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Analysing employee risk perception of sustainability risk management in the oil and gas sector

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Analysing Employee Risk Perception of Sustainability Risk Management in the Oil and Gas Sector

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Abstract

The growing demand for oil and gas products has normalised catastrophes, severely disrupting the supply chain and other socioeconomic issues in many developing countries. In various oil and gas business organisations, the way of life has become the norm for stakeholder work, impacting the risk perception of employees regarding sustainability. Sustainability risk management has evolved as an essential topic that requires an in-depth understanding of how employee risk perception, top management commitment, and organisational safety culture influence sustainability risk variables. Employees of supply chain oil and gas businesses in Nigeria contributed to developing a conceptual framework and questionnaires based on stakeholder theory and a high-reliability organisation. SEM-PLS analyses were performed to verify the relevant hypotheses. The results indicate that employees' risk perception significantly influences sustainability risk management, including the influences on the organisation's safety culture and top management commitment. However, analysing sustainability criteria, economic, environmental, and social risk separately has shown mixed results, indicating different prioritisation. This study contributes to a better understanding of the boundary conditions of employee risk perception imposed by sustainability risk factors prevalent in developing nations' oil and gas supply chains. It offers organisations a theoretical foundation and practical direction to improve decision-making.

Keywords: employee risk perception, sustainability risk management

1. Introduction

As the impact of climate change has grown, its disastrous implications have increased worldwide. Therefore, insufficient climate change mitigation is one of the most dangerous and significant risks resulting in catastrophic global consequences. Global supply chains are riskier than domestic supply chains because of the numerous links that interconnect a vast network of firms. These links are prone to disruptions, bankruptcies, breakdowns, macroeconomic and political changes, and disasters, leading to higher risks and making risk management more difficult (Manuj & Mentzer, 2008). In addition to the impact that the epidemic has on people's livelihoods, dependent inequalities, and heightened danger across the region, the impact of the pandemic has a ripple effect. Because of the issues linked to the growing influence of energy consumption, the oil and gas business is dependent on sustainability on all fronts, including the economy, environment, and society. The oil and gas supply chain operates in a volatile, uncertain, complex, and ambiguous business environment, as evidenced by massive hikes in prices, terrorism, cyber security threats, natural disasters, technological failures, and pandemics. Numerous reports indicate that the top risks with the highest probability of occurrence in the next decade include extreme weather events, the failure of climate protection measures, and man-made environmental damage (World Economic Forum, 2021).

Disruptions in oil and gas supply chains continue to present significant dangers to the general public's health and safety (Adekola et al., 2016; Ambituuni et al., 2014). Since oil and gas were first discovered, the existence of risk variables that continue to have a cataclysmic

impact on the growth of the global economy and on people's lives has been made possible as a benefit of the by-products of these discoveries.

This problem is widespread in many developing nations, which often have abundant natural resources, but little infrastructure and institutional ability. These conditions offer a one-of-a-kind setting in which a particular risk culture can flourish and eventually dominate an organisation (Adams et al., 2019; Jia et al., 2018). When a company or organisation decides to embrace environmentally friendly business practices, it may have a number of different repercussions on the people who work there. They should show their support for the company's commitment to sustainability and be given the opportunity to provide input regarding the company's future plans.

As more frequent disasters are detected, appropriate steps are taken to either prevent them or manage their aftermath. Subsequently, they were converted into regular employees. Obtaining a deeper and more comprehensive awareness of the dangers posed by the many aspects of sustainability might, as a result, help eliminate strategy problems. The way in which the risk of sustainability is managed will affect not only the attitudes of employees but also their activities. Research conducted by level found that an employee's perception of risk can change on a periodic basis depending on the severity. Therefore, when the safety culture is raised, there will be a delay in the rate of increase compared with when it is dropped. This resulted in a slower overall rate of increase (Yao et al., 2018). In particular, the risk perceptions and safety attitudes of employees are essential to the creation of a safety culture in which everyone accepts responsibility for maintaining an appropriate level of safety culture (Fleming et al., 1998; Flin et al., 1996). On the other hand, most stakeholders were of the opinion that the danger posed by climate change is one of the most significant dangers that society is currently confronted with and that considerable efforts are required to solve this problem. In addition, the vast majority of respondents believe it will be exceedingly challenging to find a solution to the problem by utilising technologies that are already available (Johnsson et al., 2010). This conclusion might differ if it is considered that numerous developing nations still suffer from a widespread lack of both transitional infrastructure and options.

Employees in the oil and gas supply chain business have varying perceptions of the dangers connected with their jobs, and as a result, they tend to be either risk takers or risk averse, putting themselves in potentially hazardous situations or putting others in harm. As a result, since beliefs and attitudes regarding risks in Nigeria's oil and gas industry are the focus of this study, the primary objective is to determine the elements that contribute to the formation of those perceptions and attitudes. As discovered, the collected beliefs and knowledge of workers have a favourable influence on both their risk assessment and their attitude towards taking risks. It is crucial to note that risk perception acts as a mediator between the discovered structures and risk attitudes of employees (Elshaer et al., 2022). The diversity of dangers that businesses are exposed to has grown as a direct result of climate change, as has the deepening of existing relationships between companies and their stakeholders. As a result of the fact that sustainability policies differ from nation to nation, sociocultural and economic factors have the potential to hinder the adoption of such policies, as well as limit their implementation and effectiveness. They are working to reach a consensus among many stakeholders on issue priorities (Sam et al., 2017). Therefore, it is essential to identify the effect of sustainability issues on the value that stakeholders, both internal and external, place on the organisation; to actively incorporate sustainability into the process of setting objectives and cascading those objectives throughout the organisation's hierarchy; and to develop

concrete support for identifying, assessing, and managing the risk that economic sustainability poses (Schulte & Hallstedt, 2018). The purpose of this paper is to offer a comprehensive description of the empirical, conceptual model of sustainable risk management behaviour among workers. As a result, we investigated the sociocultural preferences of our workforce in relation to operational risk to discover how various values are associated with the possibility of environmental damage. As a result, the primary objectives of the study were to investigate (1) the impact of employee risk perception on sustainability risk management and the influence of corporate sustainability rewards on employees' perceptions of the sustainability of their employer; (2) the impact of top management commitment and organizational safety culture; and (3) the mediating effect of antecedent variables on the effectiveness of sustainability risk management.

This research studies the oil and gas supply chain in a developing nation to compare the decision-making processes. The goal of this investigation was to appreciate the disparity in employee perspectives. There may be double ramifications because of the differences in how different employees perceive risks. On the one hand, this could result in instances where there is conflict between parties. On the other hand, they can present opportunities for the development of creative solutions that can hinder the efficiency of regulations governing risk management (Santoro & Motta Zanin, 2021). In addition, the modern business world is beginning to pay more attention to the concept of sustainability risk. Employees are valuable assets for any corporate strategy that would have a significant effect on how well they perform, and any such strategy must prioritise these employees (Sarfraz et al., 2018). Additionally, environmental and social elements, in addition to cooperative governance, can be utilised to assist employees in exhibiting environmentally responsible behaviours (Kang et al., 2022). Previous research on employee behaviour has explicitly concentrated on corporate social responsibility (S. Choi, 2018; Y. Choi & Yu, 2014; Sarfraz et al., 2018). The researchers concluded that employee perceptions of corporate social responsibility have a positive impact on employee attitudes and behaviour as well as the performance of the organisation. The commitment of top management, involvement of employees, management of risks in a sustainable manner, and integration of communication in a manner that is clearly aligned with the fundamental values and beliefs of a company are essential requirements for achieving continuous improvement. However, for a business to realise its goal of achieving organisational excellence, it must first incorporate the following four essential components: commitment of the company's top management, participation of its employees, integration of communication, and sustainable risk management (Ellison, 2013).

2. Theoretical Development

The theoretical underpinning of a joint stakeholder theory and high-reliability organizational perspective is a solid foundation for further understanding the relationship between employee risk perception, organisational safety culture, and top management commitment in relation to sustainability risk management practices. This is because these theories are based on the premise that stakeholders and high-reliability organisations are interdependent.

Although their influence on sustainable supply chain management (SSCM) is of increasing interest to researchers, considering economic, environmental, and social risks, the perspective of stakeholders is essential for contributing to an in-depth understanding of the business case for sustainability (Schaltegger et al., 2019). The existing research on stakeholder influences or risks in SSCM focuses on a limited number of topics. However, a complete evaluation of both stakeholders and risk structures is lacking (Rebs et al., 2018). However, based on their analysis, the researchers came to they concluded that managing stakeholder relationships for

sustainability presents three challenges. These challenges are as follows: (1) strengthening the particular sustainability interests of stakeholders, (2) creating mutual sustainability interests based on these particular interests, and (3) empowering stakeholders to act as intermediaries for nature and sustainable development (Hörisch et al., 2014)). The vast supply chain structure, which covers business functions for upstream, midstream, and downstream, promotes the company's sustainability in the oil and gas industry. The petroleum industry helps develop both company and industrial policies (Sueyoshi & Wang, 2014). The discordance of risk perceptions among key stakeholders has been brought to the attention of many scholars, but very few offer quantifiable evidence to describe these perceptions (Zhao et al., 2016). A research is carried out in this study to explore employee risk perceptions of sustainability risk variables that are present within the oil and gas supply chain. This was done to close the identified perception gap. Employees can include their own personal beliefs and priorities in the design and execution of strategic objectives, thanks to stakeholder theory (Freeman and McVea, 2001).

According to the high-reliability organisation theory, some organisations, despite having sophisticated technology and tightly connected processes, have successfully prevented and minimised catastrophic failures while simultaneously reinforcing behaviour in organisational processes (Agwu et al., 2019). However, there is still room for improvement in the following areas: organisational safety culture, the harmonisation of safety practices and procedures across the industry, improved workforce competency, and increased workforce participation in safety activities and decision making. This may be especially pertinent in many developing countries, which seem to have higher instances of disasters within the oil and gas sectors owing to incoherent regulations, overlaps, duplications, and contradictory regulatory functions (Ambituuni et al., 2014). Hence, the high reliability organisation theory (HRO) has gained strength and legitimacy through the ethnographic study of high-risk processes from an organisational perspective, the debate of principles that produce organizational reliability in high complexity, and the conceptualisation of some of these principles into a successful generic model of "collective mindfulness" with both practical and theoretical success (Le Coze, 2019). Consequently, the concept of safety culture is convoluted and difficult to define, even for the most knowledgeable members of the organisation (Biggs et al., 2013).

2.1 Employee Risk Perception

The study of risk perception examines individuals' decisions when they are prompted to classify and appraise potentially dangerous endeavours and technology (Slovic, 1987; Slovic et al., 2004). According to contemporary theories in cognitive psychology and neuroscience, there are two fundamental ways in which human beings comprehend risk: one is through the use of an analytical system founded on formal logic, probability calculus, and algorithms, and the other is through the use of an experiential approach that is intuitive, quick, and most automatic, but is not very accessible to conscious awareness (Slovic et al., 2004). Therefore, in the context of the oil and gas industry, it is essential to comprehend the risk perception of employees. In the oil and gas industry, the term 'employee risk perception' refers to the attitudes and beliefs held by workers regarding the existence of potential dangers and threats in their place of employment. This sector is well known for its enormous risk to workers' health and safety, which can include exposure to dangerous chemicals, the possibility of fire and explosion, and the possibility of physical injury. These risk perceptions are frequently related to variables that threaten sustainability. In addition, because of the greater likelihood of supply disruptions brought about by increasing globalisation, managers have been

compelled to develop supply chain strategies that are both efficient and responsive(Sato et al., 2020). The measurement of employee risk perception has the potential to bring about a step change from the current plateau and provide a cross-sectional understanding of the oil and gas business backgrounds. Personnel requiring non-technical skills training can be selected more effectively if we consider everyone's ability to detect, assess, and react to hazardous situations, as well as their knowledge of rules and procedures and their willingness to follow them. After doing so, we can test the effectiveness of the training and determine whether or not existing hazard controls are necessary and whether or not they are effective (McGrath, n.d.)

The degree to which risks are perceived can have a significant bearing not only on the physical and mental health of employees but also on the entire safety culture of a business. According to the findings of certain studies, elevated levels of risk perception may result in an increase in stress, a decline in job satisfaction, and a loss in productivity. According to Hai-Dong et al. (2022), employees' risk perceptions have a beneficial impact on their work engagement. On the other hand, firms that prioritise safety and actively involve employees in safety culture initiatives can experience higher morale and a reduction in occurrences(Cezar-Vaz et al., 2012). It is more probable that employees will be dedicated to sustainable practices if they are aware of the hazards linked with the activities they participate in and understand how to manage these risks. For example, studies have shown that workers who are aware of the dangers associated with their jobs are more likely to take preventative measures to manage these dangers, and they are also less inclined to participate in actions that could be harmful to the environment (Bansal & Tashman, 2000).

Employees' risk perception is critical to the management of sustainability risks in several ways. Employees are often the first line of defence in recognising and reporting sustainability concerns. This is because employees are typically most familiar with an organisation's operations (Shuen et al., 2014). They have a unique grasp of the company's operations and can provide helpful insights into potential risks, inefficient processes, and other issues related to the company's sustainability (Jia et al., 2020; Jia et al., 2018). Second, the degree to which employees feel that they are exposed to danger can also impact the effectiveness of risk-reduction strategies. If workers do not believe that the risks they face are considerable or do not understand the preventative measures that have been implemented, they may not take these precautions seriously or implement them correctly(Hajmohammad & Shevchenko, 2020; Koutsandreas et al., 2022). This can lead to large sustainability risks being left uncontrolled, which, in turn, can have a detrimental impact on the organisation's reputation as well as its capacity to remain sustainable. Third, the risk perception of employees can also affect the culture of the organisation (Karimi, 2021). It is possible for an organisation's culture to contribute to the successful management and mitigation of sustainability risks if it prioritises sustainability and encourages workers to recognise and address sustainability risks in the workplace. On the other hand, the failure to mitigate serious sustainability risks can emerge from a culture that either ignores the dangers posed by the environment or does not supply its employees with the information, tools, and resources they need to deal with these dangers.

To effectively manage employee risk perception within the context of sustainable risk management, organisations must prioritise employee involvement and education. This may involve providing employees with the tools and resources necessary to address sustainability risks and incorporating employee feedback into sustainability risk assessments. Alternatively, it may entail providing employees with the tools and resources necessary to address sustainability risk. Although there are several aspects that are known to influence employee risk perception in oil and gas supply chain management, there is still a lack of comprehensive

knowledge of how these factors characterise risk. The purpose of this study is to shed light on the perceptions of individuals working in the oil and gas supply chain.

2.2 Sustainability Risk Management

Sustainability risk management can be a challenging mission in which multiple interrelated criteria exist (Khaddour and Deng, 2023). It includes several stages of mapping and identification, analysis, evaluation, planning, and implementation to reduce risks and ensure ongoing control, all of which are linked with the triple bottom line. Its management along supply chains has become more significant in recent years due to the increased complexity of the relationships between components in the chain, as well as various disruptions such as climate change or geopolitical scenarios (Burstein & Zuckerman, 2023). Sustainability risk factors have been explored in diverse ways and in several contexts. Within the context of the environmental, social, and economic impacts of present and anticipated effects on climate change, societal efforts have been made toward sustainable consumption and production (Tseng et al., 2013). However, the oil and gas industry has a significant impact on the social and economic development of societies as well as a negative impact on nearly all environmental aspects and resource depletion in many countries, making sustainability a crucial issue for the industry (Aryanasl et al., 2017). The importance of employees' perceptions of risk in sustainability risk management is often overlooked. Sustainability risk management involves the identification, evaluation, and prioritisation of environmental, social, and economic risks. These risks can significantly impact an organisation's long-term success and viability. However, in many developing countries with infrastructural deficiencies, the primary cause for the continued deterioration of the environment is the unsustainable and unregulated pattern of consumption and production. The backward attitude to "grow first, clean up later" continues in regions with rapidly growing populations that are directly dependent on natural resources (Tseng et al., 2013).

Sustainability issues in the supply chain and the recognition of the economic, social, and environmental dimensions of business performance have been discussed (Seuring & Müller, 2008). More recently, it has been expanded to include risks that could disrupt supply chains in these three dimensions, which are centred on distinct industrial sectors (Giannakis & Papadopoulos, 2016). Consequently, numerous empirical studies have examined specific industrial sectors (Abdel-Basset & Mohamed, 2020; Bashiri et al., 2021; Choirun et al., 2020). Nevertheless, sustainability risk typically focuses on social, environmental, and economic risks despite the fact that some authors have incorporated technological, governance, and institutional risks (Valinejad & Rahmani, 2018). The focus of this study is on triple bottom line factors. At the same time, social risks are impediments to the establishment of honourable and equitable actions for supply chain parties (e.g. workers, partners) and society. Environmental risks are disturbances that jeopardise the interaction between the supply chain and environment, thereby causing irreparable damage. Several studies have demonstrated that several environmental factors impact supply chain performance from an environmental perspective (Wicaksana et al., 2022). The arguments lead us to the first proposition H1 which states that

H1abc: Employees' risk perception has a significant impact on sustainability risk management.

H1d: Employee risk perception has a significant impact on top management commitment.

H1e: Employee risk perception has a significant effect on organizational safety culture.

2.3 Top Management Commitment and Organisation Safety Culture

Research has shown a clear link between top management committees and organizational safety culture within the oil and gas supply chain. Previous results suggest that more proximal influences, such as perceived management commitment to safety and the efficacy of safety measures, have a greater impact on workforce behaviour and subsequent accident rates than fundamental national values (Mearns & Yule, 2009). The top management of a company needs to demonstrate its dedication to both the organisation's safety culture and sustainability risk management to create a programme for managing sustainability risks successfully. According to (O'Dea and Flin (2001) and Wijethilake and Lama (2019), this sets the tone for the rest of the organisation and highlights the necessity of sustainability risk management. In addition, it guarantees the availability of resources to put systems in place to address sustainability risks and maintain those processes. Businesses can improve their competitiveness in this manner while simultaneously exhibiting leadership in the transition to a more sustainable business model (Schulte & Hallstedt, 2018). Especially considering that Top management commitment is the most critical factor determining the success or failure of TQM implementation in oil businesses (Aletaiby et al., 2021).

This communicates to the rest of the organisation that sustainability risk management is a priority and that appropriate resources will be provided to support these projects. Additionally, this illustrates that the organisation is committed to reducing its environmental impact. When upper management demonstrates commitment to the management of sustainability risks, it increases the likelihood that it will receive the support and involvement of employees, which in turn can improve the performance of the business in managing sustainability risks.

However, resistance to change and a lack of support for these activities might emerge if employees' risk perception does not coincide with top management's commitment to sustainability risk management. This can be an especially difficult challenge to overcome in the oil and gas supply chain, as employees may have a limited understanding of sustainability risks and fail to recognise the necessity of incorporating these risks into their day-to-day activities. For businesses to effectively manage the risk perceptions of their employees, they need to provide open communication, consistent training and education, and employee participation in safety processes. According to O'Dea and Flin (2001), this may involve incorporating employee input and suggestions into risk assessments, involving employees in incident investigations, as well as recognising and rewarding safe behaviour. Additional work is needed in a number of areas, including the standardisation of safety culture, harmonisation of safety practices and procedures across the industry, improvement of workforce competency, and increase of workforce participation in safety activities and decision-making. Insecurity is also caused by people's perceptions of the risks posed by disasters and tragedies. According to earlier studies, low levels of dedication and involvement in safety work by management and other employees, discontent with the current state of safety, and inadequate support are all factors that are predicted to enhance an employee's impression of the danger posed (Rundmo & Sjöberg, 1996). In addition, more specialists are influenced by common cultural denominators; as a result, they might have comparable patterns of risk perceptions when they are at work (Karimi, 2021). Therefore, it was discovered that the collected beliefs and knowledge of workers had a favourable impact on both their perception of and attitude towards risk (Elshaer et al., 2022). As a result, a connection between the dedication of top management and the safety culture of an organisation is proposed.

H2a: Top management commitment has a significant impact on organisational safety culture.

H3a,b,c: Top management commitment has a significant impact on sustainability risk management.

H4a,b,c: Organisation safety culture has a significant impact sustainability risk management(a; environmental,b;social,c;economic risk)

The illustrative model in figure 1 is used as the basis for our analysis of the context of our model, which contains four latent variables: employee risk perception, top management commitment, and organizational safety culture formed from reflective measures of the construct, while the high-order construct sustainability risk management is the latent variable from the formative measure variable of sustainability risk management created from a reflective formative hierarchical model from a low-order construct of economic, social, and environmental risk factors in the model. Sustainability risk factor categories were selected, evaluated, and classified based on a literature review and expert opinion which was used to develop a hierarchical structure.

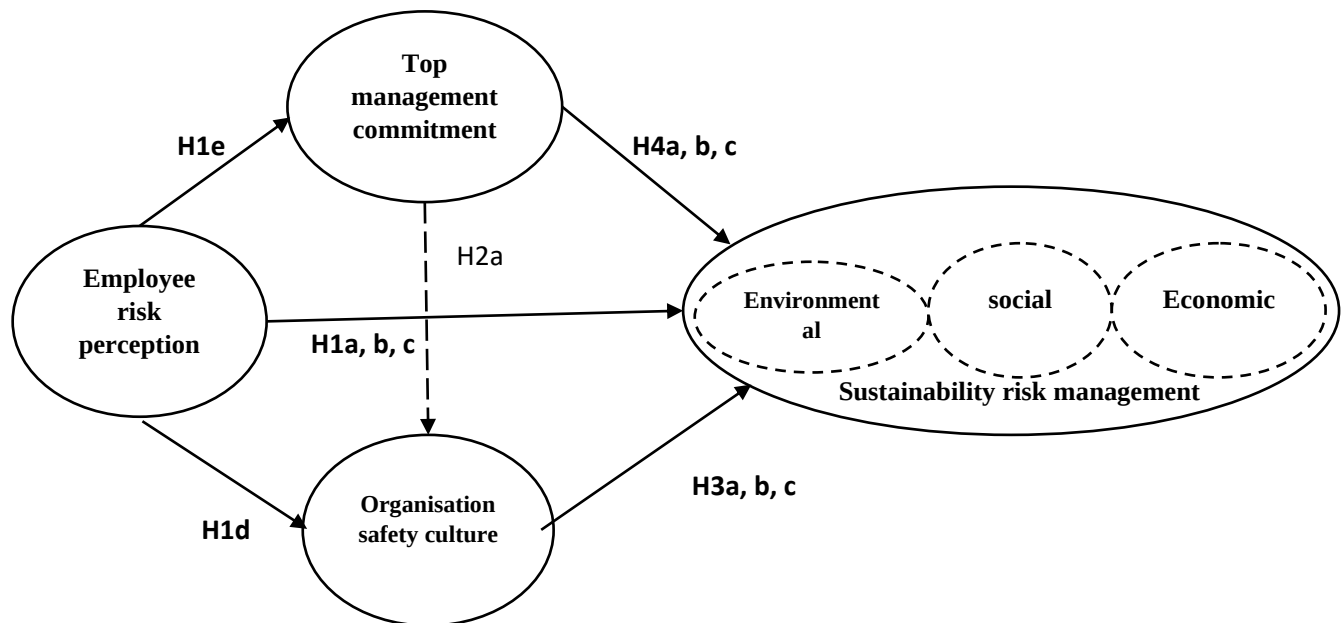


Figure 1: conceptual model for sustainability risk management

3. Methodology

An exhaustive assessment of prior research was performed as the first step towards accomplishing the goals of this study. After gaining an understanding of the body of knowledge in sustainability risk management in general and specifically oil and gas supply chain, it was recognised that input from industry practitioners was required in order to provide to evaluate their respective practices This was done in order to provide a framework for future research. Consequently, a survey questionnaire was devised and sent to companies

in the oil and gas supply chain. This study aimed to explore the risk perception of employees working in Nigerian oil and gas supply chain companies using a cross-sectional methodology. This sector was selected for several reasons. By isolating a single industry at the national level, we can better understand the factors that are unique to a particular nation as well as the activities and sectors that are relevant to that nation (Sarkis et al., 2010). Nigerian full-time workers in the oil and gas supply chain responded to an online questionnaire between December 2021 and March 2022. Responses that met the requirements were collected using a web-based questionnaire.

Respondents were contacted via email and LinkedIn and directed to an online questionnaire that they subsequently filled out voluntarily. A survey with two separate waves was conducted to mitigate the common method bias. We were provided with complete information that was matched for 206 workers who were distributed across the various categories of the oil and gas supply chain displayed in Table 1. SPSS and Smart PLS 3.0 were both utilised during the processing of the dataset. The findings of the explanatory and confirmatory factor analyses are reported in addition to descriptive statistics.

In this study, we used failure mode and effects analysis (FMEA) to identify and gain access to various sustainability risk factors. We did this by using the risk perception of employees to conceptualise the model, with the goal of establishing a generic response by utilising an antecedent variable from the existing body of literature on organisational safety culture and top management commitment as part of the critical construct variables.

Table 1 Demographic of respondents

		Frequency	Per cent
Age Range	18-24 years	23	11.2
	25-34 years	58	28.2
	35-44 years	73	35.4
	45-54 years	41	19.9
	55-64 years	7	3.4
	Above 65 years	4	1.9
	Total	206	100
Education	Not more than Secondary/technical education	12	5.8
	University Graduate/Higher National diploma	104	50.5
	Post Graduate education M.SC., MBA	86	41.7
	Doctoral level and above, PhD	4	1.9
	Total	206	100
Experience	Less than 5 years	61	29.6
	5-10 years	60	29.1
	11-15 years	55	26.7
	16-20 years	17	8.3
	More than 20 years	13	6.3
	Total	206	100
company size	Medium size (50-249)	61	29.6
	Large company (250-1000)	56	27.2
	Very large (international above 1000)	58	28.2
	Government-owned	28	13.6

Others specific	3	1.5
Total	206	100

Using principal component analysis to determine whether the correlation matrix was appropriate for factor analysis was acceptable at 0.75. and was significant at $p < 0.001$. In addition, Bartlett's test of sphericity indicated that the communalities were above 0.60 for principal component analysis and the proportion of variables explained. The eigenvalue explained 65.98% of the loading communities for total variance at 15 factors above an eigenvalue of one. This would help understand the number of variables which support the hierarchical component model.

In addition, Harman single factor analysis was performed to ensure that no common method bias indicated a variance of 13% using principal axis factoring which is far less than 50%, which enables us to conclude that there is no common method bias.

Table 2 shows the latent variables with item loadings, average variance extracted (AVE), Cronbach's α , and composite reliability for each latent variable. The study first assessed reliability using Cronbach's $\alpha=0.7$ (Chin, 1998). Since all the latent variables were reported to have Cronbach's $\alpha=0.7$, the measures were deemed reliable. Convergent validity was assessed using multiple criteria: item loading (W0.70), statistical significance, composite construct reliability, and AVE(0.50) (Fornell and Larcker, 1981). Discriminant validity was assessed using the square root of the AVE for each latent variable and its correlations with other latent variables (Fornell and Larcker, 1981).

As indicated in Table 2, standardised item loadings range from 0.63 to 0.84, composite reliabilities range from 0.8 to 0.88, and AVE values range from 0.48 to 0.61. In Table IV, the square root of the AVE for each construct is more significant than its correlation with all other constructs. Hence, these results show an acceptable level of reliability and convergent and discriminant validity; however, the cross-loadings were excluded because it was a hierarchical component model designed with a reflective-formative indicator, as shown in Table 2 below.

However, validation of the formative indicators, the variance inflation factor, was examined which showed no evidence of collinearity (F. Hair Jr et al., 2014; Hair et al., 2012). Subsequently, outweight and out loading were examined which indicated that only one variable was insignificant for both criteria with less than 0.5 loading. Therefore, we retain all formative indicators for sustainability risk management, as described below.

	Outer weight	T Statistics	P Values	Outer loading	P Values	VIF
RSMA -> SRM1	0.23	1.262	0.207	0.164	0.388	1.006
RSMB -> SRM2	0.541	1.819	0.069	0.554	0.066	1.010
RSMC -> SRM3	0.393	2.692	0.007	0.567	0.000	1.047
SRFA -> SRM1	-0.448	1.945	0.052	-0.34	0.114	1.014
SRFB -> SRM2	-0.666	1.522	0.128	-0.598	0.138	1.039
SRFC -> SRM3	-0.523	4.439	0.000	-0.48	0.000	1.047
SRVA -> SRM1	0.928	3.584	0.000	0.873	0.000	1.013
SRVB -> SRM2	0.634	1.863	0.063	0.477	0.07	1.037
SRVC -> SRM3	0.734	6.661	0.000	0.717	0.000	1.044

A &1; environmental criteria, B&2 social criteria, C&3;economic criteria denote at the end

Using PLS, we evaluated the path values and associated significance (t-statistics). Table 3 summarises the results of hypothesis testing. The proposed model explains 29.5% of the variance in sustainability risk management. In addition to top management commitment (35.5) and organisational safety culture (11.6). Following Chin (1998), R^2 values of 0.67, 0.33 and 0.19 suggest substantial, moderate, and weak predictive power, respectively, of the model under consideration. Hence, the proposed model exhibited weak-to-moderate predictive ability. Figure 2 summarises the hypothesis testing results in a structural model. In addition, the NFI value of 0.67 which was less than 0.90, and SRMR of 0.073 were considered a good fit.

Table 2: AVE, Composite Reliability, Cronbach Alpha, and Discriminant Validity

	Cronbach's	Reliability	(AVE)	ERP	OSC	SRM	TMC	R ²
ERP	0.63	0.8	0.57	0.76				
OSC	0.84	0.88	0.48	0.36	0.69			0.116
SRM1,2,3				0.37	0.48			0.295
TMC	0.84	0.88	0.61	0.34	0.57	0.42	0.78	0.355

Hierarchical Component Models

In some instances, the constructs that researchers wish to examine are complex and can also be operationalised at higher levels of abstraction. Therefore, a higher-order two-stage approach was used because it has better parameter recovery in this study on the various categories of sustainability risk management which include economic, social, and environmental risk factors, were examined using the frequency, severity, and risk response criteria for each conceptualised as a two-dimensional construct with dimensions relating to sustainability risk management. This reduces the variable from 15 construction to four representing TMC, SRP, OSC, and SRM. Thus, instead of modelling the two lower-order components related to a single multidimensional higher-order construct. This modelling approach leads to more theoretical harmony, reduces model complexity, and can avert confounding effects in multidimensional model structures such as multicollinearity (Hair et al., 2012). Theoretically, this process can be extended to any number of multiple layers; however, researchers usually restrict their modelling approach to two layers. It provides a review and evaluation of different approaches to modelling higher-order constructs using PLS-SEM, offering a tutorial on how to set up and evaluate hierarchical component models (F. Hair Jr et al., 2014; Henseler et al., 2015). A higher-order two-stage analysis is performed using the outer weight to create a factor for the sector.

Subsequent PLS path model analyses reveal that all measures meet the commonly suggested criteria for measurement model assessment; specifically, the analyses show that all indicators exhibit loadings above 0.70, and that the constructs' average variance extracted (AVE) values are above 0.50. Similarly, all constructs achieved high composite reliability values of 0.80 and higher. Two approaches were used to assess the constructs' discriminant validity. First, we examined the indicators' cross-loading, which revealed that no indicator loaded higher on an opposing construct (Hair et al., 2012). Second, we applied Fornell and Larcker's (1981) criterion and tested whether each construct's AVE was more significant than its squared

correlation with the remaining constructs. Both analyses clearly indicate that the constructs exhibit

Result

		Original (O)	Mean (M)	(STDEV)	T Statistics	P Values
H1d	ERP -> OSC	0.186	0.192	0.07	2.67	0.008**
H1a, b, c	ERP -> SRM	0.196	0.204	0.074	2.638	0.008**
H1e	ERP -> TMC	0.34	0.349	0.078	4.349	0.000***
H3a, b, c	OSC -> SRM	0.30	0.312	0.08	3.755	0.000***
H2a	TMC -> OSC	0.506	0.507	0.066	7.709	0.000***
H4a, b, c	TMC -> SRM	0.187	0.203	0.092	2.02	0.043**

*p < .10. **p < .05. ***p < .001

Overall, these results provide clear support for the measures' reliability and convergent bootstrap analyses using 5,000 samples and a number of cases equal – have a significant effect on SRM. The independent variable employee risk perception has a significant relationship with top management commitment ($\beta = 0.34$, $p < 0.001$), organizational safety culture ($\beta = 0.186$, $p = 0.008$), and sustainability risk management as it pertains to economics ($\beta = 0.196$, $p = 0.008$), supporting the hypothesis that results proposed that employee risk perception plays a significant role in sustainability risk management.

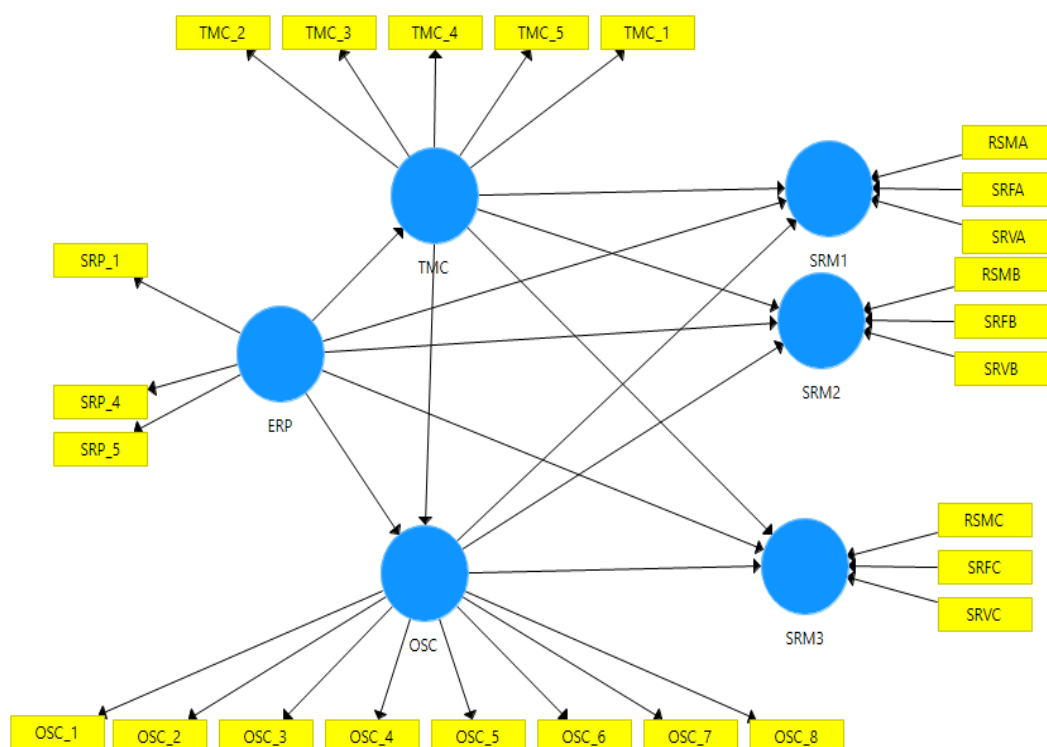
Furthermore, organizational safety culture has a significant impact on sustainability risk management ($\beta = 0.30$, $p < 0.001$). Top management commitment was perceived to have a substantial impact on organizational safety culture ($\beta = 0.506$, $p = 0.001$). However, to gain further insight into the categories of sustainability risk, economic, social, and environmental factors were considered separately. This result indicates that employee risk perception is significant for organisational safety culture ($\beta = 0.186$, $p = 0.006$) and top management commitment ($\beta = 0.341$, $p < 0.0001$). However, among sustainability risk factors, employees perceived only a significant relationship with economic risk factors ($\beta = 0.191$, $p = 0.014$), environmental factors ($\beta = 0.073$, $p = 0.380$), and social risk factors ($\beta = 0.18$, $p = 0.143$).

However, organizational safety culture is perceived as a significant environmental ($\beta = 0.186$, $p = 0.008$) and economic risk factor ($\beta = 0.186$, $p = 0.008$), but lacking as it pertains to social risk factors ($\beta = 0.186$, $p = 0.008$). Finally, top management commitment was perceived as crucial for organizational safety culture ($\beta = 0.504$, $p < 0.001$); however, employees concluded that top management was not a significant commitment to sustainability risk factors for all three criteria, especially social factors ($\beta = 0.091$, $p = 0.335$).

	Original	Mean (M)	S(STDEV)	T Statistics	P Values	
ERP -> OSC	0.186	0.191	0.068	2.743	0.006	supported
ERP -> SRM1	0.073	0.075	0.083	0.877	0.380	Not supp
ERP -> SRM2	0.18	0.157	0.123	1.464	0.143	Not supp
ERP -> SRM3	0.191	0.192	0.077	2.466	0.014	supported
ERP -> TMC	0.341	0.349	0.078	4.398	0.000	supported
OSC -> SRM1	0.202	0.203	0.108	1.875	0.061	supported
OSC -> SRM2	0.214	0.182	0.141	1.519	0.129	Not supp
OSC -> SRM3	0.271	0.276	0.077	3.493	0.000	supported

TMC -> OSC	0.504	0.504	0.066	7.615	0.000	supported
TMC -> SRM1	0.193	0.189	0.131	1.471	0.141	Not supp
TMC -> SRM2	0.091	0.084	0.094	0.964	0.335	Not supp.
TMC -> SRM3	0.145	0.152	0.091	1.59	0.112	Not supp

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4. Discussion of Result

The findings of many statistical studies paint an illuminating picture of the linkages between employee risk perception, organisational safety culture, and top management's commitment to sustainable risk management in the context of the oil and gas supply chain. The tables present a complete analysis of the evidence that either supports or refutes the hypotheses created as a result of our research based on an intensive survey of the relevant literature. In general, these findings have important repercussions for future research and for managers.

The present study on sustainability risk management investigates employee risk perception, top management commitment, and organisational safety culture in terms of individual capacity. According to (Enya et al. (2020), Giannakis and Papadopoulos (2016), and Hörisch et al. (2014), we analyse these antecedent variables in the context of employee risk perception. Previous studies have revealed that sustainable supply chain management (SSCM) is an essential organisational concept for maximising profits by minimising environmental risk and effect while simultaneously improving economic and social efficiency

components(Raut et al., 2017). The findings indicate that employee risk perception evaluates each component of the triple bottom line on its own. Therefore, their effect on environmental risk is far less significant than that of social and economic risk variables. This viewpoint also includes evidence that top management is perceived as not being committed to a large degree, which is explained by concerns regarding risks to the environment and social and economic factors. However, the social risks associated with this situation have been ignored. When taken in its entirety, previous studies indicate that top management commitment has a positive effect on sustainable risk management(Wijethilake & Lama, 2019), and when compared separately, its impact is far less significant, indicating disparity in prioritisation. On the other hand, it was decided that the safety culture of an organisation was necessary for all of the requirements for sustainable risk management. However when analysis separately likewise indicated different between social risk factors when compared to environmental and economic risk factors

Therefore, we contribute to the improvement of the evaluation of sustainability risk, which has been considered fundamentally more difficult to quantify using traditional risk management criteria, thereby making comparability on typical scales difficult or impossible. This perception stems from the use of traditional risk-management criteria. Most of the time, the risks associated with sustainability are determined by the perspectives of various stakeholders as opposed to objective measures such as regulatory requirements (Cort & Gudernatch, 2014). Adapting (Giannakis & Papadopoulos, 2016)using FMEA as a quantitative tool for examining the elements that contribute to sustainability risk

Existing research on the management of sustainability risks provides copious evidence that top management commitment, organisational safety culture, and employee risk perception all contribute to better management, but our findings provide further insight into these relationships. Our findings suggest that the capacity for data analytics contributes to increased supply chain resilience and competitive advantage. This is indicated by the fact that this is the case here. Our research has shown that, to appreciate the gap and obtain insight into how employees prioritise risk perception, access to each sustainability criterion ought to be managed in a manner that is distinct from the others. As a result, the findings of our research contribute to the existing sustainability risk management literature. It has been hypothesised that top management commitment, organisational safety culture, and the management of sustainable risks are all influenced by employees' perceptions of the risks involved. However, senior management and personnel have different priorities for each criterion, which might potentially affect decision making in the oil and gas sectors by employing empirical data. We conducted an empirical study to investigate the effect of employee risk perception on the management of long-term sustainability risk associated with the oil and gas supply chain. In addition, we investigated the moderating effect of organisational safety culture and top management commitment on this relationship. These findings contribute to scholarly discussions on the intersection of stakeholder theory and the role of sustainability (see (Hörisch et al., 2014; Matos & Silvestre, 2013; Schaltegger et al., 2019)).

5. Conclusions

The data collected for this study must be carefully analysed in light of Nigeria's economic and social situations. It would be unrealistic to assume that Nigerian businesses adhere to sustainability risk-management guidelines. Therefore, we must be cautious about generalising the situation in Nigeria to all developing nations, especially those with lower-middle incomes. Even so, we consider the population size of the developing markets.

Furthermore, the employee risk perception aspect of the constructs we have investigated here should not be confused with actual organisations, which require real data from enterprises. As studies on the sustainability risk response of enterprises have focused on organisational or managerial perspectives (Matos & Silvestre, 2013; Roehrich et al., 2014; Sajjad et al., 2015), few have addressed employees who are essential to the implementation of sustainability.

This study addresses employee risk perception priority problems in the oil and gas supply chain as they relate to the sustainability risk management of enterprises in developing countries. This finding supports previous research that concluded that risk perception plays a significant role in the decision-making process (Al Nahyan et al., 2021; Harclerode et al., 2016; Santoro & Motta Zanin, 2021). Overall, these studies suggest that top management's commitment to safety is critical for creating and maintaining a strong safety culture in an organisation. Top management should prioritise safety and actively demonstrate commitment to safety through their actions and decisions to foster a safer work environment. This suggests that employee risk perception can strongly influence top management's commitment to safety and organizational safety culture (Wei & Kuo, 2023). Organisations should prioritise employee involvement in safety activities and actively demonstrate their commitment to safety through their actions and decisions to foster a safer work environment.

Given the dangerous nature of oil and gas supply chain activities, employee concerns are crucial motivators. These employee concerns influence top management commitment and organisational safety culture in sustainable risk management systems for the oil and gas industry when trust and transparency are lacking. The present study was restricted to Nigeria. In addition, industry employees were selected using a non-discriminatory exponential snowballing technique. The findings also reveal that commitment to senior management is vital for the adoption of effective sustainability risk management policies. However, most employees inside the sampled firms do not consider environmental risk as significant as economic or environmental risk. In addition, the results indicate that organisational safety culture and top management commitment are essential for sustainability risk management, with the exception of social risk factors for top management commitment. In conclusion, this study provides an important contribution to the literature by proposing a conceptual model for sustainability risk management that considers employee risk perception and evaluates it in a developing country environment. Employees of the oil and gas industry are a significant driver of sustainability risk management in the oil and gas industry. The lack of concern for environmental risk factors can be partially attributed to major social and economic issues that hinder their ability to perceive the long-term effects of environmental neglect in developing countries. Therefore, understanding an employee's risk tolerance to assess their aversion or tolerance can aid in the development of more effective policies. This argument provides empirical support for the conclusion that different categories of stakeholders exert varying levels of influence in sustainable supply chain decision areas, and that the level of impact varies depending on whether the sustainability issue is environmental or social (Meixell & Luoma, 2015). Another study examined the importance of employee risk perception on sustainability risk management using stakeholder theory and a highly reliable organisation to further understand how antecedent variables, including top management commitment and organizational safety culture, impact SRM. However, like other survey-based studies, it has certain limitations, including a focus on only employees of oil and gas supply chains which are single informants. Given that the study design involved a cross-sectional approach which assesses variables at one time, it cannot demonstrate causal correlations between variables and how variables change over time; therefore, the application limits generalisability. However, this strategy provides an overview of the phenomena, and therefore, interpretation has certain constraints.

However, sufficient effort has been put into research design to ensure reliability and validity. Future research should focus on other stakeholder groups, including external stakeholder groups and managerial perspectives, given their role in decision making and examining other antecedent variables that impact sustainability risk management. In addition, a comparative analysis between different companies or sectors, culture, or regions is conducted using a mixed method to gain more insight into sustainability risk management.

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