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Literature Review of Factors Affecting Occupational Safety Culture

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Abstract: Work safety culture has become very important for companies to implement. With a good safety culture, the company will have a lower rate of workplace accidents, higher operational efficiency, and greater trust from employees and stakeholders. Building a strong safety culture is not easy; many challenges and obstacles occur in the field. This study aims to conduct a literature review of previous research on safety culture to identify the factors that influence the development of a good safety culture in companies. The research method used is qualitative research with content analysis techniques on 17 research papers with the keyword "safety culture" downloaded from Google Scholar and ScienceDirect. The research results identified fifteen factors that influence safety culture, namely management commitment, training, rules and procedures, behavior, leadership, beliefs and perceptions, attitudes, worker competence, communication, work environment, values and norms, resource allocation, worker knowledge, rewards and motivation, and worker involvement.

Keyword: Safety Culture, Management Commitment, Training, & Leadership.

INTRODUCTION

Occupational safety is one of the important elements in the operational sustainability of various industrial sectors. In modern industry, occupational safety is an effort to protect employees from accidents. The company's strategy is to increase productivity, operational efficiency, and business sustainability (Simbolon et al., 2024). The importance of occupational safety becomes increasingly apparent as organizations face the challenges of globalization, where competition is increasingly fierce, and demands for high work standards become part of sustainability requirements.

Organizations that do not prioritize workplace safety risks face a range of negative consequences, including accidents resulting in serious injury or death, financial losses from compensation and insurance claims, and significant reputational impacts (Zgair et al., 2023). According to a report from the International Labour Organization (ILO), more than 2.3 million people die each year due to work-related accidents or diseases, and around 340 million non-

fatal accidents occur each year worldwide (Halijah et al., 2022). This fact emphasizes the importance of a strong occupational safety culture across all industrial sectors.

Occupational safety is a very relevant issue in Indonesia, especially in the energy and natural resources sector that dominates the national economy. For example, the oil and gas industry is a high-risk sector that requires extra attention in managing occupational safety (Priyoasmoro & Djunaidi, 2024). Activities such as crude oil transportation, storage, and maintenance of oil processing facilities present risks such as explosions, fires, and exposure to hazardous chemicals for workers at offshore locations. Therefore, managing occupational safety involves not only the implementation of technical policies but also cultural aspects, where all individuals in the organization have the same understanding of the importance of safety.

One effort to improve occupational safety is to foster a safety culture in the organization. Safety culture refers to the collective attitudes, values, beliefs, and practices upheld by an organization regarding occupational safety. This activity must be concerned with the commitment and priority to occupational safety at all organizational levels, influencing how employees and leadership perceive and manage occupational safety issues (Schulman, 2020). Occupational safety culture includes (Stevianingrum & Erwandi, 2022) : (1) Shared Values and Beliefs: All employees at all levels know and believe how important safety is in the workplace and prioritize safety. This value includes understanding how safety affects the organization's success, how to accept risks, and how safety is implemented into daily operations. (2) Attitudes Toward Safety: How employees think and act about safety practices. Includes whether employees feel empowered to raise their safety concerns and whether they view safety protocols as important or simply as compliance requirements. (3) Safety Practices and Procedures: The organization uses formal and informal practices, rules, and procedures to ensure safety. This includes things like establishing safety protocols and equipment maintenance, how safety information is communicated, and whether safety training is incorporated into the workflow. (4) Employee Leadership and Involvement: the degree to which management and employees collaborate to create a safe work environment. Organizations with a strong safety culture have proactive safety leadership, and employees at all levels feel accountable for maintaining a safe work environment. Essentially, safety culture reflects how deeply workplace safety is embedded in an organization's identity and day-to-day operations, influencing how individuals and teams prioritize workplace safety throughout time.

After the nuclear incident in Ukraine, known as the "Chernobyl disaster" in 1986, the results of the International Atomic Energy Agency's investigation into the explosion showed that the accident was caused by poor safety culture (Prasuad et al., 2016) . Starting from this, safety culture has developed with various models and theories, including Social Learning Theory (Bandura, 1977), Schein's Theory (Schein, 1992), Total Safety Culture or Geller's safety culture concept (Geller, 1994), Reason Safety Culture Model (Reason, 1998), Guldenmund's Three Layered Organizational Culture (Guldenmund, 2000), Reciprocal Safety Culture Model (Cooper, 2000), People, Procedures, and Technology Model (Reniers et al., 2011) and The Egg Aggregated Model (Vierendeels et al., 2018).

The safety culture model and theory generally focus on psychological, situational, and behavioral dimensions. The psychological dimension includes a person's attitude towards safety, the influence of the surrounding environment, knowledge about safety, and risk perception. The situational dimension relates to the implementation of occupational safety in the work environment, which includes the environment that allows workers to perform their tasks safely. In comparison, the behavioral dimension includes management commitment, commitment to safety, safety training, communication, investment in safety, and worker competence (Ismail et al., 2021)

Six factors influence the formation of a work safety culture: management commitment, employee involvement, training and competence, communication, compliance with regulations,

and organizational relationships. The six factors are generally categorized into four interrelated structural components of a safety culture: safety values, safety leadership, safety attitudes, and safety performance. The four components involve two aspects, namely, the individual aspect and the organizational aspect.

This study aims to conduct a literature review of the factors that influence the development of an occupational safety culture in organizations, especially in the energy and natural resources sector.

METHOD

This research is a qualitative study using the content analysis method. The content analysis research process with a qualitative approach has several stages, namely: First, the description or orientation stage, where the researcher explains what he found from the data source. The second stage is the reduction stage; at this stage, the researcher reduces all information obtained in the first stage to focus on specific problems. The information must be used is novel, significant, valuable, and fascinating. The third stage is the selection stage; at this stage, the researcher describes the focus set in more detail. In this third stage, after the researcher has conducted an in-depth analysis of the data and information obtained, the researcher can find a theme by constructing the data obtained into new knowledge, hypothesis or science (Krippendorff, 2019).

In searching the literature, researchers use original research related to topics that include national and international research that can be accessed entirely and free of charge or full access. The research that was looked up and collected was available online and was published between 2013 and 2023. Google Scholar and Science Direct were used for the first identification. The screening procedure is then guided by the abstract and title. Workplace safety culture, particularly that of the energy and natural resources sectors, was the subject of the study. The requirements for moving on to the next phase were fulfilled, including the fact that the research was completely available online. These criteria were used to find 17 studies that met the inclusion criteria.

RESULTS AND DISCUSSION

Based on the results of the research search, 17 studies were found from the time span of 2013 to 2023, with the fulfillment of previously determined inclusion criteria. Explanations of the selected studies are explained in the following table:

Table 1. Literature Search Results

No	Research By	Factors influencing safety culture
1	(Okoye & Okolie, 2013)	1. Management Commitment 2. Beliefs and Perceptions 3. Regulatory Framework 4. Education and training
2	(Latief et al., 2017)	1. Leadership 2. Policy 3. Strategy 4. Worker 5. Process 6. Behavior 7. K3 Costs 8. Contract system 9. System values 10. Partnership
3	(Machfudiyanto et al., 2018)	1. Attitude 2. Mark 3. Belief 4. Norm

No	Research By	Factors influencing safety culture
4	(Musonda et al., 2018)	5. Perception
		1. Leadership
		2. Commitment
		3. Involvement
		4. Communication
		5. Competence
5	(Tehrani et al., 2019)	6. Procedure
		1. Management Commitment
		2. Communication
		3. Security Rules and Procedures
		4. Supportive Environment
		5. Supervisory Environment
		6. Employee Engagement
		7. Personal Reward for Risk
		8. Physical Work Environment and Occupational Hazard Assessment
		9. Work Pressure
6	(Stemn et al., 2019)	10. Competency Level and Training
		1. Individual Aspects: Care and Respect, Safety Commitment and Accountability, Employee Involvement and Coaching
7	(Ojuola et al., 2020)	2. Organizational Aspects: Safety Leadership, Safety Policy and Commitment, Risk and Hazard Management, Regulatory Requirements, Objectives, Targets and Performance Measurement
		1. Leadership
		2. Values
		3. Attitude
		4. Perception
8	(Tetzlaff et al., 2021)	5. Behavior Patterns
		1. Individual Aspects: Attitude, Behavior, Characteristics, Feelings, Perception, Thoughts, Psychological, Competence, Values, Norms, Patterns, Experience, Mental, Ethical, Interpretation, Situational, Attributes
9	(Bisbey et al., 2021)	2. Organizational Aspects: Trust, Commitment, Social Practices, Attention, Safety Culture, Communication, Monitoring
		1. Leader Commitment & Safety Priority
		2. Policies and Resources for Security
		3. Cohesion
		4. Psychological Safety
		5. Safety Knowledge & Skills
		6. Sense of Control
10	(Ismail et al., 2021)	7. Individual Commitment & Safety Priority
		1. Psychological dimensions: Safety attitudes, peer influence, safety knowledge, and risk perception.
		2. Situational dimensions: safety environment, safety rules, accidents and incidents, reporting, and job satisfaction.
		3. Behavioral dimensions: Management commitment, safety commitment, safety ownership, safety training, safety communication, rewards and recognition, safety investment, worker competence.
11	(Ahmad et al., 2022)	1. Management commitment to safety
		2. Safety training
		3. Occupational risk level
		4. Status as a safety officer
		5. Working speed
		6. Safety status
		7. The influence of safe behavior on promotion

No	Research By	Factors influencing safety culture
12	(Stevianingrum & Erwandi, 2022)	8. The impact of safe behavior on social status 1. Management commitment 2. Worker compliance 3. Worker behavior 4. Worker perception 5. Worker knowledge 6. Worker competence
13	(Vel'as et al., 2022)	1. The organization's attitude to ensure and implement security and safety in its internal environment 2. Training of all employees of the organization in the area of security and safety 3. Organizational safety and security management 4. Work environment 5. Security and safety awareness and behavior
14	(Nurcahyo et al., 2023)	1. Knowledge 2. Attitude Towards Regulations 3. Personality 4. Equipment Availability 5. Training 6. Motivation
15	(Agung Permanajati, 2023)	Leadership (<i>safety coaching, safety caring and safety controlling</i>)
16	(Ekong & Ogunbawo, 2023)	1. Safety Priority 2. Exchange of Information 3. Education 4. Workplace 5. Management Commitment
17	(Olalere et al., 2023)	1. Leadership commitment 2. Safety communication 3. Empowering employees 4. Safe behavior 5. Resource allocation

Based on the results of the literature review, researchers categorized various factors that influence safety culture according to Table 2.

Table 2. Safety Culture Factors

No	Factor	Reference	Amount
1	Management Commitment	(Ahmad et al., 2022; Ekong & Ogunbawo, 2023; Ismail et al., 2021; Musonda et al., 2018; Okoye & Okolie, 2013; Stemn et al., 2019; Stevianingrum & Erwandi, 2022; Tehrani et al., 2019; Tetzlaff et al., 2021)	9
2	Training	(Ahmad et al., 2022; Bisbey et al., 2021; Ekong & Ogunbawo, 2023; Ismail et al., 2021; Nurcahyo et al., 2023; Okoye & Okolie, 2013; Tehrani et al., 2019; Vel'as et al., 2022)	8
3	Rules and Procedures (Regulations)	(Ismail et al., 2021; Latief et al., 2017; Musonda et al., 2018; Okoye & Okolie, 2013; Stemn et al., 2019; Tehrani et al., 2019; Vel'as et al., 2022)	7
4	Behavior	(Ahmad et al., 2022; Latief et al., 2017; Ojuola et al., 2020; Olalere et al., 2023; Stevianingrum & Erwandi, 2022; Tetzlaff et al., 2021; Vel'as et al., 2022)	7
5	Leadership	(Agung Permanajati, 2023; Bisbey et al., 2021; Latief et al., 2017; Musonda et al., 2018; Ojuola et al., 2020; Olalere et al., 2023; Stemn et al., 2019)	6
6	Beliefs and Perceptions	(Ismail et al., 2021; Machfudiyanto et al., 2018; Ojuola et al., 2020; Okoye & Okolie, 2013; Stevianingrum & Erwandi, 2022; Tetzlaff et al., 2021)	6

No	Factor	Reference	Amount
7	Attitude	(Ismail et al., 2021; Machfudiyanto et al., 2018; Nurcahyo et al., 2023; Ojuola et al., 2020; Tetzlaff et al., 2021; Vefas et al., 2022)	6
8	Worker Competence	(Ismail et al., 2021; Musonda et al., 2018; Stevianingrum & Erwandi, 2022; Tehrani et al., 2019; Tetzlaff et al., 2021)	5
9	Communication	(Ismail et al., 2021; Musonda et al., 2018; Olalere et al., 2023; Tehrani et al., 2019; Tetzlaff et al., 2021)	5
10	Work environment	(Ekong & Ogunbawo, 2023; Ismail et al., 2021; Tehrani et al., 2019; Vefas et al., 2022)	4
11	Values and Norms	(Latief et al., 2017; Machfudiyanto et al., 2018; Ojuola et al., 2020; Tetzlaff et al., 2021)	4
12	Resource Allocation	(Ismail et al., 2021; Latief et al., 2017; Nurcahyo et al., 2023; Olalere et al., 2023)	4
13	Worker Knowledge	(Bisbey et al., 2021; Ismail et al., 2021; Nurcahyo et al., 2023; Stevianingrum & Erwandi, 2022)	4
14	Awards and Motivation	(Ahmad et al., 2022; Ismail et al., 2021; Nurcahyo et al., 2023; Tehrani et al., 2019)	4
15	Employee Engagement	(Musonda et al., 2018; Stemn et al., 2019; Tehrani et al., 2019)	3

Based on 17 studies reviewed, the dominant safety culture factors often raised as research variables are management commitment, training, rules and procedures, behaviour, leadership, beliefs and perceptions, and attitudes. In comparison, non-dominant factors are worker competence, communication, work environment, values and norms, resource allocation, worker knowledge, rewards and Motivation, and worker involvement.

Management Commitment

This variable is a factor that is mostly used as a research variable. 9 out of 17, or around 53% of the studies reviewed, included the management commitment factor. Management commitment is key to building a strong safety culture in various industrial sectors. A good safety culture can reduce the risk of accidents and improve overall safety performance. To build a positive safety culture, managers must demonstrate a real commitment to safety and be employee role models. The management commitment includes developing adequate safety procedures and providing the necessary support to increase safety awareness. Research (Ismail et al., 2021; Musonda et al., 2018; Tehrani et al., 2019) emphasizes that management commitment is the most significant contributor and has a major impact on safety culture.

Training

This variable is the second factor often included as a research variable. 8 out of 17, or around 43% of the studies reviewed, included training as one of the factors in developing a work safety culture. Work safety training has a significant influence on workplace safety culture. Practical training can improve safety behaviour, reduce accidents, and strengthen a safety culture within an organization. Well-designed training can increase worker awareness of work hazards and safe work practice principles, reducing the number of accidents. For employees to behave safely, they must have the knowledge and ability to recognize safety threats and carry out procedures to address them. This knowledge of hazards and factors that can change a potentially hazardous situation into a real hazard and appropriate expectations and procedures for achieving safety. To reduce workplace accidents, employers must provide proper training to staff. Employees must operate all machinery and equipment safely and effectively.

Rules and Procedures (Regulations)

This variable is the third factor often included as a research variable. 7 out of 17, or around 41% of the studies reviewed included this regulatory factor. The implementation of occupational safety regulations has a significant influence on safety culture in the workplace. Effective safety regulations can increase compliance and safe behaviour among workers, strengthening the organization's safety culture. Safety regulations serve as guidelines and tools to help workers understand hazards and develop experience. Compliance with these regulations can increase safe behaviour and reduce the risk of workplace accidents.

Behaviour

This is the fourth factor often included as a research variable. 7 out of 17, or around 41% of the studies reviewed included behavioral factors. Worker safety behaviour greatly influences work safety culture; improving worker safety behaviour is the key to reducing work accidents and improving safety in the workplace. Factors such as compliance, age, gender, beliefs, and other factors influence worker behaviour at different levels for each person and are related to risk-taking at work (Stevianingrum & Erwandi, 2022).

Leadership

This variable is the fifth factor that is often included as a research variable. 6 out of 17, or around 35% of the studies reviewed included leadership factors. Safety leadership, especially transformational and participatory, has a significant positive influence on work safety culture. This leadership improves the safety climate and employee safety behaviour, which strengthens the workplace's safety culture. Thus, developing effective safety leadership is essential to improving work safety (Agung Permanajati, 2023).

Beliefs and Perceptions

Beliefs and Perceptions are the sixth factor often included as a research variable. 6 out of 17, or around 35% of the studies reviewed, included this belief and perception factor. Employee perceptions of work safety culture have a significant influence on workplace safety. This perception can affect safety behaviour and accident rates in the company. Workers' perceptions that their work safety is guaranteed and prioritized by the organization will show more positive work behaviour than workers who feel that their organization pays less attention to safety values. When personally assessing the level of safety culture in their organization, workers' perceptions are key to understanding the existing safety culture.

Attitude

Attitude is the seventh factor often included as a research variable. 6 out of 17, or around 35% of the studies reviewed included this attitude factor. Workers' attitudes towards work safety greatly influence the safety culture in the workplace. Positive attitudes can be improved through education, training, and strong management commitment. In addition, organizational factors are more influential than individual factors in shaping safety attitudes. A positive attitude towards work safety can encourage employees to work more carefully and prioritize work safety. This positive attitude can encourage employees to pay attention to creating work safety in the organization.

Worker Competence

The worker Competence variable is the eighth factor included as a research variable. However, only 5 out of 17 or around 29% of the studies reviewed included the Competence factor. Workforce competence includes the skills, knowledge, and abilities needed to perform the job. Worker competence plays an important role in forming an effective work safety culture. This competence improves work safety and contributes to job satisfaction and overall company

performance. Thus, developing worker competence should be prioritized in improving workplace safety culture.

Communication

The communication variable is the ninth factor included as a research variable. 5 out of 17, or around 29% of the studies reviewed, included the communication factor as a research variable. Communication is one of the work accident prevention programs. Effective safety communication must be fast, accurate, informative, and relevant. Communication is also most effective when it is proactive and reactive. Safety communication can increase awareness of safety practices, encourage reporting incidents and accidents, increase worker motivation and involvement in safety efforts, maintain a positive safety culture, and create a safe and healthy work environment. Overall, effective safety communication is important in strengthening the work safety culture. It not only improves safety performance and commitment but also contributes to reducing accidents and incidents in the workplace. Thus, organizations must prioritize clear and constructive safety communication strategies to create a safer work environment.

Work Environment

This variable is the tenth factor included as a research variable. However, However, only 4 out of 17 or around 24% of the studies reviewed included work environment factors as variables studied. The work environment has a significant influence on work safety culture. A mentally and physically supportive work environment can improve work safety and health culture. Physical environmental conditions, such as ergonomics and working conditions, as well as psychosocial factors, such as work stress and the quality of interpersonal relationships, affect work safety and health.

Values and Norms

This variable is the eleventh factor used as a research variable. There are 4 out of 17 or around 24% of the studies reviewed that include this value and norm factor. Values and norms are important in shaping safety culture in various sectors. Safety culture is a collection of values and norms shared by individuals in an organization, which influence safety behaviour and practices. Cultural values and socio-economic factors, such as positive workplace norms, effective communication styles, higher income levels, and better education levels, contribute to compliance with safety guidelines and the effectiveness of training programs (Alqahtani et al., 2024). Norms and practices based on risk and safety science can help organizations develop a good safety culture. These include resilience-based strategies and risk assessments (Aven & Ylönen, 2021).

Resource Allocation

This variable is the twelfth factor, often included as a research variable. There are 4 out of 17, or around 24% of the studies reviewed that include this resource allocation commitment factor. Appropriate safety resource allocation is essential for risk mitigation. A compelling resource allocation model can help reduce accidents by prioritizing risk and cost factors (Zeibak-Shini et al., 2024). Changing a safety culture requires long-term commitment and proper resource allocation involving measurement, identification of strengths and weaknesses, and targeted interventions (Ravi et al., 2021). Appropriate resource allocation is essential to building and maintaining a strong safety culture. Resource allocation improves safety performance, staff well-being, and operational effectiveness. Management commitment and safety training are key elements that must be supported by adequate resource allocation.

Worker Knowledge

Worker Knowledge is the thirteenth factor often included as a research variable. There are 4 out of 17 or around 24% of the studies reviewed that include this knowledge factor. Knowledge plays an important role in shaping and improving workplace safety culture. Good knowledge of safety, both implicit (tacit) and explicit, can increase the tendency of employees to follow safety practices in the workplace. By effectively managing and disseminating safety knowledge, organizations can increase safety awareness and practices, which ultimately reduces accidents and improves overall workplace safety. Implementing a knowledge management system and safety education program is an important step in achieving this goal (Hejduk et al., 2020).

Awards and Motivation

Awards and Motivation are the fourteenth factors often used as a research variable. There are 4 out of 17 or around 24% of the studies reviewed that include this reward and motivation factor. Safety motivation is important in increasing employee compliance and participation in safety standards. This Motivation can be influenced by psychological conditions such as depression and anxiety, which can reduce safety motivation and behaviour (Jung et al., 2020). Incentives can increase safety motivation, but the effects may only be short-term (Ahmed & Faheem, 2021). Lack of organizational rewards and fairness can have a negative impact on safety behaviour, suggesting that incentives must be well managed to support safety culture.

Employee Engagement

This variable is the last factor often used as a research variable. 3 out of 17 or around 18% of the studies reviewed include worker involvement factors. Worker involvement is crucial in building and maintaining a strong safety culture. Effective leadership, good communication, and adequate training are key elements that can increase worker involvement in safety. Factors such as education level and work experience are positively related to involvement in safety, indicating that more educated and experienced workers tend to be more involved in safety practices (Zakaria et al., 2019).

CONCLUSION

There are four interrelated structural components of safety culture: safety values, safety leadership, safety attitudes, and safety performance. The four components involve two aspects, namely individual aspects and organizational aspects. From the literature review, fifteen factors were found to influence work safety culture. Based on 17 studies reviewed, the dominant safety culture factors often raised as research variables are management commitment, training, rules and procedures, behaviour, leadership, beliefs and perceptions, and attitudes. Non-dominant factors are worker competence, communication, work environment, values and norms, resource allocation, worker knowledge, rewards and motivation, and worker involvement.

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