wuffli, 2016). Inclusive leadership, originally christened by Nembhard and Edmondson (2006) also refers to leaders who are open, accessible and available in the course of interacting with their subordinates (Carmeli *et al*., 2010). It is unambiguously noted by Nembhard and Edmondson (2006) that this leadership behaviour is the type that leaders welcome inputs from others which in turn gives their followers the sense of belonging that their opinions are sincerely appreciated. The second hypothesis of this study (H2) states, there is a positive relationship between inclusive leadership and safety climate. Accordingly, empirical support was found for this hypothesis. More so, some plausible explanations are further suggested on the finding of the second hypothesis.

Safety climate perceptions are built and shaped based on socio-psychological organizational factors (Al-Haadir *et al*., 2013; Maslen & Hopkins, 2014), and leadership has been identified as one of the most critical of the factors (Clarke, 2013; Lievens & Vlerick, 2013). From the findings of this study, it can be posited that the safety climate perceptions of the employees are positively shaped based on the authentic leadership behaviour of the superiors, characteristic of openness, accessibility and availability. Succinctly put, leaders who display behaviours that portray the above characteristics are definitely going to build or shape positive organizational outcomes (Carmeli *et al*., 2010), and specifically positive safety climate.

Also, inclusive leaders support their subordinates all the time, and they give attention to open communication that inspires and appreciates the innovativeness of their subordinates (Hollander, 2009). Hence, as the subordinates perceive that their supervisors display inclusive leader behaviours, they tend to display heightened safety climate perceptions (Nembhard & Edmondson, 2006). The researcher also believes that better social exchange relationships would be enhanced between the leaders and their followers. This predicated upon the notion that employees are likely to perceive their relationships with their superiors as trusting, supportive and respectful, and in turn reciprocate with an improved perception of safety climate and by extension improved safety behaviours.

The concept of inclusive leadership is relatively new in the leadership literature, hence, a noticeable empirical paucity on the relationship between inclusive leadership and safety climate. Support on this leadership behaviour in eliciting safety climate outcomes within the gamut of this study will be predicated upon plausibility of other leadership behaviours in relation to safety climate and related organizational outcomes (Choi *et al*., 2015). For example, and consistent with empirical support for H2, it is the work of Carmeli *et al*. (2010) who found a statistically significant relationship between inclusive leadership and psychological safety, and by extension employee creativity in the workplace that can be relied on. It was therein also noted that the relationship was positive because leaders displayed behaviours that are characteristic of openness, accessibility and availability.

5.2.2.3 Relationship between safety climate and safety behaviours

The relationship between safety climate and safety behaviours have been extensively examined and/or investigated across diverse socio-demographic milieu, and findings from the examinations have been largely positive (Zhou *et al*., 2008; Clarke, 2010, Zohar, 2010; Kapp, 2012). Consequently, it has been posited that safety climate is an essential and crucial solution for improving workplace safety (Zohar & Luria, 2010; Bosak *et al*., 2013; Barbaranelli *et al*., 2015), and also a valid reference to guide worker's behaviours in working safely and in reducing and/or eliminating workplace risks (Huang *et al*., 2010; Fernandez-Muniz *et al*., 2012, 2014). Additionally, safety climate is also noted as the best early pointer of unsafe work behaviour (Seo, 2005). Therefore, there is no doubt that, in order to ensure safe working conditions for both workers and the work environment, safety climate indicators must be high, and at the same time play a crucial role.

In the present study, safety climate is conceptualized as employees' perception of the true priority accorded safety by their management through various safety-related policies, procedures and practices (Tholen *et al*., 2013). It is also considered as employees' perception of well-being or the extent to which the work environment is perceived as personally beneficial or injurious based on the true priority accorded safety by management (Johnson, 2007; Larsson *et al*., 2008; Morrow *et al*., 2010). Hence, the relationship between safety climate and safety behaviours were examined based on three hypotheses (H3 – H5). Specifically, the relationship between safety climate and safety compliance, and safety climate and safety participation were empirically supported. However, the relationship between safety climate and risky behaviour is not supported.

In the present study, safety climate significantly predicted safety compliance. Evidently, safety compliance is a core component of safety behaviours (Neal & Griffin, 2006). Positive safety climate perceptions determines safety compliance. That is, when employees perceive that their immediate supervisors are committed to ensuring their safety and that of the workplace, they are bound to comply with the organization's safety requirements. Additionally, it is plausible to posit that the employees perceived that the training provided for them in the workplace is adequate for them to work safely (Vinodkumar & Bhasi, 2010). It is also plausible to posit that, in addition to the employees' perception that management is committed to their safety (via behaviours of their immediate supervisors), the level of safety communication and attendant workplace safety rules, protocols and procedures would have also accounted for the formation of positive safety climate perceptions among the employees.

By implication, employees maintain safe working standards and use personal protective equipment in carrying out this routine tasks (Schutte, 2010). Categorically, for employees to comply with the safety-related procedures and practices of their organizations, safety climate must play a critical role. The finding of the present study based on the hypothesis in discuss is consistent with previous studies that found and reported a positive relationship between safety climate and safety compliance.

For example, in the study by Lu and Tsai (2010), safety compliance is one of the components of safety behaviours that was found to be positively determined by safety climate. In a similar vein, Martinez-Corcoles *et al*. (2011) was also able to find a positive association between safety climate and safety compliance. The study by Dahl and Olsen (2013) found a positive association between safety climate and safety compliance. In a more recent study, Hon *et al*. (2014) found a positive relationship between safety climate and safety compliance, and same relationship was reported in the study by Kvalheim and Dahl (2016). Other studies in this regard are also noted (e.g., Kapp, 2012; Fugas *et al*., 2012; Brondino *et al*., 2012). By implication, the findings of the present study further confirms the importance of safety climate in determining safety compliance. Employees' safety climate perceptions are formed based on organizational factors, and the safety climate perceptions further goes to determine their level of compliance. In this case, better safety climate perceptions determined better safety compliance.

On safety participation, it was hypothesized that safety climate will positively relate to safety participation (H4). Safety participation, which is another core component of safety behaviours denotes employees' participation in voluntary activities that may not necessarily contribute to their individual safety and health as employees, but to the safety and health of other employees (Neal & Griffin, 2006; Lu & Yang, 2010). Safety climate was found to have a positive significant relationship with safety participation. That is, employees' participation on safety-related matters in the workplace is largely dependent on their safety climate perceptions. Put in another way, the participation of employees in ensuring the safety of their colleagues and the workplace at large is dependent on how well the employees perceive that their immediate supervisors are committed to their safety and the safety of the workplace.

In addition to a positive perception of the level of management's commitment to the safety of their employees, the positive perception of other safety climate factors would have also played key roles in obtaining a positive relationship between safety climate and safety participation. Characteristically, safety training received by the employees is probably adequate, and it is noted to be a critical component of safety climate (Wu *et al*., 2009). It is also plausible to note that the level of safety-related communication that exists between the employees and their immediate supervisors, in addition to inherent organizational safety rules, protocol and procedures, would have accounted and/or be responsible for the relationship in discuss. The finding obtained from this study on the relationship between safety climate and safety participation is consistent with related studies.

For example, Hon *et al*. (2014) reported a positive significant relationship between safety climate of RMAA workers and safety participation. In another study by Smith, Eldridge and DeJoy (2016), it was reported that safety climate perceptions are positively and significantly associated with safety behaviours, one of which is safety participation. In another study by Zhang and Liu (2016), it was reported that all facets of safety climate was significantly associated with safety behaviour. Other studies in this regards are further noted (e.g., Clarke, 2006; Tharaldsen *et al*., 2008; Jiang *et al*., 2010; Barbaranelli *et al*., 2015).

Risky behaviour has been identified as a critical component of safety behaviours, yet gravely under-researched (Martinez-Corcoles *et al*., 2013). Specifically, it denotes behaviours which are a deviation from standard organizational practices, procedures and expectations which are likely to cause adverse consequences (Martinez-Corcoles *et al*., 2013). It was hypothesized that safety climate will negatively predict risky behaviour. This hypothesis was rejected based on some plausible reasons. Conceptually, when employees perceive that management accords priority to workplace safety (Naveh *et al*., 2005), or act in ways that support safety (Christian *et al*., 2009), the less likely they are to engage in risky behaviour (Bosak *et al*., 2013). On another note, when employees perceive that safety policies, procedures and management systems are germane, operative and given priority above competing organizational demands, they are less prone to getting involved in risky behaviours (Cooper, 2000).

Based on the above submissions, it would have been plausible to conceptually and/or theoretically accept H5. However, the above finding is consistent with Bosak *et al*. (2013) who reported a negative association between safety climate factors and risky behaviour. A plausible explanation can thus be offered for the present result. Managerial behaviour provides clues on the modus operandi of workplace norms and the attendant behaviours likely to be maintained, appreciated or rewarded, which informs workers' perception of safety climate (Morrow *et al*., 2010). Concisely put, the more employees perceive that an organization accords safety the attention it deserves (Naveh *et al*., 2005; Christian *et al*., 2009), and shows same through the behaviours of the workers' immediate supervisors, the less likely the workers will engage in risky behaviours. Consequently, though risky behaviours are noted to have the potential of causing adverse consequences (Martinez-Corcoles *et al*., 2013), the presence of factors that shape safety climate perceptions does not guarantee that employees would no longer take risks or behave in ways that are risky.

More so, the presence of factors that are supposed to reduce risk-taking behaviours have not completely ensured the safety of employees and by extension the workplace, thus leading to the occurrence of accidents (Zohar, 2002; Huang *et al*., 2006; Tharaldsen *et al*., 2008; Huang *et al*., 2012; Cigularov *et al*., 2013; Dahl & Olsen, 2013). Hence, risky behaviour is relative and is based on individual worker idiosyncrasies. In the opinion of the researcher, it is also possible that some unforeseen eventualities might have also been responsible for the finding of the relationship under discuss. A similar case is as expressed by Bosak *et al*. (2013) who suggested that perceived tensions between meeting production deadlines and following safety procedures may cause workers to sacrifice safety and engage in risky behaviour. Hence, it is probable that some unforeseen operational demands from the employers of the respondents of the present study had the propensity to cause the workers to deviate from strictly adhering to the safety rules, protocols and procedures of the organization.

5.2.3 Indirect effect

5.2.3.1 Mediating effect of safety climate on the relationship between authentic leadership and safety behaviours

The present study hypothesized that safety climate mediates the relationship between authentic leadership and safety behaviours (safety compliance, safety participation and risky behaviour). The hypotheses were developed accordingly (H6 – H8) because quite a limited number of studies have considered safety climate as a mediator in the leadership and safety behaviours relationship. More so, and to the best of the knowledge of the researcher, no study has been done within the conceptual framework being examined in the present study. Characteristically, the possibility of safety climate being considered as a mediator within the scope of this study is predicated upon related extant theoretical underpinnings and submissions (Wu *et al*., 2008; Martinez-Corcoles *et al*., 2011). Unfortunately, quite a little in terms of research has been done. As shown in the previous chapter, and specifically in Table 4.13, of the three hypotheses developed based on the section in discuss, two were supported, one was not supported. The hypotheses that was rejected is because it is not statistically significant. The hypotheses, the results obtained from the analysis and the implication of the results will now be explained based on their individual merits.

The role of safety climate as a mediator in the relationship between authentic leadership and safety compliance (H6) received empirical support. The hypothesis means that safety climate has a direct effect on safety compliance and authentic leadership has an indirect effect on safety compliance. Available empirical underpinnings attest to the significant positive association between authentic leadership and safety climate (Hyllengren *et al*., 2011; Eid *et al*., 2012), and safety climate and safety compliance (Lu & Tsai, 2010). Hence, safety climate is well-positioned theoretically and conceptually to mediate the relationship between authentic leadership and safety compliance. When employees perceive that safety is given adequate priority based on authentic leadership behaviours of their immediate supervisors, more positive perceptions of safety climate is formed. This might be the case of the respondents of the present study. Findings suggest that their immediate supervisors displayed demeanours that positively shaped that safety climate perceptions which in turn improved that safety compliance behaviours.

Empirical support for the mediating role of safety climate in the authentic leadership-safety compliance relationship is based on a number of related studies. For example, Barling *et al*. (2002), Kelloway *et al*. (2006) and Clarke (2010). Specifically, Clarke (2010) disclosed that workers' perceptions of leadership indirectly affects safety behaviours through safety climate. In view of the fact that leadership influences workers by way of modelling their climate perceptions, it is anticipated that safety climate will mediate the relationship between leadership style and safety behaviours. This has been clearly illustrated based on the findings of H6 and as supported by extant literature.

In the present study, safety climate was hypothesized to mediate the relationship between authentic leadership and safety participation (H7). The relationship received empirical support and is consistent with previous studies. For example, Clarke and Ward (2006) found that the influence of leaders' tactics positively related to safety participation, but through safety climate. Also, Clarke (2010) revealed that perceptions of leadership and safety behaviours (one of which is safety participation) is mediated by safety climate. In essence, this finding suggest that safety participation can be better encouraged through the effect of authentic leadership behaviours of the immediate supervisors of the respondents of the study on their safety climate perceptions.

From the findings of H6 and H7, it is the position of the researcher that authentic leadership does not only ensures safety compliance and participation, but should play a critical role in shaping the perceptions of employees with respect to the importance of safety, and by extension determining their safety-related behaviours. This further goes to confirm the position of researchers that obvious management actions are important to factors that help to shape employees' safety perceptions (Cooper & Phillips, 2004). Though Clarke (2010) did not categorically examine the authentic leadership style, her submission vis-à-vis the submission of Clarke and Ward (2006) provide some logical rationale on which the discussion of the present study is predicated upon.

In the present study, it was hypothesized that safety climate will mediate the relationship between authentic leadership and risky behaviour. H8 did not receive empirical support. This finding can be explained from two plausible points of view. First, theoretically, it is apt to assume and/or submit that safety climate should mediate the relationship between authentic leadership and risky behaviour. This is in the sense that employees' safety climate perceptions which should eventually reduce their risky behaviours is influenced by authentic leadership. This is evident in the study by Martinez-Corcoles *et al*. (2011) who argued that leaders influence the safety behaviours of their subordinates through safety climate. Their study specifically focuses on reducing risky behaviours. Their findings however reported positive significant statistical values. In view of theoretical/conceptual position, the hypothesis H8 would have been accepted.

The decision of the researcher to reject H8 is predicated upon the fact that the statistical significance of the relationship in discuss is negative. This finding has some form of semblance with the findings of Bosak *et al*. (2013) who reported a negative relationship between some factors of safety climate and employee risk behaviour. It is noted that with positive safety climate, employees are less likely to engage in unsafe acts (Hofmann & Stetzer, 1996). However, a plausible reason for the finding in discuss can be proffered. Although employees' immediate supervisors display authentic leader behaviours, which should positively shape their safety climate perceptions, there is no guarantee that they are less likely to take risks. Risk perceptions differ from person to person due to varying idiosyncratic characteristics. Interestingly, it has been posited in previous related studies that personal characteristics, the work environment, and other (not mentioned) factors can easily influence the behaviours of workers, especially their risk-taking behaviours (Huang, Wang, Ding, & Xia, 2016). Characteristically, risk taking could be self-determined irrespective of the presence of factors that should naturally reduce the tendency to take risks.

Characteristically, in a study on the mediating role of risk perceptions and propensity and the determinants of risky decision-making behaviour, it is noted that risk-based decision-making behaviour denotes a decision that may or may not cause grave consequences under the ambience of some uncontrolled factors (Sitkin & Weingart, 1995). Therefore, in carrying out a certain task, employees' decision of whether or not to follow laid-down safety procedures and regulations of their organizations is a function of risk-based decision-making behaviour which is often time controlled by foreseen or unforeseen circumstances (Huang *et al*., 2016). According to Sitkin and Pablo (1995), personal characteristics which involves individuals' preferences and habits, is one of the factors that skews people's behaviour in terms of their propensity to take risks. Besides, the decision of individuals on how they behave is, to a large extent predicated upon their intuition, previous experiences, risky behaviours and related idiosyncratic factors (Alexopoulos, Kavadi, Bakayannis, & Papantonopoulos, 2009; Kouabenan, Ngueutsa, & Mbaye, 2015).

5.2.3.2 Mediating effect of safety climate on the relationship between inclusive leadership and safety behaviours

The present study hypothesized that safety climate mediates the relationship between inclusive leadership and safety behaviours (safety compliance, safety participation and risky behaviour). The hypotheses were developed accordingly (H9 – H11) in view of the limited number of studies that considered safety climate as a mediator in the leadership and safety behaviours relationship. Unfortunately, and to the best of the knowledge of the researcher, no empirical examination has been conducted that examined the mediating role of safety climate in the relationship between inclusive leadership and safety behaviours. Evidently, safety climate is considered a mediator within the scope of this study is grounded upon similar extant theoretical underpinnings and submissions (Clarke & Flitcroft, 2008; Clarke, 2010). Unfortunately, there is a noted paucity of research in this regard. As illustrated in Table 4.13 in the previous chapter, of the three hypotheses developed based on the section in discuss, two were supported, one was not supported. The hypotheses that was not supported was then rejected as it is not statistically significant. The hypotheses, the results obtained from the analysis and the implication of the results are thus discussed.

The role of safety climate as a mediator in the relationship between inclusive leadership and safety compliance (H9) received empirical support. The hypothesis means that safety climate has a direct effect on safety compliance and inclusive leadership has an indirect effect on safety compliance. In the leadership and safety climate literature, notable empirical underpinnings attest to the significant positive association between leadership and safety climate, and by extension safety behaviours (Zohar, 2002; Wu *et al*., 2008; Kapp, 2012; Zohar *et al*., 2014). It is therefore plausible to posit that the finding of this study based on H9 is consistent with the above previous/related studies. As employees perceive that their immediate supervisors accord adequate attention to safety based on the display of inclusive leadership behaviours, their safety climate perceptions are then positively formed. This eventually results in improved compliance with safety policies and procedures. This is the likely situation noticed from among the respondents of the present study.

It is obvious from the findings that the employees believe that their immediate supervisors displayed inclusive leadership demeanours that positively shaped that safety climate perceptions which in turn improved that safety compliance behaviours. Concisely put, insofar as the safety climate perceptions of employees are formed by the influence of leader behaviours, and in the case of the present study, by inclusive leadership behaviours, the anticipation and position that safety climate will mediate the relationship between inclusive leadership and safety compliance is therefore well corroborated. Other studies consistent with the findings of the present study are, Wu *et al*. (2008), Clarke and Flitcroft (2008) and Martinez-Corcoles *et al*. (2013).

In the present study, it was hypothesized that safety climate will mediate the relationship between inclusive leadership and safety participation (H10). The relationship received empirical support and is consistent with previous related studies (Zohar, 2002; Kelloway *et al*., 2006). However, it is interesting to note that the above studies did not specifically examine the characteristics of inclusive leadership. The researcher used the above cited studies in relation to the present study based on plausible occurrences. In relation to the present study, the above finding denotes that the respondents of the study positively perceived the inclusive leadership traits of their immediate supervisors, which positively shaped their safety climate perceptions and eventually their positive level of compliance with safety-related activities in their place of work.

Interestingly, the researcher further emphasizes the role played by socio-psychological organizational factors like leadership in influencing safety climate and by extension, safety behaviours (Cooper & Phillips, 2004). As a way of additional plausible explanation, it was found in the submission of Carmeli *et al*. (2010) that psychological safety climate mediated the relationship between inclusive leadership and safety climate. This means when leaders are open, accessible and available to their subordinates, they promote a social context that helps to shape subordinates safety climate perceptions, and by implication improved level of safety participation.

In the present study, it was hypothesized that safety climate will mediate the relationship between inclusive leadership and risky behaviour (H11). This hypothesis was not empirically supported as the statistical value obtained was lower than acceptable empirical thresholds. The hypothesis in discuss is theoretically and conceptually logical (Clarke, 2010; Martinez-Corcoles *et al*., 2011), in that when leaders behave in an inclusive manner, they produce an appropriate safety climate, which in turn results in better safety related behaviours. The finding of this study is somewhat consistent with Bosak *et al*. (2013) who found that employee risky behaviour was negatively related to some components of safety climate. A plausible explanation for this result is that the respondents might be of the premonition that the inclusive leadership behaviours of their immediate supervisors does not necessarily have a strong bearing on their safety climate perceptions and predisposition to behaving in risky manners. Hence, it is believed that the respondents see the need to take risks as self-deciding whether their immediate supervisors display inclusive leadership behaviours or not. It is also not a guarantee that subordinates' safety climate perceptions and their attendant risky behaviours are a factor of their immediate supervisors' inclusive leader behaviours.

In supporting the discussion, Huang *et al*. (2016) posits that certain factors come to play in defining the risk-taking tendencies of individuals, noting that these tendencies and/or behaviours vary based on individual differences. Specifically suggested are personal characteristics of individuals which cannot be controlled by prevalent organizational factors that are supposed to guide employees conduct (Sitkin & Pablo, 1992). Furthermore, employees' decision of whether or not to follow laid-down safety procedures and regulations while carrying out their routine job roles is a function of risk-based decision-making behaviour that decided circumstances within and outside the control of the individuals (Huang *et al*., 2016). Besides, the decision of individuals on how they behave is, to a large extent predicated upon their level of sensitivity, prior experiences, risky behaviours and related idiosyncratic factors (Alexopoulos, *et al*., 2009; Kouabenan, Ngueutsa, & Mbaye, 2015).

5.3 IMPLICATIONS

The findings from this study brings to light several critical implications applicable to both practice and theory. The managerial implications will be discussed first and then the theoretical implications.

5.3.1 Managerial Implications

The first objective of this study was to determine the level of safety behaviours among the employees in the O & G industry in Rivers State, Nigeria. From the analysis conducted, it is noted that the level of safety behaviours among the respondents is satisfactory. In this regard, relevant stakeholders and key decision-makers must play a role in strengthening efforts directed towards improving the safety behaviours of employees and by extension their worksites. Specifically observed in the present study is that the authentic leadership and inclusive leadership styles were able to influence safety climate factors which in turn determined safety behaviour outcomes. The above relationships have also been supported with extant empirically underpinnings from diverse work-settings. The implications of the above position will now be discussed.

It is obvious that the authentic and inclusive leadership styles interrelate with safety climate to determine employees' safety behaviours. Characteristically, authentic leaders strongly emphasize the need to behave transparently with high and ethical moral standards (Avolio & Gardner, 2005), which are critical contributory factors to effective safety management practices and for the prevention of harm to employees and the workplace (Nielsen *et al*., 2013). Also, the inclusive leadership style which is characteristic of openness, accessibility and availability is also noted to exert positive safety outcomes (Carmeli *et al*., 2013). Therefore, leader inclusiveness is critical to the formation of positive safety climate perceptions. Based on the above, it is important to select leaders (possible immediate supervisors of employees) with characteristics of authenticity and inclusiveness to be heads of various work departments, work groups and operational units. This is agreement with the opinion of Rego *et al*. (2012). Specifically, when leaders display behaviours portraying the characteristics of relational transparency, moral/ethical conduct, balanced processing and self-awareness (authentic leader behaviours), and openness, accessibility and availability (inclusive leader behaviours) to discussing new ideas with their subordinates, a social context is cultivated that helps to build the safety perceptions of these subordinates.

Additionally, management should ensure the implementation of training and development initiatives aimed at increasing authentic and inclusive leadership behaviours among the immediate supervisors of the employees. This is similar to the position of Luthans, *et al*., 2007; Luthans, Avey, & Patera, 2008), who all advocated the importance of authentic leadership focused training and development initiatives as a catalyst for improving performance. Additionally, it has been argued that organizations need to invest in initiatives that are focused on human and social capital development. Supporting this, George (2003) argue that organizations need leaders who lead with purpose, values and integrity; leaders who build enduring organizations so as to achieve set organizational goals and objectives.

Characteristically, authentic and inclusive leadership-centered immediate supervisors of employees in the O & G industry will instil elevated levels of commitment among their subordinates for the enhancement of team effectiveness and efficiency. This in turn is expected to translate into shaping positive safety climate perceptions among the employees, who then will comply with, and participate in safety-related activities.

5.3.2 Theoretical Implications

Results obtained based on the objectives and attendant hypotheses of this study went beyond findings of previous empirical endeavours, thus contributing new information to the body of knowledge in the safety research area. First, the primary implication of the present study is empirically supporting and advancing the original theoretical integration of authentic and inclusive leadership styles within the gamut of the safety management literature. Specifically, though the authentic leadership and inclusive leadership styles have been advocated as important leadership styles that are capable of exerting organizational outcomes (Eid *et al*., 2012; Carmeli *et al*., 2013), a huge paucity of empirical gap does exist on how these leadership styles relate to safety climate and by extension safety behaviours in a single theoretical framework. Also, though it has been posted that safety researcher commence focusing on socio-psychological organizational factors that influence safety climate (Zohar, 2010; Clarke, 2013), only a few studies were done in this regard. Unfortunately, to the best of the researcher knowledge, no study has examined the leadership styles in discuss in the eyes of safety management and related safety behaviours.

Extant literature in the leadership and safety management domain attest to the fact that leadership is an important determinant of safety behaviours. However, a further look into the literature suggests that most of the studies focused on general transformational and transactional leadership styles, and safety compliance and safety participation were the only components of safety behaviours that were examined. Risky behaviour as a critical component of safety behaviour have suffered great empirical neglect. Consequently, findings on the relationship between authentic leadership and inclusive leadership and their relationship with safety climate (a second-order mediator) and safety behaviours offers a first-time and novel empirical validation to the theoretical justification and expansion of the social exchange (Blau, 1964) and social system (Getzels & Guba, 1957) theories.

Hence, the present study thus expands the leadership and safety management literature by pioneering the examination of authentic leadership, and inclusive leadership as antecedents of safety climate and by extension, safety behaviours. Characteristically, safety behaviours have been examined with components of safety compliance and safety participation. However, the introduction of risky behaviour as another core component of safety behaviours in a single model is one of the contributions of the present study, and also due to its novelty. More so, this study is also novel as this is the first all-inclusive model of leadership styles, safety climate, and eventually the three components of safety behaviours in the O & G industry in

Rivers State, Nigeria. This is a first look and a substantial and original contribution to the body of leadership and safety management knowledge. The importance of the leadership behaviours examined in this study as antecedents of safety climate and how they determine safety behaviours is thus noted in line with succeeding research concerns to be address in the subsequent section.

5.4 LIMITATIONS OF THE STUDY AND DIRECTIONS FOR FUTURE RESEARCH

Though the present study has provided some insights on the importance of authentic and inclusive leadership behaviours, with safety climate as mediator in relating with safety behaviours among O & G workers in Rivers State, Nigeria, conceptual and methodological limitations abound that will now be discussed. Firstly, based on related cross-sectional questionnaire surveys, the researcher was unable to investigate cause and effect relationships between the variables examined in this study. Although the present study is predicated upon the theoretical assumption that safety climate mediates the relationship between authentic and inclusive leadership styles and safety behaviours, other associations between these variables are also promising, but not examined in the present study. For example, components of safety behaviours could plausibly mediate or moderate the relationship between authentic leadership, inclusive leadership and safety climate. Hence, to show causality, longitudinal or experimental investigations examining the effects of authentic and inclusive leadership on components of safety behaviours and safety climate would make some future empirical sense.

Secondly, though procedural and statistical remedies were used to address possible issues of common method variance (Podsakoff & Organ, 1986), it is probable that the issue of Common Method Variance may not have been handled in its self-entirety. Also, as anonymity is assumed to lessen evaluation apprehension and method bias (Podsakoff *et al*., 2003), the remedies used in the present study possible ensured CMV is checked. The possibility of the CMV arose in the sense that self-reported questionnaires were used to collect data in the present study. More so, data obtained in this study is from a single source. In support of this limitation, it is difficult to assess the relationship between leadership and safety behaviours, especially when all the information pertaining to the dimensions in discuss are obtained from the same source (often from the subordinates of the leader in question) (Yammarino *et al*., 1993). Evidently, positive behaviours might be credited to leaders who are perceived as being effective, without truly observing that behaviour, because the beliefs' of the employees' about their own performance or that of their immediate supervisor could systematically sway their view of leadership. It was thus submitted by Yammarino *et al*. (1993) that independent multisource data for leadership and behaviours are crucial. This is something that can be considered for future empirical endeavours.

Thirdly, since data collected in this study was limited to employees in the O & G industry in Nigeria, the findings therefrom may not be generalized across other industries and socio-demographic settings. It is possible that various industries, work settings, countries and systems may look at leadership, safety climate and safety behaviours from a different point of view, hence a plausible call to undertake empirical endeavours as such. More so, though the results obtained from this study may be not generalizable to other work setting and/or contexts, it could be generalizable to related O & G industries is other countries. This is because the O & G industry have common and related work practices, protocols and procedures.

On directions for future research, in order to validate the acceptability of the model examined in the present study, future empirical endeavours may want to target employees who are not highly exposed to occupational risks in the O & G industry. This is because occupational incidences from such category of workers, though insignificant, may be useful in designing programmes directed toward improving general workplace safety. More so, it is possible that the way such workers perceive risks may be different from those examined in the present study. Hence, some comparative empirical examinations could be worthwhile. Additionally, the model of the present study can be examined in related safety critical organizations like the building/construction, maritime, fire-fighting, etc.

From the R^2 value obtained from the present study noted that authentic and inclusive leadership styles explained on 21% variance of safety climate. It is plausible to note that other leadership styles might play an important role in positively shaping the safety climate perceptions of the employees of the O & G industry in Nigeria. Future studies can look at general transformational and transactional leadership styles. Also suggested will be safety-specific authentic and inclusive leadership styles, and their ability to positively shape safety climate perceptions. Finally, the present study was conducted using the quantitative design. Future studies may want to explore qualitative techniques, as may provide additional insights with regards the relationship between the variables examined herein.

5.5 CONCLUSION

This study investigated the relationship between authentic leadership, inclusive leadership and safety behaviours with safety climate as mediator among 319 oil and gas workers in Rivers State, Nigeria. The relationship as examined is underpinned by the social exchange and social systems theories. The findings of the study showed that the authentic leadership and inclusive leadership styles are critical antecedents of safety climate and by extension, safety behaviours. Though the leadership styles examined within the context of this study are noted to determine various organizational outcomes in diverse socio-demographic milieu, this study is novel as it contributes to the body of knowledge by investigating the authentic and inclusive leadership styles in relation to safety climate and safety behaviours. More specifically, this study was done in a setting with less-advanced and sophisticated work systems as Nigeria. Hence, this study attempted to fill the gaps that exist in the safety management and leadership literature vis-à-vis the call for additional investigations capable of expanding the discourse in leadership and safety management.

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Research Questionnaire

15th May, 2016.

Dear Respondent,

ACADEMIC RESEARCH QUESTIONNAIRE

I am a PhD candidate at the Universiti Utara Malaysia, and currently conducting a research on leadership, safety climate and safety behaviours in the Oil & Gas industry in Rivers State, Nigeria as part of the requirements for the award of a Ph.D. degree.

I realize that your time is valuable and many demands are made upon it by your heavy workload. However, your participation in this survey, which will require only about 10-15 minutes of your time, is vital to the success of this study and would be greatly appreciated. Please be assured that your responses will be treated with utmost confidentiality and used purely for academic purposes.

Thanking you for your kind co-operation.

Yours truly,

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SECTION A: DEMOGRAPHIC INFORMATION

Please tick (✓) in the appropriate boxes that correspond to the questions below.

1. Gender: ☐ Male ☐ Female

2. Marital Status: ☐ Single ☐ Married
   ☐ Divorced ☐ Widowed

3. Age (in years): ☐ Less than 20 ☐ 21 – 24
   ☐ 25 – 29 ☐ 30 – 34
   ☐ 35 – 39 ☐ 40 - 44
   ☐ 45 – 49 ☐ 50 and above

4. Level of Education: ☐ High School ☐ Technical/Diploma
   ☐ Bachelors ☐ Masters and above

5. Work experience in this company: Year (s):…………… Month(s):……………….

6. Work experience in the Oil and Gas Industry: Year (s):……...…

7. Occupation:

   ☐ Technician/Millwright ☐ Engineer ☐ Equipment Handler
   ☐ Scaffolder ☐ Electrician ☐ Operator
   ☐ Pipe/Steel Worker ☐ HVAC ☐ Plant Maintenance
   ☐ Mechanic ☐ Welder ☐ Driller
   ☐ Rigger ☐ Safety Personnel ☐ Concrete Worker
   ☐ Transportation/Logistics ☐ Others:…………………..

8. How often do you attend safety trainings?
   ☐ Never ☐ Rarely
   ☐ Sometimes ☐ Often
   ☐ Always

9. How many times have you been involved in a workplace accident in the last 12 months?_____________

Section B

The following are statements pertaining to your leader. Please note the term "leader" refers to your **immediate supervisor**. On a five-point scale, indicate your level of agreement on the statements stated hereunder by circling the responses according to the scale below:

1	-	*Strongly Disagree*
2	-	*Disagree*
3	-	*Neither Agree nor Disagree*
4	-	*Agree*
5	-	*Strongly Agree*

My Leader…

1	**solicits feedback for improving his/her dealings with others.**	**1**	**2**	**3**	**4**	**5**
2	is available for professional questions I would like to consult with him/her.	1	2	3	4	5
3	encourages others to voice opposing points of view.	1	2	3	4	5
4	shows interest in the safety of workers in the workplace.	1	2	3	4	5
5	describes accurately the way that others view his/her abilities.	1	2	3	4	5
6	ensures there is sufficient opportunity to discuss and deal with safety issues in meetings.	1	2	3	4	5
7	uses his/her core beliefs to make decisions.	1	2	3	4	5
8	ensures newly recruits are trained adequately to learn safety rules and procedures.	1	2	3	4	5
9	shows that he/she understands his/her strengths and weaknesses.	1	2	3	4	5
10	asks for ideas that challenge his/her core beliefs.	1	2	3	4	5
11	resists pressures on him/her to do things contrary to his/her beliefs.	1	2	3	4	5
12	gives high priority to safety in training programmes.	1	2	3	4	5
13	is clearly aware of the impact he/she has on others.	1	2	3	4	5
14	ensures the safety rules and procedures followed in the company are sufficient to prevent incidents from occurring.	1	2	3	4	5
15	is guided in his/her actions by internal moral standards.	1	2	3	4	5
16	considers safety to be equally important as production/work targets.	1	2	3	4	5

17	is open to hearing new ideas.	1	2	3	4	5
18	gives high priority to safety in the workplace.	1	2	3	4	5
19	is open to discuss the desired goals and new ways to achieve them.	1	2	3	4	5
20	ensures that employees can communicate hazard information before incidents occur through the hazard reporting system.	1	2	3	4	5
21	is an ongoing 'presence' in this team—someone who is readily available.	1	2	3	4	5
22	ensures the safety training given to employees is adequate to enable them to assess hazards in work areas.	1	2	3	4	5
23	is ready to listen to my requests.	1	2	3	4	5
24	encourages me to access him/her on emerging issues.	1	2	3	4	5
25	is accessible for discussing emerging problems.	1	2	3	4	5
26	ensures that the company's open door policy on safety issues is practiced.	1	2	3	4	5
27	clearly states what he/she means.	1	2	3	4	5
28	encourages workers to attend safety training programmes.	1	2	3	4	5
29	carefully listens to alternative perspectives before reaching a conclusion.	1	2	3	4	5
30	ensures comprehensive training is given to the employees in workplace health and safety issues.	1	2	3	4	5
31	expresses his/her ideas and thoughts clearly to others.	1	2	3	4	5
32	attends safety meetings.	1	2	3	4	5
33	takes corrective action when told about unsafe practices.	1	2	3	4	5
34	ensures the facilities in the safety department are adequate to meet the needs of the organization.	1	2	3	4	5
35	shows consistency between his/her beliefs and actions.	1	2	3	4	5
36	ensures the target and goals for safety performance in the organization is clear to workers.	1	2	3	4	5
37	ensures participation of employees in regular safety inspections.	1	2	3	4	5

38	openly shares information with others.	1	2	3	4	5
39	is attentive to new opportunities to improve work processes.	1	2	3	4	5
40	always try to enforce safe working procedures.	1	2	3	4	5
41	admits mistakes when they occur.	1	2	3	4	5
42	ensures open communication about safety issues in the workplace.	1	2	3	4	5
43	acts quickly to solve the problems when near-miss accidents are reported.	1	2	3	4	5
44	objectively analyzes relevant data before making a decision.	1	2	3	4	5
45	is available for consultation on problems.	1	2	3	4	5

Section C

The following are statements pertaining to your own behaviour at the workplace. On a five-point scale, please indicate your level of agreement on the statements stated hereunder by circling the responses according to the scale below:

1 - *Strongly Disagree*
2 - *Disagree*
3 - *Neither Agree nor Disagree*
4 - *Agree*
5 - *Strongly Agree.*

1	**I use all necessary safety equipment to do my job.**	**1**	**2**	**3**	**4**	**5**
2	I help my co-workers when they are working under risky or hazardous conditions.	1	2	3	4	5
3	I voluntarily carryout tasks or activities that help to improve workplace safety.	1	2	3	4	5
4	I ensure the highest levels of safety when I carry out my job.	1	2	3	4	5
5	I break rules due to management pressure.	1	2	3	4	5
6	I take shortcuts that involve little or no risk.	1	2	3	4	5

7	I always point out to the management if any safety related matters are noticed in my company.	1	2	3	4	5
8	I put extra effort to improve the safety of the workplace.	1	2	3	4	5
9	I take chances to get the job done.	1	2	3	4	5
10	I encourage my co-workers to work safely.	1	2	3	4	5
11	I ignore safety regulations to get the job done.	1	2	3	4	5
12	I break work procedures.	1	2	3	4	5
13	I follow correct safety rules and procedures while carrying out my job.	1	2	3	4	5
14	I bend safety rules to achieve a target.	1	2	3	4	5
15	I get the job done better by ignoring some rules.	1	2	3	4	5
16	Conditions at the workplace keep me from working according to the rules.	1	2	3	4	5
17	I carry out my work in a safe manner.	1	2	3	4	5
18	It is always practical to follow all safety rules and procedures while doing a job.	1	2	3	4	5
19	I am pressured by my workmates to break rules.	1	2	3	4	5

Thank you for your time.

REVIEW OF ARTICLES

S/No	Author(s), Title,	Research Issue(s), Study Variables	Method	Finding	Issues, Gaps and Future Research
1.	Nielsen *et al*. (2013). Authentic leadership and its relationship with risk perception and safety climate.	This study aims to examine how authentic leadership relates to risk perception in safety critical organizations (SCOs). It is hypothesized that authentic leaders influence risk perception through the mediating effect of safety climate.	Using a survey design, the variables were assessed in a cross-sectional sample of 293 offshore oil installation workers from a single company.	Authentic leadership are negatively related to risk perception and positively associated with ratings of safety climate. Controlling for personality characteristics and leadership responsibility among respondents, the results confirm the hypothesis in that safety climate mediates the relationship between authentic leadership and risk perception. Safety climate had the strongest relationship with risk perception when assessed as a higher order construct.	More research is clearly necessary to fully comprehend the nature of the relationship between the variables. Supported basis for hypotheses
2.	Eid, *et al*. (2012). Leadership, psychological capital and safety research: Conceptual issues and future research questions.	Identify potential mechanisms that can explain how leadership affects safety outcomes. Authentic leadership – safety climate – Safety outcomes	Literature review on AL and safety outcomes with specific focus on the offshore O & G industry	From this we offer a research model and five research propositions implicating that authentic leadership directly affects safety outcomes via promoting positive safety climate perceptions.	Need to examine the relationship between authentic leadership and safety climate in safety critical organizations.
3.	Peus *et al*. (2012). Authentic Leadership: An Empirical Test of Its	Examine the antecedents and individual as well as group-level outcomes of AL in business as well	Longitudinal analysis. (Study 1; n = 306; (Study 2; n = 105).	Findings reveal leader self-knowledge and self-consistency as antecedents of authentic leadership and followers’	Further studies to determine exactly what components of authentic leadership

	Antecedents, Consequences, and Mediating Mechanisms.	as research organizations. First, we sought to investigate if the relation between perceived AL, leader predictability and followers' work-related attitudes could be replicated.		satisfaction with supervisor, organizational commitment, and extra effort as well as perceived team effectiveness as outcomes. The relations between authentic leadership and followers' work-related attitudes as well as perceived team effectiveness are mediated by perceived predictability of the leader, a particular facet of trust.	are crucial for follower attitudes and how they are influenced by situational variables. Deeper understanding of how AL impacts followers, their organizations, and the leaders themselves and how this type of leadership can be developed.
4.	Cavazotte, *et al*. (2013). Authentic leader, safe work: the influence of leadership on safety performance.	This study analyzed the influence of authentic leadership on the workers' safety performance, investigating the psychological mechanisms that explain the connection between authenticity and workplace safety.	The study was conducted based on a sample of 186 workers involved in projects within the oil industry in Brazil. Positivist approach.	Results suggested that authentic leadership is associated with the feedback provided by supervisors as well as with worker's perception of justice and their safety performance. Furthermore, perception of justice seems to be a relevant route through which more authentic leaders would promote safe behaviors among their followers. It was also observed that individuals who are more conscientious and less prone to take risks are also those who engage more frequently in safe behavior in the workplace.	This work represents a contribution to the advancement of knowledge about authentic leadership and safety performance because empirical studies investigating the association between the two are rare until now. More studies on AL with specific focus on workplace safety.
5.	Borgersen, *et al*.	This study examined	Positivist.	AL made a statistically	AL scarcely

	(2014). Authentic leadership and safety climate among seafarers.	relationships between *authentic leadership* and *safety climate* among 463 seafarers sailing on 23 merchant vessels in the international shipping industry. Philippines	Questionnaires administration. Regression	significant contribution to explaining variance in safety climate, controlling for age, rank on board, and social desirable responding. The present study contributes to the literature in that AL emerged as a significant predictor of perceived safety climate variance in a research setting which has not been investigated earlier.	examined. Need for further studies.
6.	Hystad, *et al*. (2014). Positive organizational behavior and safety in the offshore oil industry: Exploring the determinants of positive safety climate.	Test workplace and individual factors that may affect safety climate. Specifically, we explore the potential influence of AL and psychological capital on safety climate and risk outcomes.	Norway Offshore O & G workers. Positivist. Questionnaire administration. SEM used for analysis	Across two samples of offshore oil-workers and seafarers working on oil platform supply ships, structural equation modeling yielded results that support a model in which AL exerts a direct effect on safety climate, as well as an indirect effect via psychological capital.	Scant attention to the question of what factors might be responsible for positive or negative safety climate. Additional studies encouraged.
7.	Neider and Schreisheim (2011). The Authentic Leadership Inventory (ALI): Development and empirical tests.	This paper presents the development and preliminary validation of a new measure of authentic leadership, the Authentic Leadership Inventory (ALI).	Positivist. Instrument development and validation	Results indicate some concerns with the ALQ but support the content validity, reliability, factor structure, convergent and discriminant validity, concurrent validity, and freedom from impression management response bias of the ALI	Future research would better be served by using separate authentic and transformational dimensions (rather than aggregate or global measures) to understand the unique aspects of

					both leadership constructs.
8.	Laschinger, *et al*. (2012). The influence of authentic leadership on newly graduated nurses' experiences of workplace bullying, burnout and retention outcomes: A cross-sectional study.	The purpose of this study is to test a model linking authentic leadership to new graduate nurses' experiences of workplace bullying and burnout, and subsequently, job satisfaction and intentions to leave their jobs.	Cross-sectional survey design with 342 new graduate nurses working in acute care hospitals in Ontario, Canada. The model was tested using path analysis techniques plus SEM.	AL had a negative direct effect on workplace bullying, which in turn had a direct positive effect on emotional exhaustion. Authentic leadership also influenced job satisfaction indirectly through bullying and emotional exhaustion. Authentic leadership, workplace bullying and emotional exhaustion all had significant direct effects on job satisfaction, which in turn, was related to lower turnover intentions.	The findings from this study demonstrate the fundamental importance of AL in creating supportive working environments. Additional literature on AL.
9.	Carmeli, *et al*. (2010). Inclusive leadership and employee involvement in creative tasks in the workplace: The mediating role of psychological safety.	This study examines how IL (manifested by openness, accessibility, and availability of a leader) fosters employee creativity in the workplace.	Quantitative. SEM analysis	The results of structural equation modeling (SEM) analysis indicate that IL is positively related to psychological safety, which, in turn, engenders employee involvement in creative work.	Further studies expecting on IL with related organizational factors and outcomes
10.	Choi *et al*. (2015). Inclusive leadership and work engagement:	Examined the mediating roles of affective organizational commitment and	Quantitative. Use of questionnaire among employees	We found that inclusive leadership was positively related to employee work engagement, and that both affective	Theoretical contribution to SET and provide useful managerial

	mediating roles of affective organizational commitment and creativity.	employee creativity in the relationship IL and employee work engagement.		organizational commitment and employee creativity mediated this relationship.	implications for organizations to improve work engagement among employees.
11	Wuffli, P. A. (2016). Introduction: A Framework for Inclusive Leadership. In	Definition. Theoretical perspectives			Need to really examine IL
12.	Hollander, E. (2012). *Inclusive leadership: The essential leader-follower relationship*. New York, NY:	Insights into IL			Need to examine IL
13.	Neal and Griffin (2006). A Study of the Lagged Relationships Among Safety Climate, Safety Motivation, Safety Behavior, and Accidents at the Individual and Group Levels.	Perceptions of safety climate, motivation, and behavior at 2 time points and linked them to prior and subsequent levels of accidents over a 5-year period. Safety Climate, Motivation and Safety Behaviour	Longitudinal survey in the healthcare industry. Questionnaire used	In terms of top-down effects, average levels of safety climate within groups at one point in time predicted subsequent changes in individual safety motivation. Individual safety motivation, in turn, was associated with subsequent changes in self-reported safety behavior. In terms of bottom-up effects, improvements in the average level of safety behavior within groups were associated with a subsequent reduction in accidents at the group level.	Historical perspectives of safety behaviours
14.	Zohar (2002). The	This study is based on	Within-group split	(a) Leadership style affects the	Exposes on safety

	effects of leadership dimensions, safety climate, and assigned priorities on minor injuries in work groups.	three premises: (a) Leadership style affects the level of concern for subordinate safety; (b) Concern for safety, operationalized with supervisory practices, provides the source for safety climate perceptions; and (c) Safety priority as assigned by higher superiors' influences supervisory safety practice independently of leadership style.	sample analysis. Step-wise and group-wise regression	level of concern for subordinate safety; (b) Concern for safety, operationalized with supervisory practices, provides the source for safety climate perceptions; and (c) Safety priority as assigned by higher superiors' influences supervisory safety practice independently of leadership style. Leadership effects were moderated by assigned safety priorities and mediated by commensurate safety-climate variables. The results suggest that transformational and transactional leadership provide complementary modes of (mediated and moderated) influence on safety behavior.	climate. Dimensions and importance of safety climate in predicting safety outcomes. How leadership is related to safety climate and safety outcomes also discussed and need for further studies highlighted.
15.	Tholen *et al*. (2013) - Causal relations between psychosocial conditions, safety climate and safety behaviour – A multi-level investigation	289 construction employees	Positivist	Results showed that individual perceptions of safety climate exerted a causal effect on individual safety behaviour, but we also found some evidence of a reversed relationship, where safety behaviour influenced safety climate. Furthermore, we found that work unit average perceptions of safety climate predicted the growth of the individual safety behavior but this influence was mediated by	SB and reverse. SB influencing SC SC

				the individual's perception of the safety climate. The results also indicate that supportive psychosocial conditions within an organisation influence individual safety perceptions but do not per se have an impact on safety behaviour.	
16.	Huang *et al*. (2006) - Safety climate and self-reported injury: Assessing the mediating role of employee safety control		Positivist	Factorial evidence substantiated that management commitment to safety, return-to-work policies, post-injury administration, and safety training are important dimensions of safety climate. In addition, the data support that safety climate is a critical factor predicting the history of a self-reported occupational injury, and that employee safety control mediates the relationship between safety climate and occupational injury.	Safety behaviours and self-reported injury MCS,RTW policies etc
17.	Griffin and Neal (2000) - Perceptions of Safety at Work: A Framework for Linking Safety Climate to Safety Performance, Knowledge, and Motivation	1403 Australian manufacturing	Positivist	Perceptions of knowledge about safety and motivation to perform safely influenced individual reports of safety performance and also mediated the link between SC and safety performance. Specific dimensions of safety climate were identified and constituted a	Safety behaviour Proposed framework, early insights on conceptualization of safety behaviour.

				higher order safety climate factor. The results support conceptualizing safety climate as an antecedent to safety performance in organizations.	
18.	Olsen (2010) - Exploring the possibility of a common structural model measuring associations between safety climate factors and safety behaviour in health care and the petroleum sectors	1919 and 1806 health care and petroleum questionnaire	Longitudinal. Positivist	SC Validation on SC factors	Safety behaviours explained and need to for further studies explained.
19.	Huang *et al*. (2012) Management commitment to safety vs. employee perceived safety training and association with future injury	MCS and SC	Positivist	Even though results showed that the correlation between employees' perceived safety training and management commitment to safety was high, CFA of measurement models showed that two separate factors fit the model better than as two dimensions of a single factor	Injuries compliance and participation
20.	Evans *et al*. (2007) - Development and initial validation of an Aviation Safety Climate Scale.	A need was identified for a consistent set of safety climate factors to provide a basis for aviation industry benchmarking.	Positivist	The results of this study have produced a scale of safety climate for aviation that is both reliable and valid.	Safety behaviours MCS, ST, Communication, equipment and maintenance. Need to further study safety climate.

21.	Morrow *et al*. (2014) Exploring the relationship between safety culture and safety performance in U.S. nuclear power operations	Safety Culture, Safety Climate, safety behaviours	Positivist	Correlations suggested meaningful, statistically significant relationships between safety culture, as measured by the survey, and multiple nuclear power plant performance indicators.	Safety Compliance and safety participation. Further studies needed.
22.	Seo *et al*. (2004) - A cross-validation of safety climate scale using confirmatory factor analytic approach.	This study tested the stability of a factor structure of a safety climate scale developed through an extensive literature review using confirmatory factor analytic approach and cross-validation.	Meta-analysis	Each item of safety climate showed proper discriminative power based on both internal and external criteria. Criterion validity was manifested by the significant positive correlation of the scale with five criteria. Evidence of construct validity was provided by both exploratory and confirmatory factor analyses. Both calibration and validation samples supported a consistent factor structure. Management commitment and supervisor support were found to influence other dimensions of safety climate.	Safety behaviours - compliance and participation and reduction of injuries. Gap on consistent factor structure of safety climate.
23.	Fernandez-Muniz *et al*. (2012). Safety climate in - OHSAS 18001-certified	To analyse the safety climate in these organisations, identify its dimensions, and	Meta-analysis	The results show that management's commitment, and particularly communication, have an effect	Employee satisfaction and firm competiveness. Different

	organisations: Antecedents and consequences of safety behavior.	propose and test a structural equation model that will help determine the antecedents and consequences of employees' safety behaviour. MCS, SC		on safety behaviour and on safety performance, employee satisfaction, and firm competitiveness	dimensions of safety performance. Gaps. Additional studies on safety performance.
24.	Bosak *et al* (2013) - Safety climate dimensions as predictors for risk behavior.	This study examines the interactive relationship between three dimensions of safety climate (management commitment to safety, priority of safety, and pressure for production), and their impact on risk behavior reported by employees.		The results showed that, employees' risk behavior was negatively related to MCS and priority of safety and positively related to pressure for production. Moreover, the three-way interaction between MCS, priority of safety and pressure for production was significant. When pressure for production was high, MCS was negatively related to risk behavior, regardless of level of priority of safety on plant. When pressure for production was low, the effect of MCS on risk behavior was nullified under conditions of high, as compared to low priority of safety on plant.	Risky behaviour. Additional study needed. These findings highlight the importance of managerial commitment to safety in contexts where employees experience tensions between production deadlines and safety procedures.
25.	Kapp (2012) - The influence of supervisor leadership practices and perceived group	Leadership practices and safety behaviour	Positivist. Use of questionnaire	Results indicate that greater levels of transformational and contingent reward leadership are both associated with greater levels of safety compliance and	Future studies

	safety climate on employee safety performance			safety participation behavior, however group safety climate moderates the leadership-safety compliance relationships.	
26.	Zohar and Luria (2010) Group Leaders as Gatekeepers: Testing Safety Climate Variations across Levels of Analysis.	The moderating effect of transformational supervisory leadership on the relationship between organisational and group climates, using safety climate in risky operations as an exemplar.		Results indicated that under low or poor organisational climate, indicative of limited organisational commitment to employee safety, transformational leaders promoted a higher group climate as compared to the organisational climate. Similarly, under a weak organisational climate, indicative of limited consensus among company employees regarding the priority of safety, transformational leaders promoted a stronger group climate, reflecting greater consensus among group members.	Compliance and Participation. The need for further studies on leadership in the safety management. Leadership as an antecedent of safety climate.
27.	Kines *et al.* (2010) Improving construction site safety through leader-based verbal safety communication.	This paper tests the effect of increasing leader-based on-site verbal safety communication on the level of safety and safety climate at construction sites.	Quantitative	Coaching construction site foremen to include safety in their daily verbal exchanges with workers has a significantly positive and lasting effect on the level of safety, which is a proximal estimate for work-related accidents.	Safety performance: compliance and participation. Leadership based communication.
28.	Lievens & Vlerick (2013) -	To report the impact of transformational	Cross-sectional survey with use of	The results show that transformational leadership	Compliance and Participation.

	Transformational leadership and safety performance among nurses: the mediating role of knowledge-related job characteristics.	leadership on two dimensions of nurses' safety performance (i.e. safety compliance and safety participation) and to study the mediating role of knowledge-related job characteristics in this relationship.	questionnaire	exerted a significant positive impact on both dimensions of nurses' safety performance. This positive relation was mediated by knowledge-related job characteristics, supporting our second hypothesis.	Transformational leadership and knowledge related job-characteristics as mediators. Further studies needed on leadership in safety management.
29.	Zohar (2010) - Thirty years of safety climate research: Reflections and future directions			The need to study the antecedents of safety climate in relation to safety behaviours	
30.	Vinodkumar and Bhasi (2010) - Safety management practices and safety behaviour: Assessing the mediating role of safety knowledge and motivation.	Measuring employees' perceptions on 6 SMPs and self-reported safety knowledge, safety motivation, safety compliance and safety participation.	Quantitative study done in a safety critical organization in India	Path analysis showed that some of the safety management practices have direct and indirect relations with the safety performance components, namely, safety compliance and safety participation. Safety knowledge and safety motivation were found to be the key mediators in explaining these relationships. Safety training was identified as the most important safety management practice that predicts safety knowledge, safety motivation, safety compliance and safety participation.	Additional studies in safety management with specific focus on safety behaviours.

31.	Mearns *et al*. (2003) - Safety climate, safety management practice and safety performance in offshore environments.	The present study reports on a cross-organisational survey designed to benchmark participating offshore installations on their safety climate, and to identify best safety management practices.	Cross-organizational survey	Proficiency in some safety management practices was associated with lower official accident rates and fewer respondents reporting accidents.	Safety Climate & Safety Management Practices. Additional studies needed.
32.	Cigularov *et al*. (2013) - Measurement equivalence and mean comparisons of a safety climate measure across construction trades.	This study used multi-group confirmatory factor analyses to investigate the measurement equivalence of a multidimensional safety climate measure across ten construction trade groups	Cross-sectional survey among 4725 construction trades. Use of CFA	Results revealed strong measurement equivalence of the safety climate measure across the construction trade groups	SC measures. Further insights to assess the relationship between SC and safety behaviours
33.	Cooper & Phillips (2004) - Exploratory analysis of the safety climate and safety behavior relationship.	Exploring the relationship between SC and safety behaviour	Questionnaire. 540 packaging production plant, manufacturing. Regression analysis.	Perceptions of the importance of safety training were predictive of actual levels of safety behavior. The results also demonstrate that the magnitude of change in perceptual safety climate scores will not necessarily match actual changes in employee's safety behavior.	Behaviours. Early studies in safety behaviours based on Borman and Motowidlo (1993).
34.	Martinez-Corcoles *et al*. (2013) - Empowering team leadership and safety	Team Leadership DV Compliance and	479 workers in 2 Spanish nuclear power plants.	Leaders' empowering behaviors generated higher safety compliance behaviors and higher safety participation	Team leader behaviors. Further asserts need to study risky behaviour as a

	performance in nuclear power plants: A multilevel approach.	Participation and Risky Behaviour		behaviors by team members, whereas risky behaviors were reduced.	component of safety behaviour
35.	Lu & Tsai (2010) - The effect of safety climate on seafarers' safety behaviors in container shipping.	This study empirically examined safety climate and its effects on safety behaviors from seafarers' perceptions in the container shipping context. DV Compliance and participation and accidents and injuries recorded	Stratified sampling Use of questionnaire among 608 seafarers. Mata-Analysis	A structural equation model was used to examine the effect of safety climate dimensions, namely, safety policy, perceived supervisor safety behavior, and safety management, on safety behavior. The results revealed a positive association between safety climate and seafarers' safety behavior.	Safety climate dimensions, namely, safety policy, perceived supervisor safety behavior, and safety management, on safety behavior. Refer for gaps on safety climate measures….and also safety performance measures
36.	Hon *et al*. (2014) - Relationships between safety climate and safety performance of building repair, maintenance, minor alteration, and addition (RMAA) works.	The present study aims to determine the relationships between safety climate and safety performance of RMAA works, thereby offering recommendations on improving RMAA safety.	Questionnaires analysed from 396 repairs and maintenance personnel	A significant negative relationship between RMAA safety climate and incidence of self-reported near misses and injuries, and significant positive relationships between RMAA safety climate and safety participation and safety compliance respectively. Higher RMAA safety climate was positively associated with a lower incidence of self-reported near misses and injuries and higher levels of safety participation and safety compliance.	Near misses and injuries and safety compliance and participation. Information on safety climate and safety performance measures. History of safety performance.

37.	Wu (2008) - Safety leadership in the teaching laboratories of electrical and electronic engineering departments at Taiwanese Universities.	The study discusses the factors affecting safety leadership in teaching laboratories. Safety leadership	Mail questionnaire survey among 147 university faculty in various departments.	The descriptive statistics also reveals that among faculty, the perception of department heads' safety leadership is in general positive. A two-way MANOVA shows that there are interaction effects on safety leadership between university size and instructor age; there are also interaction effects between presence of a safety committee and faculty gender and faculty age.	Safety leadership. Leadership in safety management
38.	Fernandez-Muniz *et al*. (2014) - Safety leadership, risk management and safety performance in Spanish firms.	The role of the safety leadership and of the proactive risk management in the improvement of occupational safety performance. Safety Leadership & risk management	Questionnaire and data analyzed among 159 construction and services workers in Spain	The results show the importance of employees' safety behaviour in the improvement of safety outcomes, as well as the importance of the proactive risk management and transformational leadership in promoting safety behaviour.	Compliance and Participation. Refer for study on safety leadership. Transactional or transformational leadership
39.	Bahari & Clarke (2013) Cross-validation of an employee safety climate model in Malaysia.	The current study focuses on the cross-validation of a safety climate model in the non-Western industrial context of Malaysian manufacturing.	50 employees from manufacturing companies. CFA	Results showed that the model fit indices were below accepted levels, indicating that the original Cheyne *et al*. (1998) safety climate model was not supported. An alternative three-factor model was developed using exploratory factor analysis.	Justification for studying the Nigerian setting. Inconsistencies noted. Model not supported. cross-cultural study.
40.	Huang *et al*. (2012)	Explore and examine,	Questionnaires of	Even though results showed that	Refer for questions

	Management commitment to safety vs. employee perceived safety training and association with future injury.	specific to the restaurant industry, two important constructs emerging from the safety climate literature: employee perceptions of safety training and management commitment to safety. MCS and SC Injuries compliance and participation	419 restaurant workers. With the use of multivariate binomial equation.	the correlation between employees' perceived safety training and management commitment to safety was high, confirmatory factor analysis of measurement models showed that two separate factors fit the model better than as two dimensions of a single factor	on MCS and ST. safety training and MCS as important components of SC
41.	Zohar and Luria (2010) Group Leaders as Gatekeepers: Testing Safety Climate Variations across Levels of Analysis.	This paper tests the moderating effect of transformational supervisory leadership on the relationship between organisational and group climates, using safety climate in risky operations as an exemplar.	Associational design. Testing a relationship among 3952 production workers	Results indicated that under low or poor organisational climate, indicative of limited organisational commitment to employee safety, transformational leaders promoted a higher group climate as compared to the organisational climate. Similarly, under a weak organisational climate, indicative of limited consensus among company employees regarding the priority of safety, transformational leaders promoted a stronger group climate, reflecting greater consensus among group member	Fragmentations exist. Further study on group level safety climate vis-à-vis improving organizational level safety climate
42.	Clarke (2013)	A theoretical model of safety leadership, which incorporated both	Meta-Analysis	The final model showed that transformational leadership had a positive association with both	The findings suggest that active transactional

		transformational and active transactional leadership styles, was tested using meta-analytic path analysis.		perceived safety climate and safety participation, with perceived safety climate partially mediating the effect of leadership on safety participation. Active transactional leadership had a positive association with perceived safety climate, safety participation and safety compliance. The effect of leadership on safety compliance was partially mediated by perceived safety climate and the effect on safety participation fully mediated by perceived safety climate.	leadership is important in ensuring compliance with rules and regulations, whereas transformational leadership is primarily associated with encouraging employee participation in safety. Therefore, in line with the augmentation hypothesis of leadership, a combination of both transformational and transactional styles appeared to be most beneficial for safety. There is little guidance available on leadership interventions that focus on a wider range of leader behaviour or focus on the ability to change between leadership styles to fit the requirements of the situation.

43.	Martinez-Corcoles *et al*. (2011). Leadership and employees' perceived safety behaviours in a nuclear power plant: A structural equation model	Study is to find out how leader behaviours influence employees' safety behaviours (perceived safety behaviours) in the nuclear field.	566 employees from a nuclear power plant	The results indicated that when safety culture was strong, leader behaviour generated a higher safety climate among the members, which predicted their perceived safety behaviours. Support was found for a structural model linking leadership and safety behaviour to safety culture and safety climate.	Further antecedents of safety climate. Formed foundation for present study.
Other studies that formed strong foundation for the present study. Barling *et al*. (2002) Clarke and Ward (2006) Kelloway *et al*. (2006) Beus *et al*. (2016) Bosak *et al*. (2013)					

SPSS OUTPUTS

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	288	90.3	90.3	90.3
	Female	31	9.7	9.7	100.0
	Total	319	100.0	100.0	

Marital Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Single	92	28.8	28.8	28.8
	Married	205	64.3	64.3	93.1
	Divorced	12	3.8	3.8	96.9
	Widowed	10	3.1	3.1	100.0
	Total	319	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 20	4	1.3	1.3	1.3
	21-24	17	5.3	5.3	6.6
	25-29	66	20.7	20.7	27.3
	30-34	105	32.9	32.9	60.2
	35-39	77	24.1	24.1	84.3
	40-44	36	11.3	11.3	95.6
	45-49	10	3.1	3.1	98.7
	50 and above	4	1.3	1.3	100.0
	Total	319	100.0	100.0	

Level of Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High School	57	17.9	17.9	17.9
	Technical/Diploma	217	68.0	68.0	85.9
	Bachelors'	42	13.2	13.2	99.1
	Masters and Above	3	.9	.9	100.0
	Total	319	100.0	100.0	

Present Company Work Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5	157	49.2	49.2	49.2
	6-10	136	42.6	42.6	91.8
	11-15	26	8.2	8.2	100.0
	Total	319	100.0	100.0	

Oil and Gas Work Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5	101	31.7	31.7	31.7
	6-10	181	56.7	56.7	88.4
	11-15	37	11.6	11.6	100.0
	Total	319	100.0	100.0	

Occupation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Technician/Millwright	44	13.8	13.8	13.8
	Engineer	6	1.9	1.9	15.7
	Equipment Handler	27	8.5	8.5	24.1
	Scaffolder	18	5.6	5.6	29.8
	Electrician	33	10.3	10.3	40.1
	Operator	23	7.2	7.2	47.3
	Pipe/Steel Worker	10	3.1	3.1	50.5
	HVAC Operator	9	2.8	2.8	53.3
	Plant Maintenance	50	15.7	15.7	69.0
	Mechanic	13	4.1	4.1	73.0
	Welder	7	2.2	2.2	75.2
	Driller	39	12.2	12.2	87.5
	Rigger	8	2.5	2.5	90.0
	Safety Personnel and First Aider	5	1.6	1.6	91.5
	Concrete Worker	11	3.4	3.4	95.0
	Transportation and Logistics	13	4.1	4.1	99.1
	Others	3	.9	.9	100.0
	Total	319	100.0	100.0	

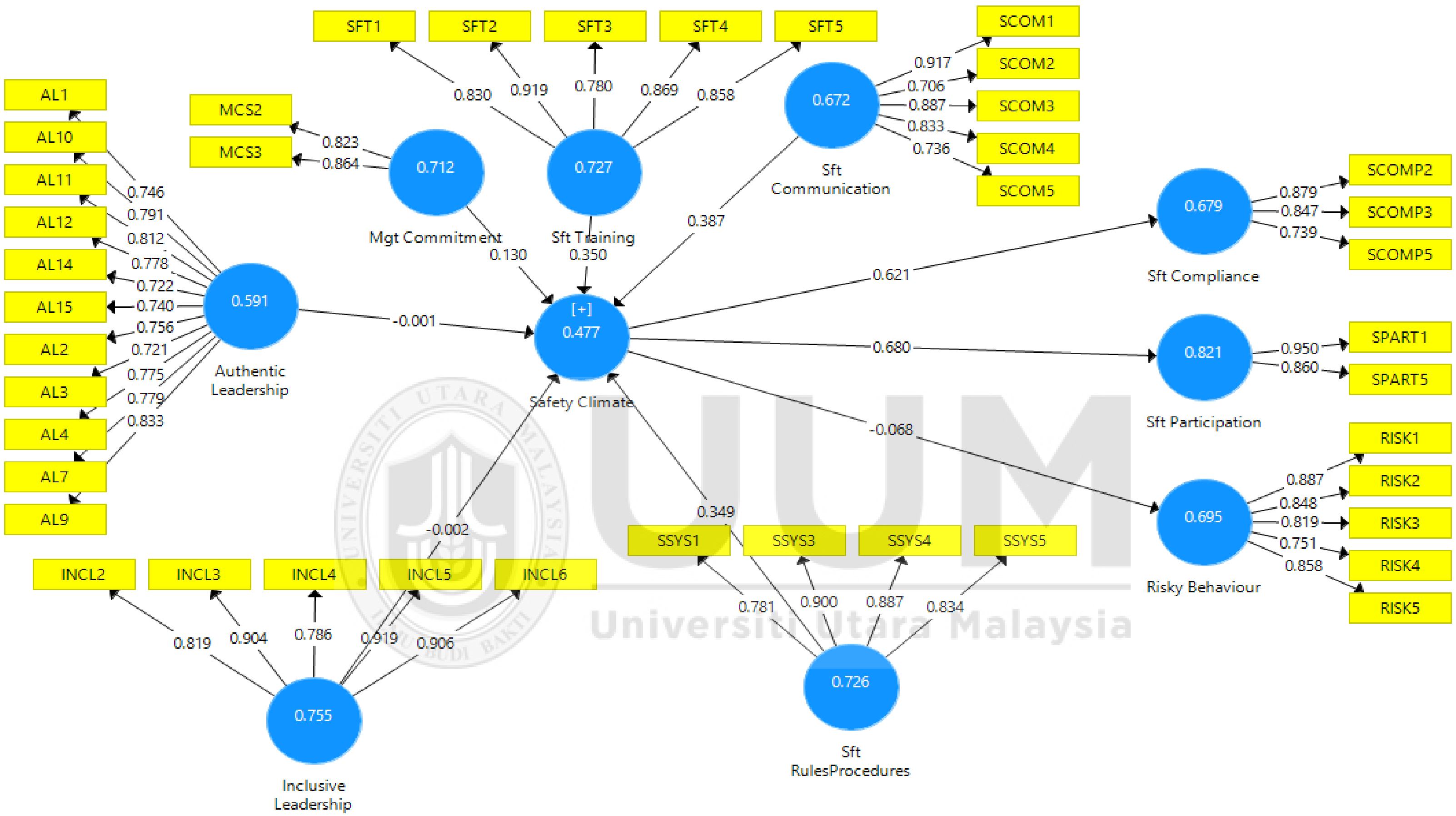
Frequency of attendance of Safety Training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sometimes	17	5.3	5.3	5.3
	Often	151	47.3	47.3	52.7
	Always	151	47.3	47.3	100.0
	Total	319	100.0	100.0	

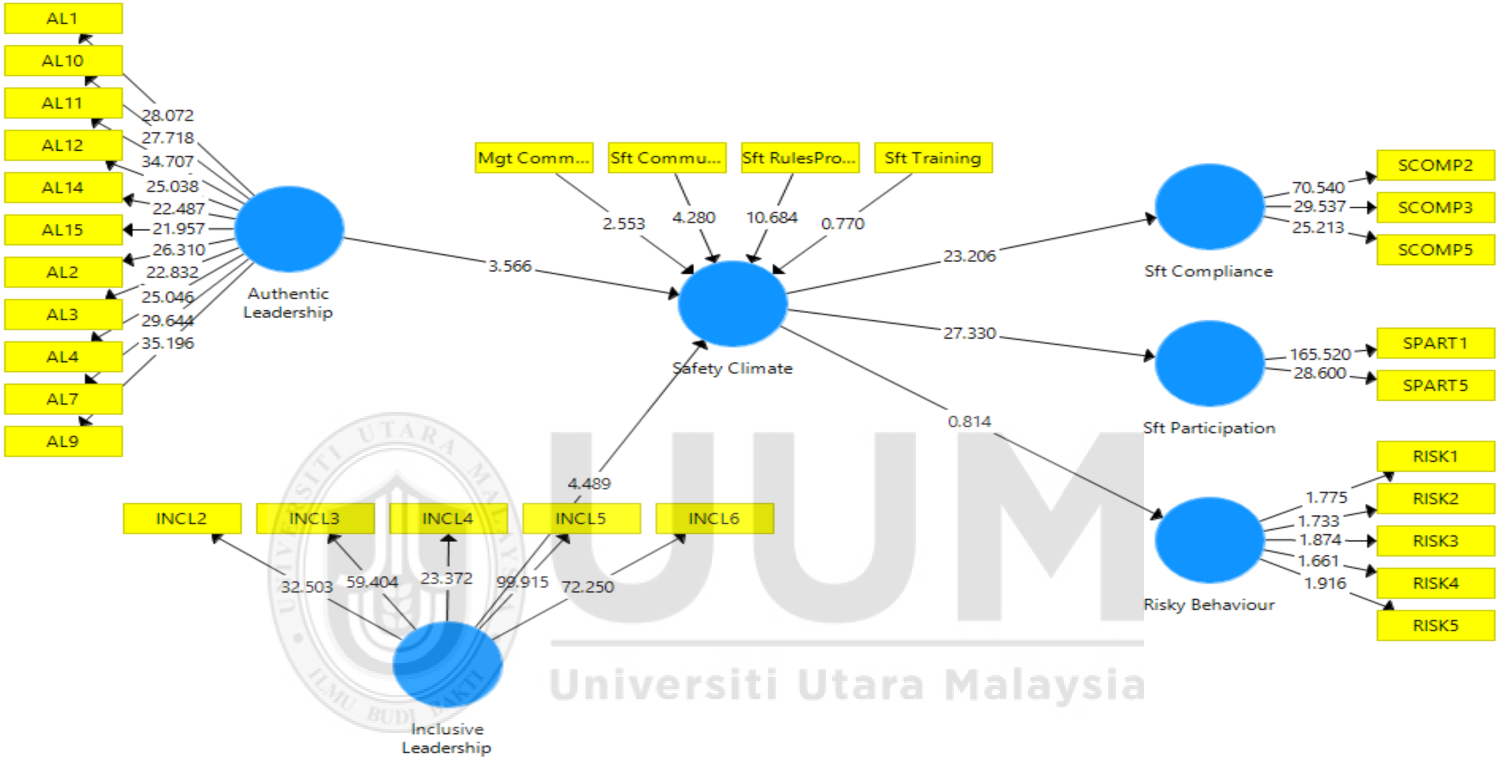
Number of Times involved in Workplace Accident

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5	274	85.9	85.9	85.9
	6-10	45	14.1	14.1	100.0
	Total	319	100.0	100.0	

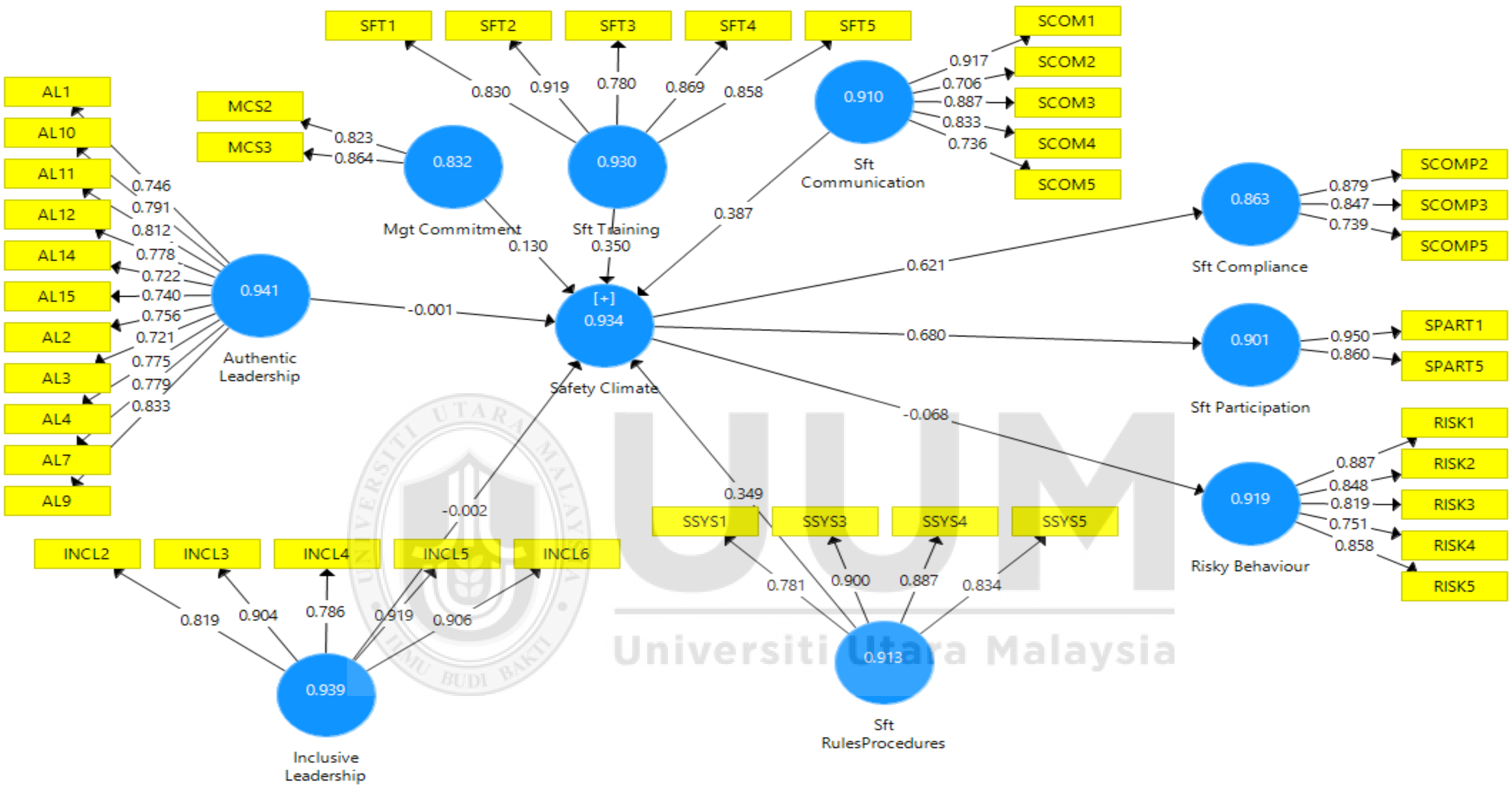
PLS OUTPUTS



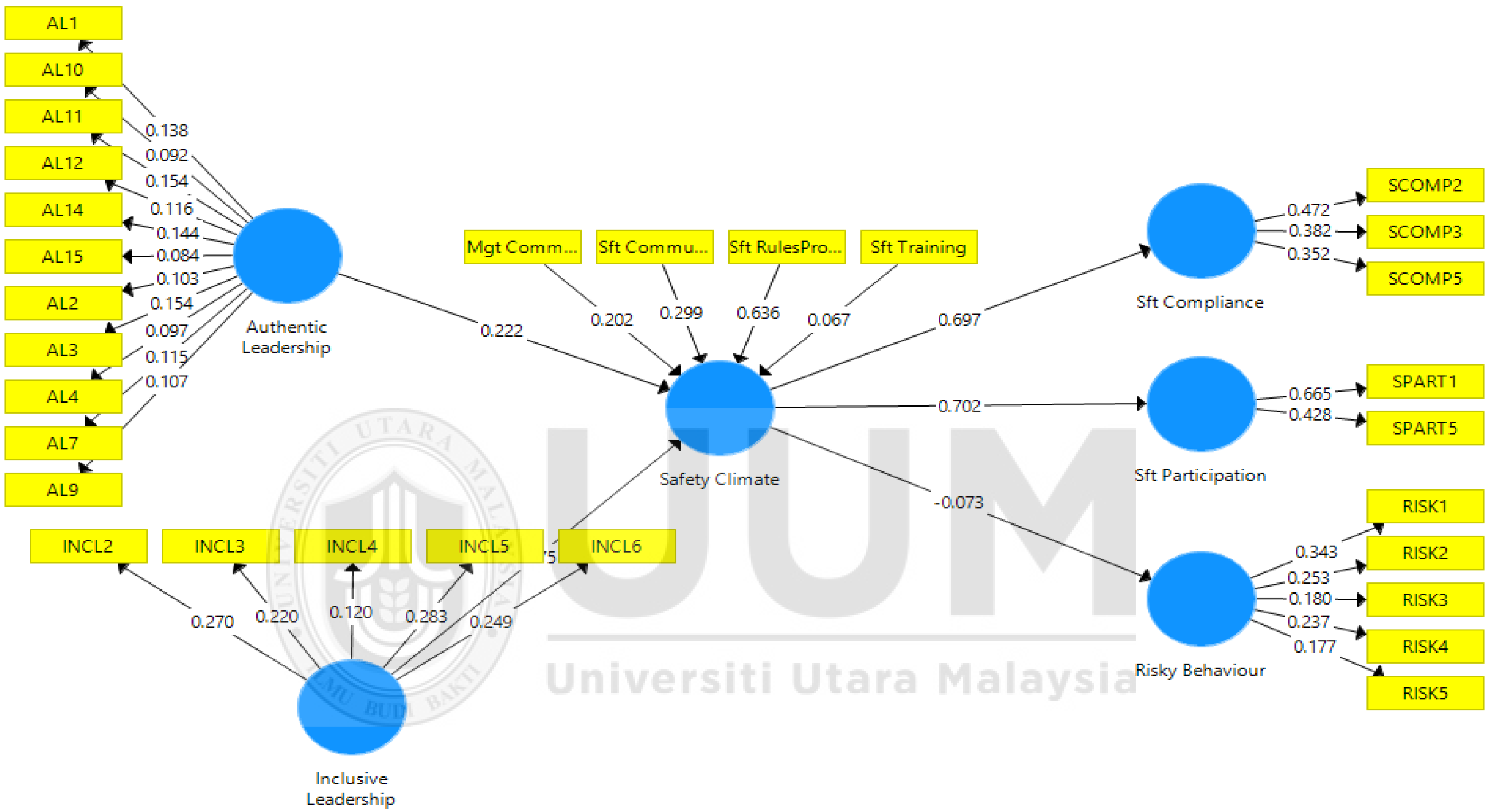
Average variance extracted



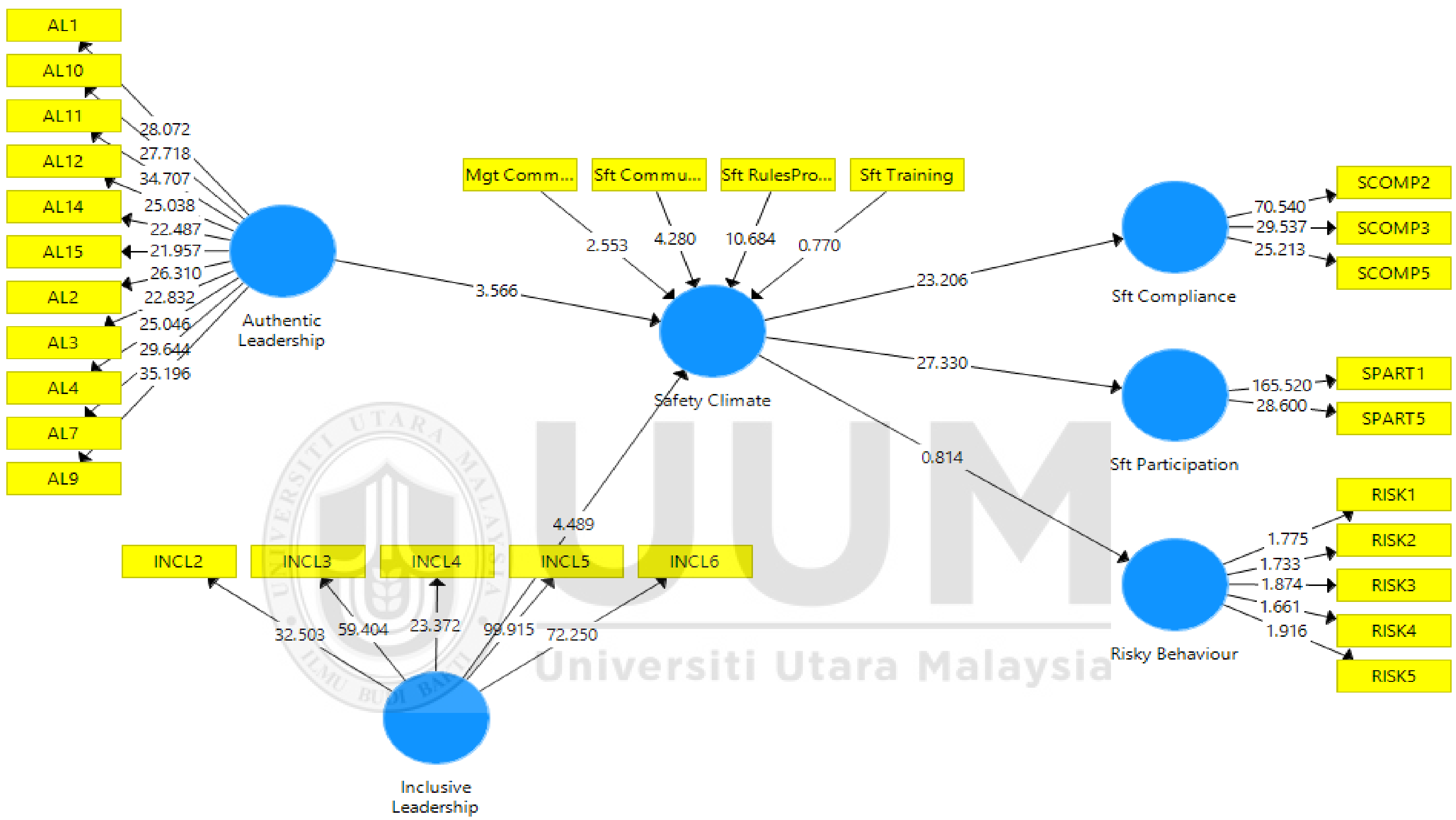
Bootstrap for hypotheses test



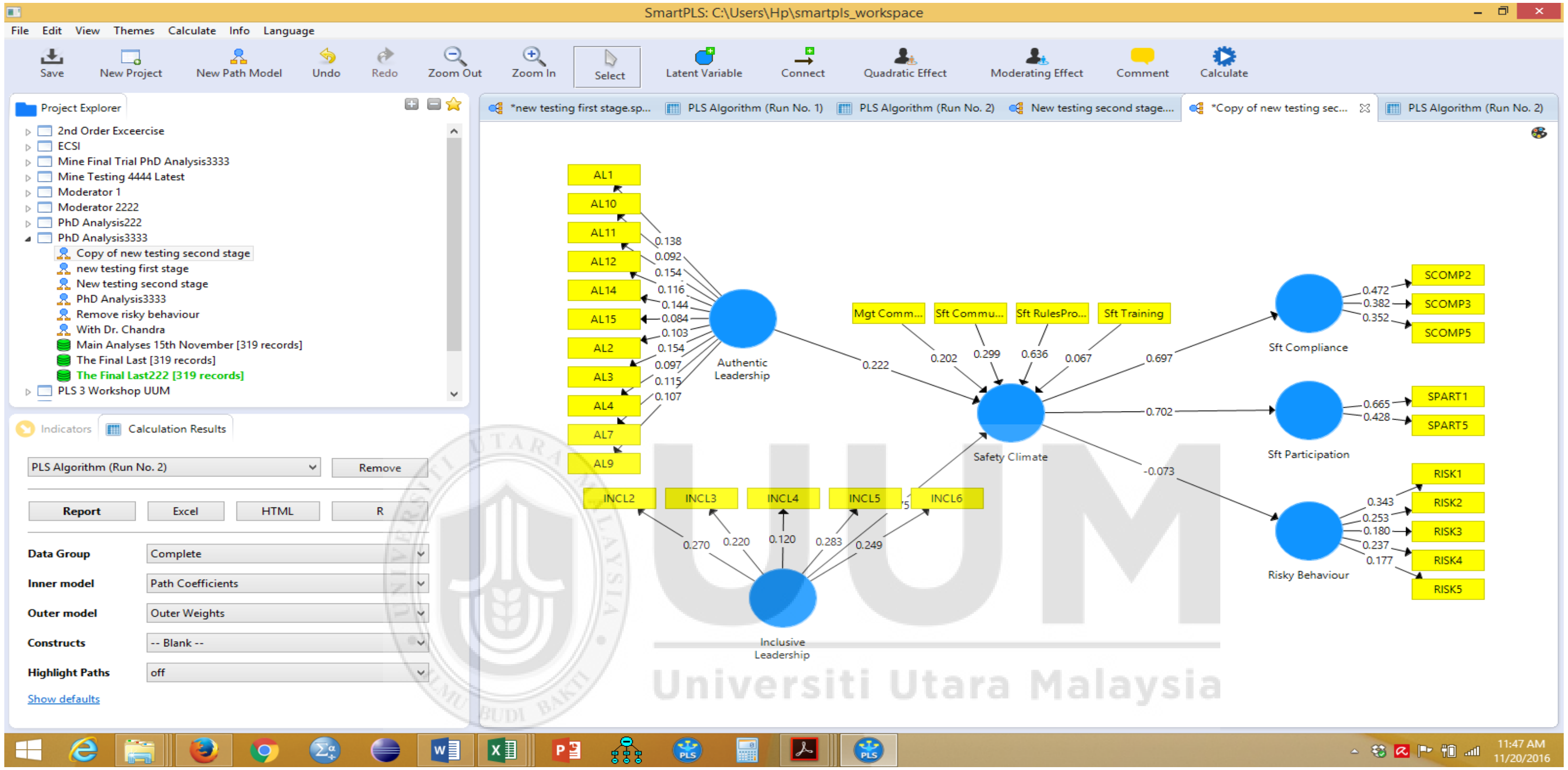
Composite reliability



Second stage model weights



Structural model



Second order stage model

Measurement and structural model outputs

	AL->SC->SComp	AL->SC->SP	AL->SC->RB	IL->SC->Scomp	IL->SC->SP	IL->SC->RB
Sample 1	0.158000	0.168889	-0.034331	0.190455	0.203580	-0.041383
Sample 2	0.087349	0.083683	0.006697	0.210329	0.201502	0.016126
Sample 3	0.155335	0.156263	-0.022823	0.186453	0.187567	-0.027395
Sample 4	0.119727	0.122172	0.012436	0.173240	0.176778	0.017995
Sample 5	0.174554	0.171805	0.020391	0.194183	0.191125	0.022684
Sample 6	0.174849	0.174548	-0.027376	0.184545	0.184227	-0.028894
Sample 7	0.195489	0.199841	-0.036786	0.152757	0.156158	-0.028745
Sample 8	0.215866	0.235922	-0.039385	0.124790	0.136384	-0.022768
Sample 9	0.066073	0.070904	-0.008609	0.313460	0.336379	-0.040845
Sample 10	0.091080	0.087251	-0.016335	0.212935	0.203983	-0.038189
Sample 11	0.066383	0.067126	0.005564	0.196968	0.199173	0.016511
Sample 12	0.102620	0.105982	-0.017526	0.240425	0.248302	-0.041061
Sample 13	0.195586	0.191741	-0.021284	0.186810	0.183137	-0.020329
Sample 14	0.171646	0.167482	-0.043915	0.164754	0.160757	-0.042151
Sample 15	0.078099	0.081118	-0.013073	0.274251	0.284850	-0.045906
Sample 16	0.174425	0.176676	0.032968	0.191924	0.194401	0.036275
Sample 17	0.163977	0.156910	0.013362	0.159934	0.153042	0.013033
Sample 18	0.193753	0.206847	-0.025890	0.187296	0.199953	-0.025027
Sample 19	0.130788	0.130562	-0.026925	0.204286	0.203932	-0.042056
Sample 20	0.127856	0.134748	-0.008261	0.207299	0.218474	-0.013394

Sample 21	0.119691	0.117722	0.023873	0.266076	0.261700	0.053070
Sample 22	0.113469	0.119925	-0.023669	0.214287	0.226480	-0.044699
Sample 23	0.164871	0.157207	-0.039062	0.191319	0.182425	-0.045328
Sample 24	0.146354	0.157415	-0.024092	0.226481	0.243599	-0.037283
Sample 25	0.113807	0.122962	-0.015817	0.180001	0.194482	-0.025016
Sample 26	0.179295	0.182457	-0.011570	0.169748	0.172742	-0.010954
Sample 27	0.121415	0.122137	-0.017428	0.195812	0.196976	-0.028106
Sample 28	0.226573	0.243272	-0.052043	0.160085	0.171883	-0.036771
Sample 29	0.102263	0.099104	-0.009698	0.158260	0.153370	-0.015009
Sample 30	0.179424	0.178516	-0.052923	0.155011	0.154227	-0.045722
Sample 31	0.137552	0.136883	-0.015492	0.181386	0.180504	-0.020429
Sample 32	0.186704	0.183699	-0.026923	0.182541	0.179604	-0.026323
Sample 33	0.123830	0.120974	0.011763	0.205639	0.200896	0.019534
Sample 34	0.059881	0.061469	-0.008856	0.268492	0.275612	-0.039710
Sample 35	0.110055	0.109183	0.012896	0.133918	0.132857	0.015692
Sample 36	0.070765	0.074839	0.014105	0.204229	0.215987	0.040707
Sample 37	0.009544	0.009486	-0.001364	0.286480	0.284736	-0.040934
Sample 38	0.175304	0.185437	-0.016395	0.211012	0.223210	-0.019735
Sample 39	0.113465	0.118250	-0.014114	0.198782	0.207165	-0.024727
Sample 40	0.139350	0.150987	0.035515	0.164305	0.178026	0.041875
Sample 41	0.152867	0.147343	-0.017614	0.197359	0.190227	-0.022741
Sample 42	0.218173	0.231081	-0.048041	0.169835	0.179883	-0.037397
Sample 43	0.083649	0.080267	-0.023125	0.288553	0.276884	-0.079772
Sample 44	0.210229	0.208887	-0.021377	0.193274	0.192040	-0.019653
Sample 45	0.144437	0.140657	-0.023749	0.183710	0.178902	-0.030206
Sample 46	0.162160	0.170933	-0.018700	0.192118	0.202512	-0.022154
Sample 47	0.170373	0.173387	-0.036187	0.196846	0.200328	-0.041809

Sample 48	0.179769	0.174743	-0.025803	0.219707	0.213564	-0.031536
Sample 49	0.162167	0.165205	-0.019060	0.187576	0.191090	-0.022046
Sample 50	0.222220	0.218534	-0.032122	0.115474	0.113558	-0.016692
Sample 51	0.185848	0.181051	-0.034193	0.155761	0.151741	-0.028657
Sample 52	0.138960	0.149574	-0.028231	0.204970	0.220627	-0.041641
Sample 53	0.130586	0.123630	-0.013966	0.178228	0.168734	-0.019061
Sample 54	0.068390	0.069629	-0.008835	0.237133	0.241428	-0.030635
Sample 55	0.124089	0.128958	-0.016747	0.195319	0.202983	-0.026360
Sample 56	0.129882	0.122333	-0.034027	0.196583	0.185158	-0.051502
Sample 57	0.201875	0.202047	-0.037584	0.185529	0.185687	-0.034540
Sample 58	0.134177	0.132942	-0.013648	0.135608	0.134359	-0.013794
Sample 59	0.139169	0.129858	-0.017442	0.138187	0.128941	-0.017318
Sample 60	0.123707	0.126738	-0.020322	0.186574	0.191145	-0.030649
Sample 61	0.047755	0.047198	-0.005568	0.228318	0.225653	-0.026620
Sample 62	0.066156	0.070556	-0.026020	0.265078	0.282708	-0.104260
Sample 63	0.191154	0.190233	-0.017626	0.193822	0.192888	-0.017872
Sample 64	0.226955	0.220353	-0.039147	0.195381	0.189697	-0.033701
Sample 65	0.168154	0.165256	-0.027100	0.153527	0.150882	-0.024743
Sample 66	0.203114	0.214076	-0.042167	0.165701	0.174644	-0.034400
Sample 67	0.136994	0.148516	0.025482	0.162157	0.175797	0.030162
Sample 68	0.209183	0.219566	-0.042904	0.179234	0.188130	-0.036761
Sample 69	0.131602	0.143823	0.015640	0.255799	0.279555	0.030400
Sample 70	0.113087	0.121938	-0.013716	0.194800	0.210046	-0.023627
Sample 71	0.199823	0.195919	-0.019503	0.148353	0.145455	-0.014480
Sample 72	0.145288	0.147839	-0.026170	0.286128	0.291153	-0.051539
Sample 73	0.150714	0.162246	-0.015368	0.238549	0.256802	-0.024324
Sample 74	0.169221	0.168835	-0.019590	0.180243	0.179832	-0.020866

Sample 75	0.123545	0.121592	-0.010012	0.216242	0.212824	-0.017525
Sample 76	0.195291	0.212840	-0.024320	0.169937	0.185208	-0.021162
Sample 77	0.140709	0.139883	-0.021967	0.175383	0.174353	-0.027381
Sample 78	0.191074	0.196883	-0.058958	0.177657	0.183058	-0.054818
Sample 79	0.186107	0.191856	-0.031823	0.169900	0.175148	-0.029051
Sample 80	0.235115	0.225676	-0.050060	0.084774	0.081371	-0.018050
Sample 81	0.116505	0.126001	-0.017901	0.255530	0.276356	-0.039261
Sample 82	0.144265	0.139498	-0.017786	0.174302	0.168542	-0.021489
Sample 83	0.161064	0.166262	-0.020407	0.182555	0.188445	-0.023129
Sample 84	0.105719	0.111615	-0.016227	0.174790	0.184538	-0.026828
Sample 85	0.144922	0.159311	-0.017434	0.231888	0.254912	-0.027897
Sample 86	0.131410	0.132349	-0.016960	0.239863	0.241577	-0.030957
Sample 87	0.158727	0.157641	-0.012590	0.166861	0.165720	-0.013235
Sample 88	0.152424	0.147252	-0.018534	0.213487	0.206244	-0.025958
Sample 89	0.147498	0.142572	-0.019628	0.172515	0.166754	-0.022957
Sample 90	0.118961	0.116705	-0.021099	0.226348	0.222056	-0.040145
Sample 91	0.175422	0.172738	-0.029020	0.210326	0.207108	-0.034795
Sample 92	0.083055	0.085491	-0.015145	0.218539	0.224949	-0.039849
Sample 93	0.158600	0.162174	-0.029543	0.278441	0.284716	-0.051866
Sample 94	0.227550	0.235538	-0.034398	0.167896	0.173790	-0.025380
Sample 95	0.101396	0.096966	-0.011047	0.181716	0.173778	-0.019798
Sample 96	0.167401	0.177964	0.043533	0.203405	0.216239	0.052895
Sample 97	0.151457	0.143897	0.013858	0.184336	0.175134	0.016867
Sample 98	0.099971	0.093548	-0.015213	0.165475	0.154843	-0.025181
Sample 99	0.210092	0.205984	-0.054063	0.168927	0.165623	-0.043470
Sample 100	0.141891	0.154924	-0.020308	0.268811	0.293503	-0.038473
Sample 101	0.174014	0.166449	-0.027495	0.206818	0.197827	-0.032678

Sample 102	0.132525	0.126679	0.013706	0.256843	0.245512	0.026564
Sample 103	0.114870	0.115842	-0.014208	0.228197	0.230128	-0.028225
Sample 104	0.234965	0.237883	-0.058562	0.161203	0.163205	-0.040177
Sample 105	0.233490	0.241607	-0.030572	0.186127	0.192598	-0.024371
Sample 106	0.110347	0.115898	-0.027155	0.214710	0.225510	-0.052838
Sample 107	0.156714	0.151146	-0.025384	0.208944	0.201521	-0.033844
Sample 108	0.115671	0.113279	-0.014760	0.210649	0.206291	-0.026879
Sample 109	0.119985	0.125185	0.014449	0.193686	0.202080	0.023325
Sample 110	0.162329	0.158322	-0.041629	0.195485	0.190660	-0.050132
Sample 111	0.217499	0.206936	-0.020964	0.154507	0.147003	-0.014892
Sample 112	0.163648	0.164659	-0.031730	0.194148	0.195348	-0.037644
Sample 113	0.149120	0.156748	0.018599	0.223832	0.235281	0.027917
Sample 114	0.165168	0.177134	0.020901	0.198377	0.212748	0.025104
Sample 115	0.186045	0.190225	-0.028715	0.158391	0.161949	-0.024446
Sample 116	0.183463	0.184837	-0.032007	0.135303	0.136317	-0.023605
Sample 117	0.138747	0.147779	-0.023467	0.199255	0.212225	-0.033700
Sample 118	0.146583	0.145425	-0.016922	0.241916	0.240006	-0.027928
Sample 119	0.190219	0.198482	0.029399	0.186761	0.194874	0.028864
Sample 120	0.070901	0.073505	-0.008707	0.295305	0.306154	-0.036266
Sample 121	0.100585	0.103989	-0.025708	0.233678	0.241587	-0.059726
Sample 122	0.203047	0.205172	0.012111	0.115312	0.116518	0.006878
Sample 123	0.128628	0.128574	-0.008515	0.143626	0.143566	-0.009508
Sample 124	0.214765	0.220135	-0.053866	0.210366	0.215626	-0.052763
Sample 125	0.214618	0.229461	-0.021204	0.155000	0.165720	-0.015314
Sample 126	0.085831	0.082428	-0.012538	0.256069	0.245916	-0.037405
Sample 127	0.204176	0.204769	-0.019673	0.198411	0.198988	-0.019117
Sample 128	0.077860	0.081585	-0.011415	0.208997	0.218996	-0.030641

Sample 129	0.159740	0.156143	-0.019740	0.183097	0.178974	-0.022627
Sample 130	0.155396	0.156183	-0.024581	0.177839	0.178740	-0.028131
Sample 131	0.156435	0.168745	0.018960	0.163355	0.176209	0.019799
Sample 132	0.172547	0.171195	-0.021599	0.222359	0.220617	-0.027834
Sample 133	0.186038	0.175621	0.019630	0.155159	0.146471	0.016372
Sample 134	0.191318	0.188123	-0.018300	0.179378	0.176382	-0.017158
Sample 135	0.203604	0.215879	-0.039325	0.118816	0.125980	-0.022949
Sample 136	0.176431	0.190131	0.009192	0.171469	0.184784	0.008934
Sample 137	0.194352	0.182670	-0.015701	0.148170	0.139264	-0.011970
Sample 138	0.206736	0.207171	-0.039705	0.175101	0.175470	-0.033629
Sample 139	0.132620	0.137133	-0.017792	0.222934	0.230520	-0.029908
Sample 140	0.210601	0.204391	-0.038060	0.136772	0.132739	-0.024717
Sample 141	0.211898	0.207735	0.021061	0.130744	0.128175	0.012995
Sample 142	0.211154	0.207016	-0.030569	0.123597	0.121176	-0.017894
Sample 143	0.173121	0.174348	-0.024003	0.134078	0.135029	-0.018590
Sample 144	0.121888	0.124166	-0.020217	0.264100	0.269037	-0.043805
Sample 145	0.246402	0.248106	-0.053631	0.156623	0.157706	-0.034090
Sample 146	0.172601	0.174065	-0.017152	0.230904	0.232864	-0.022946
Sample 147	0.145311	0.153835	-0.022896	0.197099	0.208661	-0.031056
Sample 148	0.142720	0.147587	-0.009502	0.239704	0.247877	-0.015960
Sample 149	0.169505	0.163715	-0.030474	0.221198	0.213642	-0.039768
Sample 150	0.172595	0.173396	-0.012357	0.247874	0.249024	-0.017747
Sample 151	0.072566	0.073928	-0.017264	0.267525	0.272546	-0.063646
Sample 152	0.152428	0.156495	-0.013844	0.170053	0.174589	-0.015444
Sample 153	0.217622	0.201307	-0.051181	0.145008	0.134137	-0.034104
Sample 154	0.134755	0.140568	-0.023076	0.213889	0.223116	-0.036627
Sample 155	0.142636	0.151316	0.017091	0.219729	0.233101	0.026329

Sample 156	0.143329	0.151371	-0.017364	0.236957	0.250251	-0.028706
Sample 157	0.191649	0.186426	0.029612	0.187505	0.182395	0.028972
Sample 158	0.163506	0.171814	-0.054249	0.235051	0.246995	-0.077987
Sample 159	0.086705	0.087507	-0.006981	0.225764	0.227851	-0.018178
Sample 160	0.205913	0.202548	-0.034915	0.125567	0.123515	-0.021292
Sample 161	0.118725	0.114215	0.008102	0.152392	0.146602	0.010399
Sample 162	0.146476	0.151432	0.010717	0.166773	0.172415	0.012202
Sample 163	0.183561	0.189669	-0.039843	0.216335	0.223534	-0.046957
Sample 164	0.147776	0.150533	0.013371	0.181961	0.185356	0.016464
Sample 165	0.214966	0.226718	0.021582	0.131101	0.138268	0.013162
Sample 166	0.079510	0.080253	-0.013620	0.207886	0.209829	-0.035611
Sample 167	0.174381	0.172554	0.028847	0.204352	0.202210	0.033805
Sample 168	0.148776	0.141742	-0.013665	0.164109	0.156350	-0.015073
Sample 169	0.113291	0.108950	-0.012533	0.198592	0.190983	-0.021969
Sample 170	0.091994	0.088970	-0.005473	0.207373	0.200556	-0.012337
Sample 171	0.123573	0.130941	-0.020152	0.232947	0.246837	-0.037988
Sample 172	0.159518	0.170868	-0.035858	0.224914	0.240917	-0.050558
Sample 173	0.189001	0.180023	-0.026754	0.189500	0.180498	-0.026824
Sample 174	0.140090	0.143465	0.014437	0.180359	0.184704	0.018587
Sample 175	0.205064	0.209949	-0.045588	0.142421	0.145813	-0.031662
Sample 176	0.186882	0.197997	-0.034785	0.134957	0.142984	-0.025120
Sample 177	0.230195	0.225946	-0.030415	0.131772	0.129339	-0.017411
Sample 178	0.131119	0.141117	-0.024556	0.255152	0.274605	-0.047786
Sample 179	0.226118	0.223921	-0.040184	0.134960	0.133649	-0.023984
Sample 180	0.166867	0.174077	-0.045343	0.186310	0.194361	-0.050627
Sample 181	0.125182	0.135531	-0.016001	0.206271	0.223323	-0.026366
Sample 182	0.074875	0.080756	-0.012980	0.339635	0.366314	-0.058879

Sample 183	0.134738	0.147714	0.027070	0.164949	0.180834	0.033140
Sample 184	0.172395	0.173137	-0.028831	0.210438	0.211344	-0.035193
Sample 185	0.137179	0.136148	-0.034274	0.285455	0.283309	-0.071321
Sample 186	0.172496	0.170017	-0.023582	0.128677	0.126828	-0.017592
Sample 187	0.166141	0.160102	-0.027651	0.150282	0.144819	-0.025012
Sample 188	0.187664	0.202280	0.016340	0.170479	0.183756	0.014844
Sample 189	0.140796	0.151581	0.009223	0.238375	0.256634	0.015614
Sample 190	0.168171	0.174162	-0.019565	0.141695	0.146743	-0.016485
Sample 191	0.148976	0.153424	-0.028574	0.201206	0.207213	-0.038592
Sample 192	0.071554	0.071376	0.006375	0.266577	0.265913	0.023750
Sample 193	0.161017	0.162908	-0.051883	0.150918	0.152690	-0.048629
Sample 194	0.183975	0.175526	-0.016037	0.108168	0.103200	-0.009429
Sample 195	0.131704	0.135179	0.028480	0.236464	0.242704	0.051133
Sample 196	0.233287	0.231854	-0.016837	0.160679	0.159693	-0.011597
Sample 197	0.065867	0.065061	-0.009807	0.258513	0.255350	-0.038489
Sample 198	0.109712	0.101026	0.005688	0.138365	0.127411	0.007174
Sample 199	0.113205	0.108582	-0.019197	0.219578	0.210611	-0.037235
Sample 200	0.185899	0.178641	0.013974	0.175043	0.168209	0.013157
Sample 201	0.233160	0.250766	-0.028154	0.185956	0.199998	-0.022454
Sample 202	0.209401	0.206040	-0.024047	0.120009	0.118083	-0.013781
Sample 203	0.097794	0.100812	-0.013267	0.260804	0.268853	-0.035381
Sample 204	0.234852	0.238388	-0.027385	0.141019	0.143142	-0.016443
Sample 205	0.176306	0.181610	-0.025821	0.203755	0.209884	-0.029841
Sample 206	0.113836	0.111604	0.011972	0.252342	0.247394	0.026538
Sample 207	0.104541	0.105018	-0.010699	0.232835	0.233897	-0.023828
Sample 208	0.187762	0.193026	0.033047	0.185096	0.190285	0.032578
Sample 209	0.177104	0.175083	-0.009321	0.180736	0.178673	-0.009513

Sample 210	0.157020	0.153498	0.017942	0.134845	0.131820	0.015408
Sample 211	0.151615	0.146840	-0.014606	0.207138	0.200614	-0.019955
Sample 212	0.222294	0.220176	-0.012211	0.211291	0.209278	-0.011607
Sample 213	0.143595	0.136851	-0.022220	0.187491	0.178686	-0.029012
Sample 214	0.149009	0.151625	-0.034633	0.218354	0.222189	-0.050750
Sample 215	0.182225	0.170946	-0.029567	0.165491	0.155248	-0.026852
Sample 216	0.109520	0.116943	0.024752	0.216033	0.230676	0.048825
Sample 217	0.140341	0.153295	0.026931	0.196788	0.214953	0.037763
Sample 218	0.148036	0.143165	-0.030048	0.135990	0.131516	-0.027603
Sample 219	0.247338	0.243735	-0.042009	0.177177	0.174596	-0.030093
Sample 220	0.127927	0.131779	-0.022320	0.250593	0.258139	-0.043722
Sample 221	0.193748	0.198058	0.017929	0.208520	0.213158	0.019295
Sample 222	0.216742	0.219211	-0.030014	0.170676	0.172621	-0.023635
Sample 223	0.160634	0.159191	-0.020549	0.109352	0.108370	-0.013989
Sample 224	0.158957	0.170906	-0.027523	0.190139	0.204433	-0.032922
Sample 225	0.146291	0.155493	-0.022269	0.209790	0.222987	-0.031936
Sample 226	0.209535	0.214317	-0.045803	0.185729	0.189967	-0.040599
Sample 227	0.215917	0.212756	0.046341	0.130992	0.129074	0.028114
Sample 228	0.194867	0.203057	-0.040121	0.190032	0.198019	-0.039126
Sample 229	0.213280	0.214912	-0.050832	0.188518	0.189960	-0.044930
Sample 230	0.165114	0.169778	-0.032269	0.186256	0.191517	-0.036401
Sample 231	0.184968	0.182072	-0.038321	0.190924	0.187936	-0.039555
Sample 232	0.110670	0.109572	-0.016471	0.261153	0.258564	-0.038867
Sample 233	0.120899	0.115306	-0.012105	0.215763	0.205783	-0.021603
Sample 234	0.147556	0.144594	-0.012121	0.206624	0.202476	-0.016973
Sample 235	0.131148	0.130852	-0.008497	0.195156	0.194714	-0.012643
Sample 236	0.121666	0.119194	0.013917	0.184624	0.180874	0.021119

Sample 237	0.168756	0.169565	0.021136	0.160597	0.161367	0.020114
Sample 238	0.180464	0.167995	-0.034211	0.134599	0.125299	-0.025516
Sample 239	0.184231	0.180640	0.018579	0.197369	0.193522	0.019904
Sample 240	0.157129	0.156351	-0.023689	0.238557	0.237375	-0.035966
Sample 241	0.108634	0.105032	-0.015388	0.217295	0.210090	-0.030780
Sample 242	0.167821	0.166442	-0.031528	0.228083	0.226210	-0.042850
Sample 243	0.097053	0.096398	0.004727	0.231692	0.230129	0.011286
Sample 244	0.054058	0.052404	0.006899	0.224433	0.217564	0.028644
Sample 245	0.171594	0.180888	-0.026600	0.171167	0.180438	-0.026533
Sample 246	0.157394	0.156819	-0.025186	0.179712	0.179056	-0.028757
Sample 247	0.172071	0.192055	-0.020515	0.200350	0.223618	-0.023886
Sample 248	0.150597	0.157977	-0.012127	0.200605	0.210436	-0.016154
Sample 249	0.063649	0.061219	0.003630	0.280220	0.269519	0.015983
Sample 250	0.150381	0.151119	0.012890	0.202761	0.203756	0.017380
Sample 251	0.182372	0.196538	-0.045384	0.201426	0.217072	-0.050125
Sample 252	0.191801	0.194080	0.020438	0.199596	0.201968	0.021268
Sample 253	0.169520	0.173943	-0.035696	0.191271	0.196263	-0.040276
Sample 254	0.152191	0.150849	-0.012063	0.194596	0.192881	-0.015424
Sample 255	0.238214	0.249515	-0.051171	0.151557	0.158746	-0.032556
Sample 256	0.144436	0.154034	-0.023245	0.220620	0.235282	-0.035506
Sample 257	0.114573	0.112278	-0.020206	0.235094	0.230384	-0.041461
Sample 258	0.198576	0.199958	-0.021692	0.175703	0.176926	-0.019193
Sample 259	0.124501	0.125066	-0.012408	0.237760	0.238840	-0.023695
Sample 260	0.180861	0.181664	-0.022368	0.183972	0.184789	-0.022752
Sample 261	0.211365	0.219354	-0.026784	0.161251	0.167346	-0.020434
Sample 262	0.197406	0.196264	-0.024872	0.191360	0.190253	-0.024111
Sample 263	0.109166	0.102708	-0.024883	0.202855	0.190854	-0.046239

Sample 264	0.219933	0.225835	0.024217	0.103651	0.106432	0.011413
Sample 265	0.153899	0.150414	0.025100	0.245387	0.239831	0.040021
Sample 266	0.170575	0.166279	-0.021546	0.159145	0.155137	-0.020102
Sample 267	0.096792	0.094302	-0.008895	0.222632	0.216905	-0.020460
Sample 268	0.232721	0.232527	-0.036193	0.177350	0.177202	-0.027581
Sample 269	0.193160	0.195421	-0.030964	0.122497	0.123930	-0.019637
Sample 270	0.181146	0.184984	-0.044289	0.172934	0.176598	-0.042282
Sample 271	0.127750	0.129173	-0.016716	0.221056	0.223518	-0.028925
Sample 272	0.206728	0.204253	-0.021489	0.087843	0.086791	-0.009131
Sample 273	0.139509	0.139428	-0.018288	0.246249	0.246105	-0.032280
Sample 274	0.160823	0.162942	-0.013937	0.148844	0.150805	-0.012899
Sample 275	0.177756	0.186613	0.020424	0.191563	0.201107	0.022010
Sample 276	0.102081	0.104613	0.020873	0.187804	0.192462	0.038402
Sample 277	0.146392	0.145564	-0.018484	0.189461	0.188389	-0.023922
Sample 278	0.188985	0.199770	-0.036733	0.165766	0.175226	-0.032220
Sample 279	0.250967	0.239950	-0.039584	0.151112	0.144479	-0.023834
Sample 280	0.120384	0.123685	-0.020402	0.157909	0.162239	-0.026761
Sample 281	0.225247	0.235934	-0.042405	0.118717	0.124350	-0.022350
Sample 282	0.200050	0.204720	-0.038814	0.167248	0.171153	-0.032450
Sample 283	0.191361	0.188440	0.027286	0.180154	0.177404	0.025688
Sample 284	0.163153	0.169910	0.011581	0.166926	0.173840	0.011849
Sample 285	0.025329	0.025557	0.002976	0.266063	0.268456	0.031259
Sample 286	0.113682	0.117476	-0.010986	0.184426	0.190581	-0.017822
Sample 287	0.114180	0.121172	-0.009797	0.249027	0.264277	-0.021368
Sample 288	0.123003	0.121260	-0.024555	0.200878	0.198032	-0.040101
Sample 289	0.245239	0.243723	-0.029975	0.103345	0.102706	-0.012632
Sample 290	0.167906	0.170511	-0.023338	0.153462	0.155844	-0.021331

Sample 291	0.124349	0.122857	-0.023205	0.233826	0.231020	-0.043635
Sample 292	0.213860	0.221939	-0.024523	0.140754	0.146071	-0.016140
Sample 293	0.176443	0.172417	-0.023733	0.222689	0.217607	-0.029954
Sample 294	0.145871	0.145315	-0.021328	0.194179	0.193438	-0.028392
Sample 295	0.195056	0.217054	-0.033386	0.115314	0.128319	-0.019737
Sample 296	0.170183	0.167938	-0.033119	0.139451	0.137611	-0.027138
Sample 297	0.178435	0.165553	-0.029654	0.138500	0.128501	-0.023017
Sample 298	0.086015	0.089089	-0.011673	0.246942	0.255767	-0.033511
Sample 299	0.131655	0.136569	-0.009981	0.198312	0.205714	-0.015034
Sample 300	0.160992	0.166868	-0.034245	0.191175	0.198153	-0.040665
Sample 301	0.191812	0.191933	-0.031001	0.151485	0.151581	-0.024484
Sample 302	0.183474	0.187462	-0.025502	0.200004	0.204350	-0.027799
Sample 303	0.185286	0.183004	-0.017059	0.207527	0.204970	-0.019106
Sample 304	0.100630	0.094459	-0.012070	0.204085	0.191572	-0.024478
Sample 305	0.134176	0.143769	-0.012950	0.239891	0.257042	-0.023153
Sample 306	0.196949	0.200971	-0.046921	0.196751	0.200769	-0.046874
Sample 307	0.196636	0.194908	-0.044004	0.221261	0.219317	-0.049515
Sample 308	0.209335	0.203007	-0.029742	0.231455	0.224458	-0.032884
Sample 309	0.116948	0.111306	-0.015344	0.201310	0.191597	-0.026413
Sample 310	0.114953	0.112740	0.008858	0.190280	0.186616	0.014663
Sample 311	0.146218	0.160579	-0.029826	0.252141	0.276905	-0.051433
Sample 312	0.081397	0.074871	-0.011485	0.241671	0.222297	-0.034100
Sample 313	0.165167	0.163259	-0.021954	0.226859	0.224239	-0.030154
Sample 314	0.173624	0.162456	-0.014508	0.173101	0.161967	-0.014464
Sample 315	0.127715	0.122922	0.009811	0.208297	0.200480	0.016001
Sample 316	0.203779	0.195202	-0.046140	0.158479	0.151810	-0.035883
Sample 317	0.122495	0.130900	-0.020663	0.248610	0.265668	-0.041936

Sample 318	0.090452	0.089427	0.013864	0.202493	0.200199	0.031037
Sample 319	0.187046	0.187720	-0.017785	0.076641	0.076917	-0.007287
Sample 320	0.131677	0.130820	-0.013224	0.223290	0.221836	-0.022424
Sample 321	0.131606	0.141770	-0.022390	0.194617	0.209648	-0.033110
Sample 322	0.120589	0.123167	-0.019802	0.235484	0.240518	-0.038668
Sample 323	0.089759	0.085739	-0.009955	0.239040	0.228332	-0.026511
Sample 324	0.161749	0.161766	-0.031088	0.201831	0.201852	-0.038792
Sample 325	0.189721	0.187443	-0.027404	0.207201	0.204712	-0.029929
Sample 326	0.153961	0.164310	0.010204	0.121690	0.129870	0.008065
Sample 327	0.143399	0.152925	0.032652	0.217500	0.231948	0.049524
Sample 328	0.096618	0.094718	-0.025438	0.270572	0.265251	-0.071238
Sample 329	0.147630	0.144781	-0.025141	0.235305	0.230765	-0.040071
Sample 330	0.139240	0.136061	-0.016318	0.206126	0.201421	-0.024156
Sample 331	0.176832	0.190699	-0.032130	0.151780	0.163682	-0.027578
Sample 332	0.228172	0.229406	-0.013741	0.138871	0.139621	-0.008363
Sample 333	0.188781	0.194307	-0.020641	0.230597	0.237347	-0.025213
Sample 334	0.133212	0.133997	-0.017164	0.177426	0.178472	-0.022861
Sample 335	0.128290	0.126147	-0.011475	0.174500	0.171585	-0.015609
Sample 336	0.143462	0.146871	-0.017020	0.194928	0.199560	-0.023126
Sample 337	0.077824	0.082921	-0.011075	0.202426	0.215683	-0.028807
Sample 338	0.172045	0.187895	-0.023109	0.180726	0.197375	-0.024275
Sample 339	0.191780	0.191494	0.039757	0.174992	0.174731	0.036277
Sample 340	0.148088	0.143004	-0.023717	0.163179	0.157577	-0.026134
Sample 341	0.099766	0.096794	-0.016445	0.201876	0.195861	-0.033277
Sample 342	0.207554	0.211907	-0.036351	0.187528	0.191461	-0.032844
Sample 343	0.148616	0.153992	-0.035535	0.231906	0.240295	-0.055451
Sample 344	0.215711	0.228855	-0.079471	0.211533	0.224421	-0.077932

Sample 345	0.155217	0.168637	-0.032835	0.187893	0.204138	-0.039747
Sample 346	0.098442	0.098241	-0.014445	0.272568	0.272012	-0.039995
Sample 347	0.218272	0.229762	-0.029670	0.118641	0.124887	-0.016127
Sample 348	0.206763	0.196402	-0.023130	0.141563	0.134469	-0.015836
Sample 349	0.210149	0.218218	-0.037736	0.173269	0.179923	-0.031114
Sample 350	0.170714	0.171231	0.009367	0.185244	0.185805	0.010164
Sample 351	0.215482	0.205230	0.035519	0.071416	0.068018	0.011772
Sample 352	0.182931	0.178915	-0.017915	0.188300	0.184166	-0.018441
Sample 353	0.210071	0.214945	0.029122	0.118178	0.120920	0.016383
Sample 354	0.187702	0.192996	-0.031384	0.163525	0.168137	-0.027341
Sample 355	0.201313	0.208989	-0.030942	0.167025	0.173394	-0.025672
Sample 356	0.168673	0.175914	-0.037666	0.231743	0.241692	-0.051751
Sample 357	0.143768	0.133725	0.009175	0.124298	0.115615	0.007932
Sample 358	0.191426	0.189874	-0.030147	0.138636	0.137512	-0.021833
Sample 359	0.227878	0.231633	-0.044491	0.207679	0.211102	-0.040547
Sample 360	0.148161	0.152710	-0.010351	0.225180	0.232095	-0.015731
Sample 361	0.137659	0.135085	-0.019739	0.190569	0.187005	-0.027326
Sample 362	0.150411	0.154265	-0.024993	0.166161	0.170419	-0.027610
Sample 363	0.190261	0.178555	-0.018276	0.182025	0.170826	-0.017485
Sample 364	0.185181	0.194159	-0.048664	0.208434	0.218539	-0.054775
Sample 365	0.146007	0.149311	-0.021268	0.202246	0.206823	-0.029460
Sample 366	0.203349	0.203548	-0.039066	0.117254	0.117369	-0.022526
Sample 367	0.134611	0.130436	-0.010941	0.171605	0.166283	-0.013948
Sample 368	0.168112	0.177608	-0.017854	0.142139	0.150168	-0.015096
Sample 369	0.141913	0.151548	-0.019757	0.209544	0.223770	-0.029173
Sample 370	0.174504	0.172757	-0.040142	0.222149	0.219924	-0.051102
Sample 371	0.102155	0.105227	-0.020345	0.165872	0.170861	-0.033034

Sample 372	0.217449	0.211559	-0.027974	0.152115	0.147995	-0.019569
Sample 373	0.139911	0.138565	-0.036973	0.180844	0.179104	-0.047790
Sample 374	0.197029	0.202816	-0.026902	0.217231	0.223612	-0.029660
Sample 375	0.148244	0.137929	-0.017668	0.201128	0.187133	-0.023971
Sample 376	0.189229	0.183091	-0.021859	0.130960	0.126712	-0.015128
Sample 377	0.177390	0.180493	-0.019882	0.167186	0.170110	-0.018739
Sample 378	0.193402	0.198098	-0.031031	0.154484	0.158236	-0.024786
Sample 379	0.164018	0.165745	-0.036749	0.212422	0.214658	-0.047594
Sample 380	0.172656	0.186441	-0.016372	0.224079	0.241970	-0.021248
Sample 381	0.109588	0.115496	-0.017104	0.196184	0.206760	-0.030619
Sample 382	0.125772	0.125367	-0.014060	0.268308	0.267444	-0.029994
Sample 383	0.254265	0.261286	-0.025342	0.106900	0.109852	-0.010654
Sample 384	0.089259	0.085419	0.007342	0.152569	0.146006	0.012549
Sample 385	0.185276	0.187866	-0.027525	0.167251	0.169589	-0.024847
Sample 386	0.169888	0.172410	-0.017442	0.214419	0.217602	-0.022014
Sample 387	0.135821	0.139566	-0.018507	0.204782	0.210428	-0.027903
Sample 388	0.189025	0.209746	-0.027023	0.182581	0.202595	-0.026102
Sample 389	0.174011	0.178330	-0.025744	0.241049	0.247033	-0.035662
Sample 390	0.171409	0.172269	0.021231	0.160143	0.160946	0.019835
Sample 391	0.148102	0.144109	-0.029502	0.185848	0.180837	-0.037020
Sample 392	0.191734	0.187131	-0.020517	0.156151	0.152402	-0.016710
Sample 393	0.134179	0.142279	-0.021498	0.225922	0.239559	-0.036197
Sample 394	0.154367	0.161088	-0.030775	0.219620	0.229183	-0.043784
Sample 395	0.175632	0.182305	0.025529	0.179986	0.186825	0.026162
Sample 396	0.171354	0.172164	-0.022044	0.185055	0.185929	-0.023806
Sample 397	0.148815	0.147987	-0.025063	0.240626	0.239286	-0.040525
Sample 398	0.176398	0.175725	-0.037888	0.180471	0.179782	-0.038763

Sample 399	0.188236	0.195556	-0.023932	0.135918	0.141204	-0.017280
Sample 400	0.180011	0.188770	-0.023679	0.192943	0.202332	-0.025380
Sample 401	0.146907	0.153671	-0.022182	0.228562	0.239086	-0.034511
Sample 402	0.144327	0.141344	-0.026231	0.160513	0.157194	-0.029172
Sample 403	0.192059	0.199183	-0.025027	0.263336	0.273105	-0.034315
Sample 404	0.142282	0.144935	-0.027612	0.169334	0.172491	-0.032862
Sample 405	0.164178	0.164710	-0.017545	0.164975	0.165509	-0.017630
Sample 406	0.096921	0.099838	-0.011926	0.293809	0.302653	-0.036154
Sample 407	0.092745	0.088768	-0.019727	0.217944	0.208600	-0.046358
Sample 408	0.136036	0.138997	-0.034657	0.239595	0.244811	-0.061040
Sample 409	0.092922	0.093823	-0.021212	0.234600	0.236876	-0.053554
Sample 410	0.141532	0.142231	-0.026273	0.203480	0.204485	-0.037773
Sample 411	0.169411	0.180582	-0.036352	0.179895	0.191757	-0.038601
Sample 412	0.150965	0.147188	-0.019737	0.215352	0.209965	-0.028155
Sample 413	0.207090	0.205633	-0.021425	0.138709	0.137733	-0.014350
Sample 414	0.246442	0.241633	-0.043410	0.133875	0.131263	-0.023581
Sample 415	0.189938	0.180284	-0.036059	0.107942	0.102455	-0.020492
Sample 416	0.170621	0.172449	-0.015526	0.177933	0.179839	-0.016192
Sample 417	0.067685	0.068191	-0.009257	0.222888	0.224554	-0.030484
Sample 418	0.135758	0.130246	0.015064	0.161015	0.154478	0.017867
Sample 419	0.223009	0.220212	-0.053857	0.140664	0.138900	-0.033971
Sample 420	0.178365	0.182705	-0.032302	0.218601	0.223921	-0.039589
Sample 421	0.224910	0.225308	-0.038262	0.156766	0.157043	-0.026669
Sample 422	0.165493	0.182505	0.018145	0.163399	0.180196	0.017915
Sample 423	0.208377	0.211057	-0.022742	0.186013	0.188406	-0.020301
Sample 424	0.157899	0.166875	-0.017993	0.179644	0.189855	-0.020471
Sample 425	0.215716	0.215671	-0.027251	0.132420	0.132392	-0.016728

Sample 426	0.110652	0.104869	0.008611	0.220911	0.209367	0.017192
Sample 427	0.238365	0.251730	-0.044232	0.156661	0.165445	-0.029071
Sample 428	0.229316	0.239172	-0.045078	0.159578	0.166437	-0.031369
Sample 429	0.238995	0.243343	-0.056618	0.163314	0.166285	-0.038689
Sample 430	0.219595	0.221211	-0.033002	0.147609	0.148695	-0.022184
Sample 431	0.086653	0.083878	-0.011748	0.255559	0.247376	-0.034648
Sample 432	0.136490	0.141093	-0.017037	0.181907	0.188040	-0.022706
Sample 433	0.189571	0.205314	-0.028129	0.214517	0.232332	-0.031831
Sample 434	0.161391	0.171214	-0.040119	0.208278	0.220954	-0.051774
Sample 435	0.152641	0.151723	-0.029435	0.228929	0.227553	-0.044147
Sample 436	0.138698	0.135987	-0.020543	0.243533	0.238774	-0.036071
Sample 437	0.181762	0.179759	-0.030202	0.161112	0.159336	-0.026771
Sample 438	0.138824	0.135068	-0.021910	0.163440	0.159018	-0.025795
Sample 439	0.038727	0.039068	0.005800	0.247387	0.249566	0.037047
Sample 440	0.005970	0.006099	-0.000496	0.345711	0.353168	-0.028709
Sample 441	0.112990	0.108566	-0.008889	0.246716	0.237056	-0.019409
Sample 442	0.191664	0.204669	-0.030114	0.208474	0.222620	-0.032755
Sample 443	0.191294	0.187977	0.037699	0.168987	0.166057	0.033303
Sample 444	0.093684	0.095577	-0.007358	0.230728	0.235390	-0.018122
Sample 445	0.150933	0.164472	-0.008734	0.240504	0.262078	-0.013916
Sample 446	0.219797	0.216223	-0.058926	0.166223	0.163520	-0.044563
Sample 447	0.190044	0.187032	0.022090	0.132995	0.130887	0.015459
Sample 448	0.111916	0.104135	-0.020165	0.168597	0.156875	-0.030377
Sample 449	0.210155	0.205530	-0.049695	0.174306	0.170470	-0.041218
Sample 450	0.114771	0.115448	-0.017162	0.224078	0.225400	-0.033506
Sample 451	0.219300	0.206165	0.049635	0.087936	0.082669	0.019903
Sample 452	0.199453	0.208276	-0.029722	0.205029	0.214098	-0.030553

Sample 453	0.149579	0.142525	-0.033222	0.204631	0.194982	-0.045449
Sample 454	0.156706	0.159112	-0.023915	0.171647	0.174282	-0.026195
Sample 455	0.086464	0.085804	0.010556	0.152131	0.150969	0.018573
Sample 456	0.129824	0.126370	-0.025278	0.192433	0.187314	-0.037469
Sample 457	0.136956	0.136222	-0.014065	0.212344	0.211206	-0.021807
Sample 458	0.264704	0.275465	-0.056893	0.144456	0.150329	-0.031048
Sample 459	0.186420	0.180102	-0.043119	0.149260	0.144201	-0.034524
Sample 460	0.148564	0.157925	-0.021957	0.214802	0.228336	-0.031747
Sample 461	0.096765	0.091161	-0.009172	0.188259	0.177356	-0.017844
Sample 462	0.105591	0.112032	-0.011536	0.231347	0.245459	-0.025276
Sample 463	0.172557	0.177054	-0.037183	0.206198	0.211572	-0.044432
Sample 464	0.169326	0.182585	-0.028314	0.193059	0.208177	-0.032283
Sample 465	0.181973	0.178535	-0.029572	0.203384	0.199541	-0.033051
Sample 466	0.212181	0.214924	-0.041131	0.180472	0.182805	-0.034985
Sample 467	0.163862	0.162642	-0.014045	0.120764	0.119865	-0.010351
Sample 468	0.069865	0.069178	-0.020600	0.291945	0.289073	-0.086080
Sample 469	0.205920	0.212264	-0.029759	0.147905	0.152461	-0.021375
Sample 470	0.164086	0.168721	0.016718	0.144085	0.148155	0.014680
Sample 471	0.166372	0.173059	-0.026090	0.217458	0.226197	-0.034102
Sample 472	0.179469	0.182978	-0.017757	0.193305	0.197084	-0.019126
Sample 473	0.158407	0.165499	-0.021740	0.232951	0.243381	-0.031971
Sample 474	0.121719	0.128042	0.014343	0.193606	0.203664	0.022815
Sample 475	0.169809	0.186316	-0.035777	0.137827	0.151225	-0.029039
Sample 476	0.219212	0.212555	-0.057319	0.185225	0.179600	-0.048432
Sample 477	0.227881	0.237056	-0.027387	0.122060	0.126974	-0.014669
Sample 478	0.088200	0.084512	-0.009976	0.201058	0.192651	-0.022741
Sample 479	0.185228	0.192686	-0.052016	0.183049	0.190419	-0.051404

Sample 480	0.094631	0.091545	0.015316	0.187123	0.181021	0.030285
Sample 481	0.240169	0.254106	-0.037610	0.167020	0.176712	-0.026155
Sample 482	0.194662	0.201102	-0.026748	0.209107	0.216024	-0.028733
Sample 483	0.148258	0.150313	0.015774	0.210918	0.213843	0.022440
Sample 484	0.094363	0.090776	0.005993	0.205770	0.197948	0.013069
Sample 485	0.130132	0.130834	0.006818	0.239203	0.240493	0.012533
Sample 486	0.108879	0.115253	-0.012261	0.175447	0.185717	-0.019757
Sample 487	0.108808	0.110884	-0.023193	0.205697	0.209621	-0.043845
Sample 488	0.050538	0.047687	-0.011410	0.225988	0.213241	-0.051023
Sample 489	0.147234	0.134864	0.014187	0.152339	0.139541	0.014679
Sample 490	0.172414	0.172294	-0.033213	0.227818	0.227659	-0.043886
Sample 491	0.118081	0.119212	-0.016224	0.208073	0.210065	-0.028588
Sample 492	0.178876	0.173759	-0.029185	0.208950	0.202972	-0.034092
Sample 493	0.126811	0.127875	-0.014198	0.171952	0.173395	-0.019253
Sample 494	0.192866	0.196071	-0.026193	0.188715	0.191851	-0.025629
Sample 495	0.216783	0.215393	-0.031712	0.184052	0.182873	-0.026924
Sample 496	0.196753	0.197601	-0.036899	0.173106	0.173852	-0.032464
Sample 497	0.225125	0.229102	-0.042693	0.131849	0.134179	-0.025004
Sample 498	0.188916	0.204916	-0.035168	0.255643	0.277294	-0.047590
Sample 499	0.211196	0.219816	-0.033248	0.185797	0.193381	-0.029249
Sample 500	0.071531	0.067295	-0.007115	0.228457	0.214930	-0.022724

	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Authentic Leadership ->Safety Climate-> Safety Compliance	0.154913	0.044552	3.477142	0.000551
Authentic Leadership ->Safety Climate-> Safety Participation	0.155990	0.045702	3.413184	0.000694
Authentic Leadership -> Safety Climate -> Risky Behaviour	-0.016295	0.020387	0.799266	0.424516
Inclusive Leadership ->Safety Climate-> Safety Compliance	0.191416	0.041266	4.638648	0.000004
Inclusive Leadership -> Safety Climate->Safety Participation	0.192747	0.043485	4.432523	0.000011
Inclusive Leadership -> Safety Climate ->Risky Behaviour	-0.020135	0.023980	0.839661	0.401500

Mean, STDEV, T-Values, P-Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Authentic Leadership -> Safety Climate	0.222192	0.226266	0.063687	3.488796	0.000528
Inclusive Leadership -> Safety Climate	0.274548	0.275014	0.059926	4.581467	0.000006
Safety Climate -> Risky Behaviour	-0.073337	-0.074684	0.083624	0.876990	0.380913
Safety Climate -> Safety Compliance	0.697205	0.697792	0.030743	22.678128	0.000000
Safety Climate -> Safety Participation	0.702050	0.704424	0.024179	29.035602	0.000000