INTERNATIONAL JOURNAL OF INDUSTRIAL MANAGEMENT
ISSN: 2289-9286 E-ISSN: 2590-3594
VOLUME 20, NO. 2, 2026, 76 - 85
DOI: https://doi.org/10.15282/ijim.20.2.2026.12173

REVIEW ARTICLE

Investigating the organisational safety culture factors in the oil and gas industry: A systematic review

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Abstract - The oil and gas industry is one of the major contributors to global economic growth and industrial development. However, its operation is high-risk with challenges such as human error, chemical hazards, flammable materials, high-pressure systems, and complex machinery, which can lead to accidents. A prominent solution to handle such risks is to promote and strengthen a good safety culture practice in oil and gas sites. Therefore, this study aims to investigate the organisational factors influencing the safety culture in the oil and gas industry. A systematic literature review (SLR) was conducted using the Preferred Reporting Items for System Reviews and Meta-Analyses (PRISMA) method and the data were analysed using thematic analysis. The findings revealed six organisational factors (safety rules, safety reporting, working environment, job satisfaction, accident and incidents, and technology equipment) that significantly influence the establishment of a safety culture in the oil and gas industry. This study can assist managerial personnel to strengthen their company by fostering organisational safety culture and minimise workplace accidents.

Article History
Received : 17 March 2025
Revised : 7 October 2025
Accepted : 30 November 2025
Published : 30 June 2026

Keywords
Oil and gas
Organisational factors
Safety culture
Systematic review
Safety rules

1. Introduction

The oil and gas industry is one of the most critical sectors driving global economic development. Petroleum and natural gas supply over half of the world's energy demand, serving as essential inputs for industrial, transportation, and domestic sectors (Tumanov, 2021). The industry is divided into upstream, midstream, and downstream sectors, all of which pose high operational risks due to the use of hazardous materials, high-pressure systems, and complex processes (Asad et al., 2019). Despite its economic importance, the oil and gas industry is also among the most hazardous, with the history of major industrial accidents highlighting the need for a robust safety management approach (Manca & Brambilla, 2012). These challenges go beyond technical controls and require a deeply embedded safety culture within organisations. According to Cox and Flin (1998), safety culture encompasses the shared values, beliefs, and behaviours that influence how safety is managed in a workplace. A positive safety culture helps reduce incidents, improve compliance, and support long-term operational excellence. However, the implementation of safety culture remains limited or underdeveloped in many regions, especially in developing and industrialising countries (Hien et al., 2024). Recent studies suggest that factors such as leadership commitment, psychological safety, communication, training, and safety management systems can significantly influence worker behaviour and safety attitudes (Gao et al., 2019; Meng et al., 2021). Yet there remains a lack of consensus on which components of safety culture have the greatest impact, especially in high-risk industries such as oil and gas. The Reciprocal Safety Culture Model, introduced by Cooper (2000), provides a comprehensive framework that highlights the dynamic and interdependent relationships within the organisational dimension of safety culture. This dimension emphasises the structural and procedural aspects that organisations must implement to promote a safety-oriented environment across all hierarchical levels, including leadership, management, and operational staff. The model focuses on "what people do" within the organisation, reflecting how policies, systems, and leadership practices shape collective values, attitudes, and perceptions related to safety.

In the oil and gas industry, organisational factors are instrumental in influencing safety culture. Elements such as clear safety rules, effective incident reporting systems, strong management commitment, and adequate investment in safety infrastructure play a pivotal role in enhancing workplace safety. When organisations actively support and enforce safety policies, employees are more likely to comply with safety standards and procedures. Conversely, a lack of organisational support, such as inadequate safety training, insufficient communication, or the absence of accountability mechanisms, can undermine safety culture and increase the likelihood of accidents. Prior research has demonstrated that systemic failures in these organisational domains significantly contribute to poor safety performance in the oil and gas sector (Hien et al., 2024). This study aims to examine the organisational factors that influence safety culture with particular focus on the downstream oil and gas industry in Malaysia. Strengthening these organisational dimensions is crucial for fostering a culture of safety that minimises risk, protects employee well-being, and supports sustainable industrial operations. As the industry continues to evolve, integrating organisational safety culture into strategic planning remains essential for accident prevention and long-term operational resilience.

1.1 Literature Review

1.1.1 Safety challenges in the oil and gas industry

The oil and gas industry is among the most hazardous globally, particularly in sectors involving reef information, petrochemicals, and distribution. Accidents in downstream operations often result from equipment failures, human error, inadequate safety protocols, and insufficient risk assessments, thus underscoring the critical need for a strong safety

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culture. One example is the 2020 explosion and fire at Malaysia's Pengerang Integrated Complex, where a catastrophic failure in the Diesel Hydro Treating (DHT) unit resulted in five fatalities and significant damage. International Association of Oil and Gas Procedures (IOGP) reported an increase in facilities and injuries in 2021 compared to 2022 despite a 5% rise in work hours. Fatalities also increased from 14 in 2020 to 20 in 2021 across 15 incidents. The overall total recordable injury rate (TRIR), which includes fatalities, lost-workday cases, restricted-workday cases, and medical treatment cases, rose to 0.77 in 2021, a 10% increase from 0.70 in 2020. However, the Lost Time Injury Rate (LTIR), which includes fatalities and lost workday cases, remained steady at 0.22 across the 580 reported lost workday cases, with 453 incidents contractor-related and 127 company-related. The most common causes of incidents were slips and trips at the same height and "struck by", accounting for 20% and 18% of the overall cases, respectively.

According to Houri and Sadeghi (2022), safety management is necessary for the development, utilisation, and maintenance of offshore structures like oil and gas platforms. This is because oil and gas platforms are complex structures that frequently face both internal and external challenges, such as high costs, tight schedules, and unexpected technical problems, which expose workers to high risk and create a hazardous work environment. Safety culture is a set of beliefs, norms, attitudes, roles, and social-technical practices that minimise exposure of workers, managers, customers, and the public to dangerous or harmful conditions (Hien et al., 2024). Maintaining and developing a positive safety culture is crucial for improving safety within an organisation.

1.1.2 Safety culture models and theories

Experts have developed numerous models and theories to explain safety culture, including the Reniers Model/P2T Model (Reniers, 2011), the Reason Safety Culture Model (Reason, 1997), Guldenmund's Three-Layered Organisational Culture (Guldenmund, 2000), the Reciprocal Safety Culture Model (Cooper, 2000), the Social Learning Theory (Bandura, 1977), Schein's Theory (Schein, 1992), and the Total Safety Culture or Geller's Theory (Geller, 1994) (see Figure 1). These models aim to reduce accidents and promote a strong safety culture in organisations across various industries by emphasising the psychological (how people feel), situational (what the organisation has), and behavioural (what people do) components. These models also posit that creating a strong safety culture in the oil and gas sector requires a shared understanding of the importance of safety and active participation in developing plans to reduce risks and prevent mishaps. For example, the Norwegian Petroleum Safety Authority (PSA) promotes a health, safety, and environment (HSE) culture across industries to establish a robust safety culture and raise safety awareness in Norwegian offshore operations (Elvik et al., 2021).

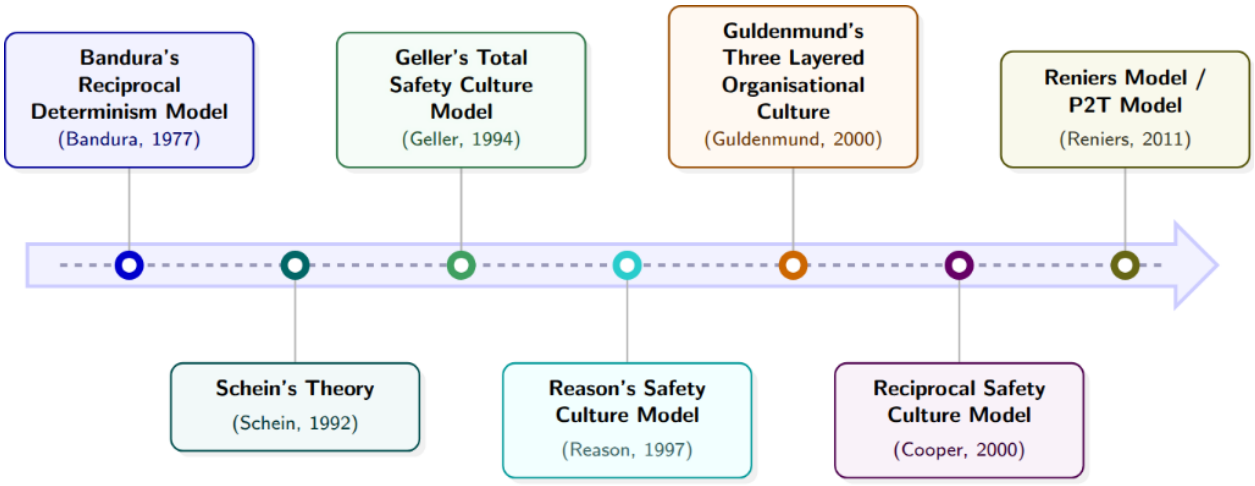

Figure 1. Safety culture models

This paper reports a systematic literature review (SLR) on the behavioural factors that contribute to safety culture in the global oil and gas industry. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method was employed to analyse relevant literature published between 2020 and 2024. The investigation was guided by the following research question: What organisational safety culture factors are required in the oil and gas industry? The findings aim to provide valuable insights and suggestions to promote further improvements in the industry, especially regarding hazards and accidents.

2. Materials and Methods

2.1 PRISMA Method

PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) is a structured approach designed to enhance the quality and transparency of systematic reviews and meta-analyses. Originally developed for healthcare research, PRISMA is now widely adopted across various disciplines to ensure comprehensive and replicable reporting of findings. It features a checklist and a flow diagram to guide researchers through each phase of the systematic review process. The first phase (identification) involves collecting potential studies from databases, reference lists, and grey literature, followed by the removal of duplicates. In the screening phase, titles and abstracts are assessed using predefined

inclusion and exclusion criteria, and irrelevant studies are excluded. The eligibility phase involves a more in-depth evaluation of full-text articles to ensure they meet specific criteria, with exclusions clearly documented. Finally, during the data abstraction and analysis phase, relevant studies are included for data extraction, evaluation, and synthesis to address the research questions. The entire process is visually summarised in a PRISMA flow diagram, which tracks study inclusion and exclusion at each stage, thereby enhancing transparency and enabling readers to understand the rationale behind each decision throughout the review.

2.2 Identification Phase

The identification phase represents the initial step in the SLR process. During this stage, appropriate keywords and search strings were developed and refined to retrieve relevant literature aligned with the research topic's core concepts. These keywords were carefully constructed to ensure a comprehensive and accurate search strategy. Advanced techniques, such as the Boolean operators and synonyms, were employed to enhance the breadth and precision of the search. The finalised search strings were then applied across multiple academic databases, including SpringerLink, ScienceDirect, and Research Gate. The process yielded 532 articles, retrieved from SpringerLink (230), ScienceDirect (82), and ResearchGate (220). The search strings used for each database are illustrated in Figure 2.

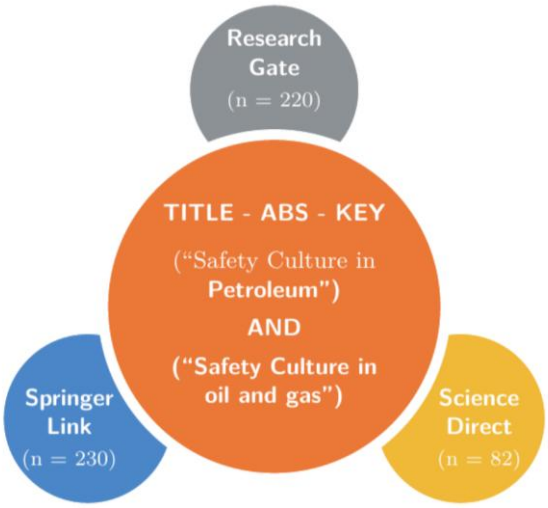

Figure 2. Search string and database used in the identification stage

2.3 Screening Phase

Following the screening phase, a total of 532 articles were retrieved from three academic databases: SpringerLink (n = 230), ResearchGate (n = 220), and ScienceDirect (n = 82). These articles were assessed against predefined inclusion and exclusion criteria established by the authors, using database filtering tools. The first inclusion criterion was the publication timeline: only studies published between 2020 and 2024 were considered relevant, and those published prior to 2019 were excluded. The second criterion focused on document type, where only original research articles published in academic journals were included, while review articles, conference proceedings, book series, and other non-primary sources were excluded. The third criterion addressed language, with only English-language articles selected to ensure consistency and eliminate potential inaccuracies. The detailed inclusion and exclusion criteria applied during the screening process are summarised in Table 1.

Table 1. The criteria for inclusion and exclusion

Criteria	Inclusion	Exclusion
Publication Timeline	2020 to 2024	2019 and before
Document Type	Journal (research articles)	Conference proceedings, review articles, book series, books, etc.
Language	English	Non-English

2.4 Eligibility Phase

During the eligibility assessment, all articles were manually screened and excluded based on predefined criteria. Prior to this stage, duplicate entries were identified and removed, eliminating three identical articles across all databases. This process left a total of 67 articles for further evaluation. These articles were then manually reviewed using the inclusion and exclusion criteria established in the earlier screening phase to determine their relevance to the topic of safety culture within the oil and gas industry. Ultimately, 17 articles were carefully selected for the literature review focusing on organisational factors influencing safety culture in the oil and gas sector.

2.5 Data Abstraction and Analysis

This phase involved extracting and synthesising key information from 17 full-text articles to address the research objectives. These articles were thoroughly reviewed for relevance, quality, and alignment with the study's focus on safety culture in the oil and gas industry. All 17 articles met the eligibility criteria and were included in the qualitative synthesis, where critical data such as study objectives, methodologies, findings, and conclusions were systematically abstracted. The analysis identified recurring themes, patterns, and gaps in the literature to ensure an evidence-based understanding of safety culture. Figure 3 summarises the PRISMA flow process for the systematic literature review, and Figure 4 illustrates the thematic analysis process of the selected articles.

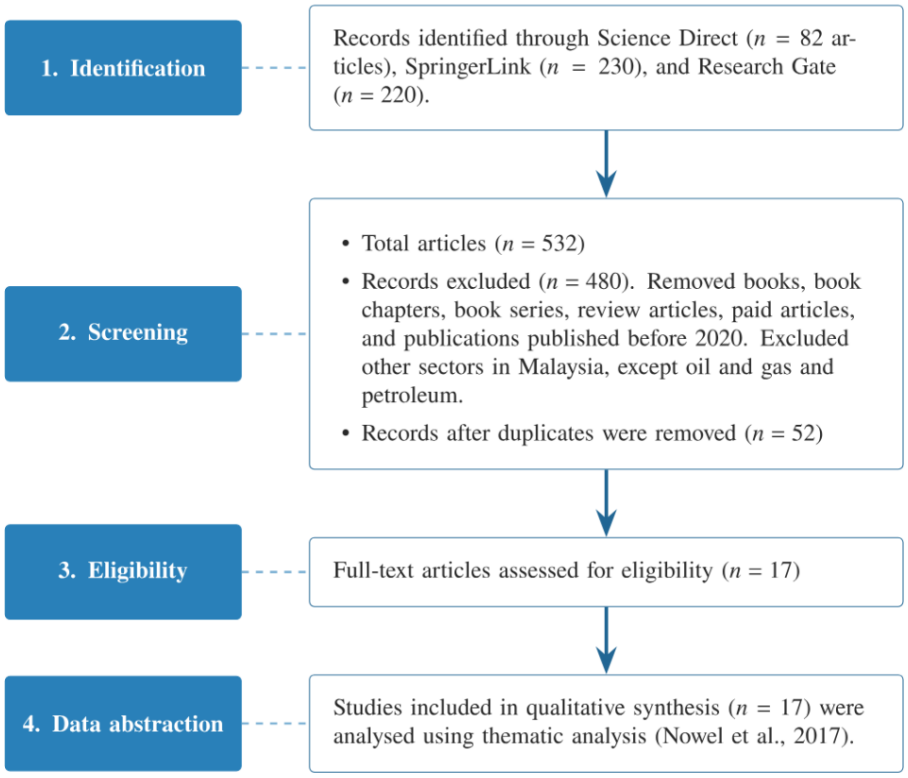

Figure 3. PRISMA method

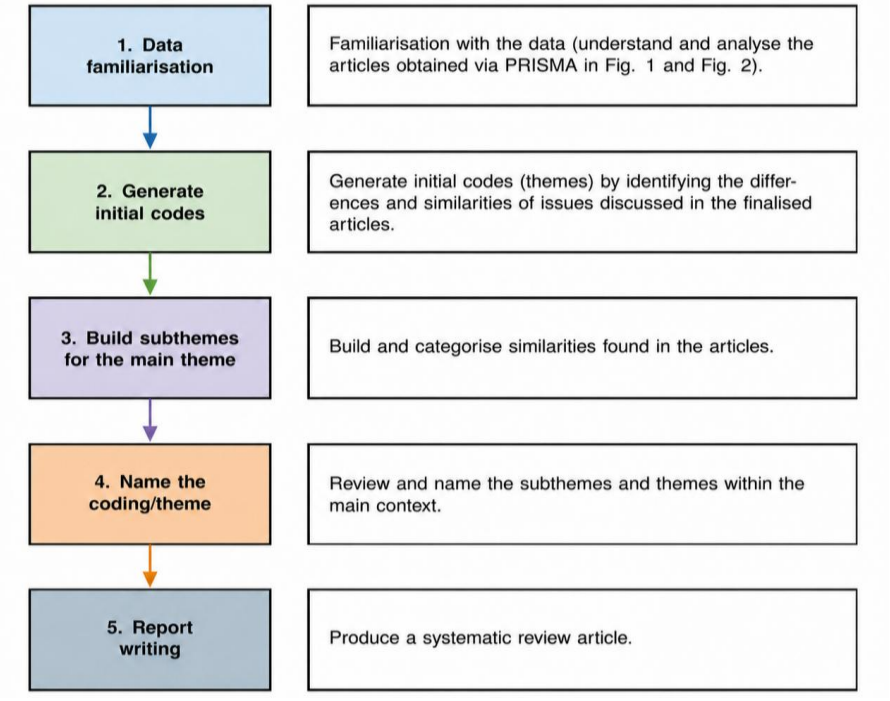

Figure 4. Thematic analysis (Nowell et al., 2017)

3. Results and Discussion

The SLR was successfully conducted to investigate the factors contributing to safety culture in the oil and gas industry. A total of 17 articles published between 2020 and 2024 were carefully analysed using thematic analysis following the procedures outlined by Nowell et al. (2017). Several safety cultures in the global oil and gas industry were established in 11 countries, including Malaysia, Nigeria, Vietnam, the United States of America (USA), Africa, Indonesia, the United Kingdom, Ghana, Turkey, Brazil, and the United Arab Emirates (UAE). Nigeria ranked first in the number of publications with 4 articles, followed by Malaysia (3 articles) and Vietnam (1 article). The main theme was organisational dimension, which comprised six factors (see Table 2).

Table 2. SLR results of safety culture in the oil and gas industry from 2020 to 2024

Authors	Year	Division of Safety	Country	Organisational Factors					
				SR	AI	RE	WE	JS	TE
Rahim et al. (2024)	2024	Downstream	Malaysia	/	/	/	/	/	/
Ehiaguina et al. (2024)	2024	Upstream, Midstream, Downstream	Nigeria	/	/			/	
Hien et al. (2024)	2024	Upstream, Midstream, Downstream	Vietnam	/			/		
Wang et al. (2024)	2024	Upstream	USA	/	/		/		/
Quaigrain et al. (2024)	2024	Downstream	Africa	/	/		/		
Masudin et al. (2024)	2023	Upstream	Indonesia						/
Babatunde et al. (2023)	2023	Downstream	Nigeria	/			/		
Oduoza et al. (2023)	2023	Downstream	United Kingdom	/			/	/	/
Olaniran & Akinbile (2023)	2023	Upstream & Downstream	Nigeria	/			/		/
Ansong et al. (2023)	2023	Upstream, Midstream, Downstream	Ghana	/			/		
Maduabuchi et al. (2023)	2023	Downstream	Nigeria		/				
Houri & Sadeghi (2022)	2022	Upstream	Turkey			/			
Almeida & Vinnem (2020)	2020	Upstream	Brazil	/					
Saedi et al. (2020)	2020	Downstream	Malaysia	/			/	/	
Kassem et al. (2020)	2020	Downstream	Malaysia			/			
Almazrouei et al. (2020)	2020	Downstream	UAE						

Legends:
SR: Safety Rule
AI: Accident and Incident
RE: Safety Reporting
WE: Working Environment
JS: Job Satisfaction
TE: Technology Equipment

Table 2 presents a summary of studies published from 2020 to 2024 that explore various organisational dimensions of safety culture in the oil and gas industry across countries and sectors. The six key dimensions assessed include Safety Rule (SR), Accident & Incident (AI), Safety Reporting (RE), Working Environment (WE), Job Satisfaction (JS), and Technology Equipment (TE). These studies span upstream, midstream, and downstream operations, with a notable concentration in the downstream sector, particularly in countries such as Malaysia and Nigeria. Rahim et al. (2024) investigated all six safety dimensions in Malaysia's downstream sector. Similarly, Ehiaguina et al. (2024) and Hien et al. (2024) covered multiple sectors (from upstream to downstream) in Nigeria and Vietnam, respectively, although each study emphasised different dimensions, such as safety rules and the working environment. Wang et al. (2024) also covered several factors in the USA, notably technological equipment and the working environment in the upstream sector.

A regional focus is evident, with multiple Nigerian studies (e.g., Ekong et al., 2023; Oduoza et al., 2023; Olaniran and Akinbile, 2023) highlighting recurring attention to safety rules, working conditions, and technological equipment in the downstream sector. Meanwhile, Masudin et al. (2023) uniquely focused on the technology aspect in upstream operations in Indonesia. Additionally, studies by Almeida and Vinnem (2020) and Houri and Sadeghi (2022) highlight safety rules and reporting practices in the upstream sector across Brazil and Turkey, respectively. In contrast, Middle Eastern studies such as that of Almazrouei et al. (2020) focused more narrowly on reporting and working-environment dimensions in the downstream sector in the UAE. Overall, the results in Table 2 revealed that while safety rules and working environment have received broad attention across most regions and sectors, dimensions such as safety reporting and job satisfaction

are less commonly explored, indicating potential gaps in current safety culture research. Figure 5 illustrates the distribution across the six organisational safety dimensions.

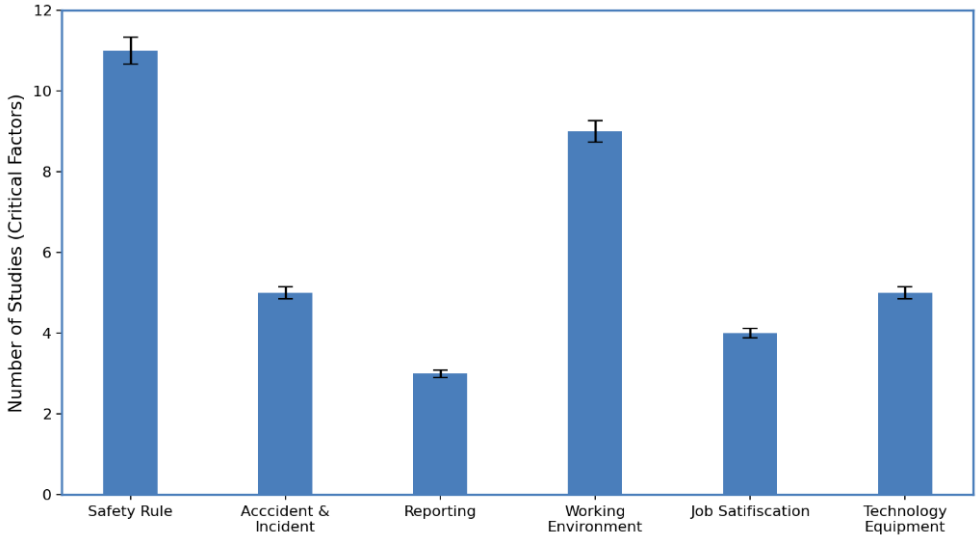

Figure 5. Distribution of articles by organisational dimension and contributing factors

Figure 6. Contributing factors of safety culture in the oil and gas industry

Safety culture is regularly cited as an important concept for understanding the state of safety in organisations. It can be understood as an analytical concept rather than an empirical entity, suggesting that safety culture is a label for the relationship between culture and safety, not a separate entity (Saedi et al., 2020). The importance of safety culture in oil and gas operations cannot be overstated, as it directly impacts the safety and well-being of workers, contractors, and surrounding communities. A well-embedded safety culture promotes vigilance, accountability, and proactive measures, which reduce the likelihood of accidents and injuries. Furthermore, preventing accidents that could lead to environmental damage plays an important role in a safety culture. Safety is integrated into aspects of operations, from leadership decisions to worker behaviour, thus encouraging vigilance and accountability. Proactive safety measures such as regular training, hazard identification, and risk assessments become second nature in organisations with a strong safety culture. By embedding these practices, the likelihood of accidents caused by human error, equipment malfunctions, or environmental conditions can be significantly reduced. Figure 6 summarises the six contributing factors for establishing an organisational safety culture in the oil and gas industry.

3.1 Safety Rule

According to Saedi et al. (2020), state safety rules refer to the next level of understanding and implementation of safety regulations and procedures by workers in the plant. Generally, safety rules are essential for managing the numerous risks associated with operations, ultimately ensuring the well-being of workers, the protection of assets, and the prevention of environmental harm. These rules focus on minimising hazards such as fires, explosions, chemical exposure, equipment failures, and accidents in high–risk environments, including offshore platforms, refineries, and pipelines. Organisations implement safety frameworks that cover personal safety, operational control, emergency preparedness, and risk management. All workers must wear personal protective equipment (PPE) to protect against physical, chemical, and environmental hazards. High-risk tasks such as welding or working in confined spaces require a strict procedure, such as a permit-to-work (PTW) system, to manage controlled activities with proper authorisation and supervision. Risk management is also conducted regularly to identify and mitigate potential dangers before commencing any operations.

Furthermore, emergency response plans are important for managing incidents such as fires or chemical spills, and drills help ensure that workers know the safe escape procedures and emergency contacts. This industry also prioritises process safety, which focuses on maintaining and inspecting critical equipment to prevent system failures that can lead to critical incidents. According to Rahim et al. (2024), organisational dimensions such as the physical working environment, safety rules, and reporting systems are also necessary for maintaining a safety culture that encourages continuous improvement and adaptability to changing conditions. Despite the awareness regarding local and international regulatory guidelines among oil and gas companies in the nation, health and safety rules and policies remain inadequate (Ehiaguina et al., 2024). Safety rules are the biggest game-changer that can help oil and gas organisations to prevent unwanted accidents and mishaps involving their workers.

3.2 Safety Reporting

Safety reporting is a critical component of safety culture for maintaining operational safety and preventing accidents. According to Ekong et al. (2023), incident reporting systems are situational factors that significantly impact safety culture in the oil and gas industry. These systems develop a safe working environment and improve safety practices by ensuring that organisations document safety-related occurrences, such as near-misses, injuries, and fatalities. Ekong et al. (2023) emphasise that organisations must create a culture in which employees feel free to report safety issues without fear of reprisal, thereby enabling effective investigations and prompt corrective actions. Incident reporting serves multiple purposes, including tracking safety trends over time, identifying common risk factors, and analysing the root causes of incidents. By leveraging this data, organisations can implement targeted interventions to enhance safety and reduce the likelihood of future incidents. Almeida and Vinnem (2020) highlight the importance of annual reviews that incorporate incident reporting data, regulatory audit results, and comparisons with international standards. These reviews contribute to safety and environmental performance reports, which are discussed in workshops to address safety challenges and develop actionable solutions. Through this structured approach, safety reporting supports continuous improvement in safety practices across the oil and gas sector.

3.3 Working Environment

The safety culture in the oil and gas industry is closely linked to the working environment, which significantly impacts workers' perspectives on safety practices and their implementation. According to Hien et al. (2024), the industry's high-pressure and intense working conditions demand psychological safety, trust, and support from leaders and colleagues. This helps workers feel secure, confident, and motivated to improve safety performance. Additionally, Rahim et al. (2024) highlight that situational factors, such as clear safety rules, incident reporting systems, and employee satisfaction, are essential for fostering a safe working environment and improving safety practices. Workers' mental and physical well-being is also a critical concern, as stress from heavy workloads, job insecurity, and harsh conditions can negatively affect alertness and decision-making. Ekong et al. (2023) stated that workplace stress and unsafe environments can reduce productivity and morale. Training and communication are vital to addressing these challenges. Leadership also plays an important role in establishing a safety culture. Hien et al. (2024) underline that leadership commitment significantly influences safety attitudes, compliance, and engagement. Furthermore, Ekong et al. (2023) emphasise that when leaders actively address safety concerns and support training programs, they set a positive example for their teams and foster a shared sense of responsibility for safety. Therefore, a strong safety culture, combined with leadership, training, and supportive environments, is essential for reconciling challenging working conditions with sound safety practices.

3.4 Job Satisfaction

Job satisfaction and safety culture are fundamentally interconnected in the oil and gas sector. A positive safety environment can significantly impact worker contentment and performance, ultimately influencing job satisfaction. Workers often feel more secure when they have strict safety protocols, well-maintained equipment, and prompt hazard response. This emphasis on safety not only reduces accidents but also boosts workers' confidence, as they feel their safety is prioritised, thus creating a sense of value and stability. Furthermore, developing a solid safety culture requires supportive leadership. Leaders who actively prioritise safety, engage their teams, and respond to safety feedback can build a culture of trust. Workers feel more respected and valued when leaders prioritise their well-being, which increases job satisfaction. Providing workers with opportunities for training and development is a vital aspect of worker empowerment. Workers who receive comprehensive safety training are better prepared to manage risks, thereby lowering stress and boosting confidence. Investing in workers' development by providing training and career advancement opportunities

demonstrates the organisation's commitment to their future and ultimately increases job satisfaction. Open communication within the organisation promotes a culture in which safety concerns can be raised without fear of retaliation. When workers feel comfortable reporting hazards and understand that their concerns will be taken seriously, the workplace becomes safer and more transparent. This open communication makes employees feel valued and engaged, which improves their overall satisfaction. Finally, work-life balance matters most in the demanding oil and gas industry, where long hours and physically demanding work are commonplace. Organisations that place a high priority on mental health care, sufficient rest, and manageable work schedules will promote a better work-life balance, which raises employee satisfaction and productivity (Oduoza et al., 2023). Similarly, employees who are acknowledged for their well-being outside of work are more likely to be happier, healthier, and more productive at work.

3.5 Technology Equipment

The global economy depends heavily on the oil and gas sectors, and integrating smart technology has become crucial to promoting sustainability, efficiency, and safety. Smart technology offers numerous advantages to the oil and gas industry, including Internet of Things (IoT) devices, advanced analytics, BD, and Artificial Intelligence (AI) (Masudin et al., 2024). Temizel et al. (2019) believe that the ability to monitor and control operations in real time is a critical component of smart technology, thereby increasing operational efficiency and reducing downtime. The technology-equipment safety culture of the oil and gas industry emphasises the use of advanced tools and systems to improve worker, asset, and environmental safety. This approach focuses on fostering a mindset in which the use of technology is integral to the organisation's safety practices. One major component is proactive risk management, which utilises predictive maintenance technologies such as AI-driven analytics and IoT sensors to detect potential equipment failures before they occur, thus avoiding accidents. Another critical component is real-time monitoring, which uses continuous monitoring systems such as drones and real-time data analytics to constantly oversee operational conditions and quickly identify potential safety hazards.

Enhanced training is equally important, as augmented and virtual reality (AR and VR) are used in immersive safety training programs, allowing workers to practice emergency responses and safe operating procedures in a controlled virtual environment, thereby reducing real-world risks. Furthermore, automated safety systems are necessary since devices such as blowout preventers and emergency shutdown systems are designed to respond quickly to hazardous situations, ultimately reducing human error and improving response time. Cloud-based platforms and advanced communication tools enable effective communication by instantly sharing safety alerts, updates, and best practices across all organisational levels. Environmental protection is also prioritised through emissions-control technologies and environmentally friendly equipment, which help reduce operations' ecological footprint, ensure regulatory compliance, and promote a sustainable culture. The utilisation of smart technology in the oil and gas sector also contributes to environmental sustainability and resource optimisation (Masudin et al., 2024).

4. Conclusions

This study highlights the critical role of organisational factors, such as safety rules, safety reporting, working environment, job satisfaction, and technology equipment, in shaping and sustaining a strong safety culture within the oil and gas industry. It demonstrates that clear safety protocols, effective reporting systems, supportive leadership, active employee involvement, and the integration of advanced technologies collectively enhance operational safety, reduce risks, and improve performance, particularly in high-risk environments such as offshore platforms and refineries. From a theoretical perspective, this study supports and extends existing safety culture models by providing evidence-based themes to inform future conceptual frameworks. It underscores the interrelationship between organisational systems and behavioural outcomes, advocating for integrated safety strategies in both research and application. From a managerial standpoint, the findings offer a practical roadmap for industry stakeholders, including safety managers, policymakers, and engineers, to assess and strengthen their internal safety structures. By focusing on these key dimensions, organisations can cultivate a proactive safety mindset, improve compliance, and align operations with both regulatory expectations and sustainability goals. Therefore, this systematic review stands as a valuable guideline for fostering safety cultures by investing in modern safety solutions and cultivating a work environment, and for promoting continuous improvement and safety excellence across the oil and gas sector.

Acknowledgements

The authors wish to thank the Faculty of Chemical and Process Engineering Technology, Universiti Malaysia Pahang Al-Sultan Abdullah.

Funding

This study was not supported by any grants from funding bodies in the public, private, or not-for-profit sectors.

Declaration of Competing Interest

The authors declare no conflicts of interest.

CRediT Authorship Contribution Statement

Abdul Azim Abdul Razak: Writing - original draft; Methodology; Validation; Formal analysis
Siti Noraishah Ismail: Conceptualisation; Visualisation; Writing - review & editing; Validation; Formal analysis

Availability of Data and Materials
The data supporting this study's findings are available on request from the corresponding author.

Ethics Declarations
This study did not involve human or animal participants, nor did it require ethical approval.

Generative Artificial Intelligence Declarations
The authors declare no use of AI tools or technologies to prepare this manuscript.

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