

Demystifying the Recent Trends and Advances in Safety Culture Research: A Systematic Review



M. D. Deepak  and Gangadhar Mahesh

Abstract In the recent times, there has been a growing concern to improve safety management practices in the construction sector. In this regard, there is a need to improve “safety culture” as it plays a significant role in improving workplace safety conditions and is viewed as a comprehensive construct having possibilities of interventions at all levels of construction projects. However, the growing body of knowledge on safety culture research makes it difficult to have a systematic and comprehensive view of the subject. Towards addressing this issue, there is a need to systematize this body of knowledge with a comprehensive systematic literature review. The review is based on three-step methodology. First step aims at gathering suitable articles related to safety culture in construction sector. The second step presents the results of descriptive analysis on recent trends in safety culture research. Last step focuses on a detailed systematic review pertaining to definition, factors, and assessment tools that influence the level of safety culture practices. Results of this review help to uncover and provide a comprehensive overview of recent trends and advances governing safety culture research, and it can help academicians and practitioners identify fundamental influence from these published articles. Implications of the study emphasized that the study outcomes can assist researchers and practitioners to have consensus on industry-specific standards. Furthermore, this systematic literature review has helped to conceptualize safety culture, thereby highlighting the impact of external events and stakeholders interests in construction sector.

Keywords Safety culture · Systematic literature review · Construction sector

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R. Y. M. Li (ed.), *Construction Safety: Economics and Informatics Perspectives*,

https://doi.org/10.1007/978-981-19-3234-2_9

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1 Introduction

For the last two decades, there has been a rising concern among safety professionals towards enhancing safety management practices in construction sector (Luo et al., 2022). In this regard, there is a need to improve “safety culture” as it plays an important role in avoiding workplace accidents. Recent studies have focused on measuring, sustaining, and improving safety culture in construction organizations (Deepak & Mahesh, 2021; Machfudiyanto et al., 2017). Assessing safety culture is reflected as a proactive method of safety performance (Haslam et al., 2016). Hence, most construction projects aim to minimize injuries and strive to achieve zero incidents, which can only be reached by achieving positive safety culture (Choudhry et al., 2007). Also, frequency of occurrence and severity of the nature of most accidents at construction sites makes it imperative to understand safety culture in the industry.

The sheer number of articles present on a particular research area usually makes it difficult for academicians and practitioners to get a general overview of the specific information. This can quantitatively be analyzed based on information pertaining to publication history, features, and progress of scientific outcomes within a particular research area (Li & Hale, 2016). Moreover, there are several studies related to safety culture research relevant to construction sector, thus making it difficult to have a consistent and thorough overview in this area. The term “safety culture” is possibly the most cited cause for accidents occurring worldwide (Gadd & Collins, 2002; Tetzlaff et al., 2021) and has not been clearly defined in research studies. Moreover, academicians and practitioners have defined safety culture in different domains; thus causing confusion over the definitions and constituents (factors) of safety culture. The scope of any application of safety culture in industrial and practical environment would vary depending on the definition and its constituents (factors) (Swuste et al., 2016). The appropriate definition adopted would influence how people think about the measures and initiatives needed to improve safety culture.

Nearly one-third of studies that propose safety culture definitions do not explicitly discuss the constituents of safety culture. Multiple factors of safety culture are detailed in those studies that discuss them, however, there is no consensus, and different factors are highlighted as the most important. In this regard, the perspective utilized to conceptualize and describe safety culture has an impact on how safety culture can be measured and understood, and this should be a key factor to consider when selecting an appropriate safety culture definition and its constituents. However, there exists diversity in addressing safety culture of construction industry in terms of its definition, factors, and assessment tools that influence the level of safety culture practices. This is because the term “safety culture” is used to describe the elements that influence employee adherence to safety laws and protocols of the organization (Chen et al., 2021; Newaz et al., 2018). Also, the concept has gained acceptance as a vital part of safety management over the last three decades. Researchers and practitioners from various industries and countries have collaborated to establish safety culture in practice (Swuste et al., 2016). Across multiple domains, safety culture research has followed a similar pattern of interest in the notion from industry or

regulators, followed by a collaboration between industry and researchers to develop industry-specific assessment tools.

In this regard, the suitable method for recognizing, choosing, and assessing all literature upon an established level of measurable quality that is suitable to a research problem is conducting a systematic literature review (Booth et al., 2016). This type of review focuses on the process of collecting and gathering all published facts over a topic (Lee et al., 2019). This type of review method helps to summarize available research findings in a more balanced and consistent manner in terms of transparency and objective specificity. However, to the best of our knowledge, no comprehensive and systematic review of safety culture has been published in the area of construction sector which justifies our study. The remainder of this research study is structured as follows: Sect. 2 presents the importance of safety culture in organizations while Sect. 3 describes the research method; Sect. 4 provides the analysis and results; and Sect. 5 presents the conclusion.

2 Importance of Safety Culture in Organizations

Major accidents over the years have made national headlines (e.g., Space shuttle programs like Challenger and Columbia in 1986 and 2003 respectively, epic disaster at Chernobyl in April 1986, Deepwater Horizon oil spill in April 2010, Boeing 737 MAX accident in October 2018), rising concern over health and human error in our daily lives. Much has been learned in following the tragedies, which unveil potential dangers that are embedded in work systems. We have learned that these accidents are most often caused by a set of failures, defective processes, and poor organizational conditions (Khalid et al., 2021; Perrow, 2011). One of the primary underlying causes of these accidents can be attributed to flaws in the organization's safety culture. However, if a good safety culture exists within an organization, the likelihood of events occurring and the effects of those events could be mitigated. Cooper et al. (2019) stated that focusing on these critical safety issues while conducting safety culture evaluations will result in substantially better relationship with actual safety performance. Moreover, many academicians have identified techniques to reduce accident rates, define safety metrics, and develop models to assess safety-related concepts that direct the organization's employees (Al-Bayati, 2021; Vogus et al., 2010; Zohar, 2010).

Investigations of major industrial accidents have related causal factors to 'poor' workplace safety culture (Moreira et al., 2021). An organization's culture is analogous to an individual's identity; which defines his/her values and beliefs and directs his/her behavior. In general, safety culture of an organization focuses on the core assumption that endorses the importance and goals of safety. Reason (1997) points out that safety culture has an important role in any workplace accident. Poor safety culture in the workplace mainly creates an atmosphere in which mistakes are made

more often and violations are generally accepted. This in effect shows vulnerabilities caused by latent and active system failures. In addition, this could be characterized by the inability of the management to identify or resolve weaknesses in its safety management practices. Consequently, these vulnerabilities persist and probably aggravate over a period of time. This increases the risk of impending adverse events which could lead to injury or fatality. Based on this view, the conceptualization of “ideal” safety culture is defined as: “the engine that drives the system towards the goal of maintaining maximum resistance to its operational hazards” (Reason, 1997, p. 294). In practice, this means that safety culture in the workplace has a high predictive value for preventative actions (Aburumman et al., 2019).

Further, a study conducted by Schwatka et al. (2016) indicated some of the predominant issues addressing safety culture in construction sector are: (i) transient nature of the industry, (ii) subcontracting of work, (iii) work organization, and (iv) induction/acclimation process. These issues shape the conception of safety culture as quite complex; challenging content-wise, multi-dimensional, and a cross-disciplinary study area (van Nunen et al., 2017). Also, in addressing these adverse issues, organizations need to encourage safety culture practices for creating a positive working environment within the organization (Wang et al., 2020). Dealing with issues of safety culture research is relatively new phenomenon related to academic research. The conception of safety culture began in reaction to Chernobyl disaster which occurred in 1986, and with time, there is rapid increase in studies on safety culture. However, accidents and incidents still remain a concern in this sector (Luo et al., 2022). The notion of improving safety culture at the workplace is believed to act as an accident prevention system (Gabryelewicz et al., 2015; Khalid et al., 2021). Furthermore, a study conducted by van Nunen et al. (2017) highlights the development of safety culture model in relation to construction sector; yet, there is no consensus regarding the definition, factors, and cause and consequences of the same. Many theories have been formulated to link safety performance and its relationship with safety culture of the organization (Gadd & Collins, 2002; Guldenmund, 2000). Moreover, this has led to constant growth in number of articles on this topic, thus making it challenging to attain a detailed overview of this topic. In an effort to address this issue, a systematic literature review is undertaken to define and broaden the current knowledge and understanding on the topic of safety culture in construction sector. This type of review differs from traditional narrative reviews as it is reproducible, logical, and more transparent (Newaz et al., 2018); in other words, it is a comprehensive methodology aimed at reducing bias obtained through exhaustive literature reviews of reported studies and provides an audit trail of judgments, procedures, and conclusions of the reviewers (Qureshi et al., 2020).

The relevance of this study is that, while certain safety initiatives have been successful, there is a lot of inconsistency in the relationship between safety culture and its consequences. This indicates that there is a need to examine and develop our understanding of safety culture and its influence in the construction sector.

3 Research Method

The research approach adopted in this study consists of comprehensive review of safety culture articles and is undertaken using a 3-step methodology. First step intends to collect recent safety culture articles. Then, these articles are codified based on selection criteria that are related to safety culture aspects of construction sector. In the second step, these codified articles are analyzed by descriptive analysis to highlight recent trends in safety culture research. Last step focuses on conducting a systematic review to have a comprehensive overview of safety culture studies. Detailed methodology map adopted in this study is presented in Fig. 1.

3.1 Literature Search

Safety culture articles were collected from web-based search conducted on the SCOPUS database. This database search conducted using SCOPUS offers consistent and accurate results and covers wide range of discipline-related publications and assists with keyword searches and citation analysis (Chellappa et al., 2021; Newaz et al., 2018). Literature search was made on keywords search for the keyword ‘safety’, ‘safety culture’, and ‘construction’. The keywords search for these terms were made on ‘title’, ‘abstract’, and ‘keywords’ of articles that are published in various journals from 2000–2021. This search yielded 140 articles and the data of these articles were exported to Microsoft Excel version 2013.

3.2 Keyword Co-occurrence Analysis

In this analysis, the number of co-occurrence of keywords in the search criteria of articles is mapped that can offer insight into key topics and trends of a particular interest area (Goerlandt et al., 2021; Li et al., 2021). The articles that were obtained from literature-search method were used to analyze the keywords. This analysis is carried out as searching within the SCOPUS database offers several possible research articles at disposal (Jin et al., 2019). In order to identify whether the intended search truly reflects the criteria, the co-occurrence of keywords from the articles was analyzed. VOSviewer version 1.6.5 was used to examine and visualize the keywords (Van Eck & Waltman, 2010; Zeng et al., 2022). VOSviewer is a freely available tool (www.vosviewer.com) that allows users to analyze bibliographic records that are directly imported from SCOPUS database used for visualizing networks and patterns (Chen et al., 2021; Li et al., 2021).

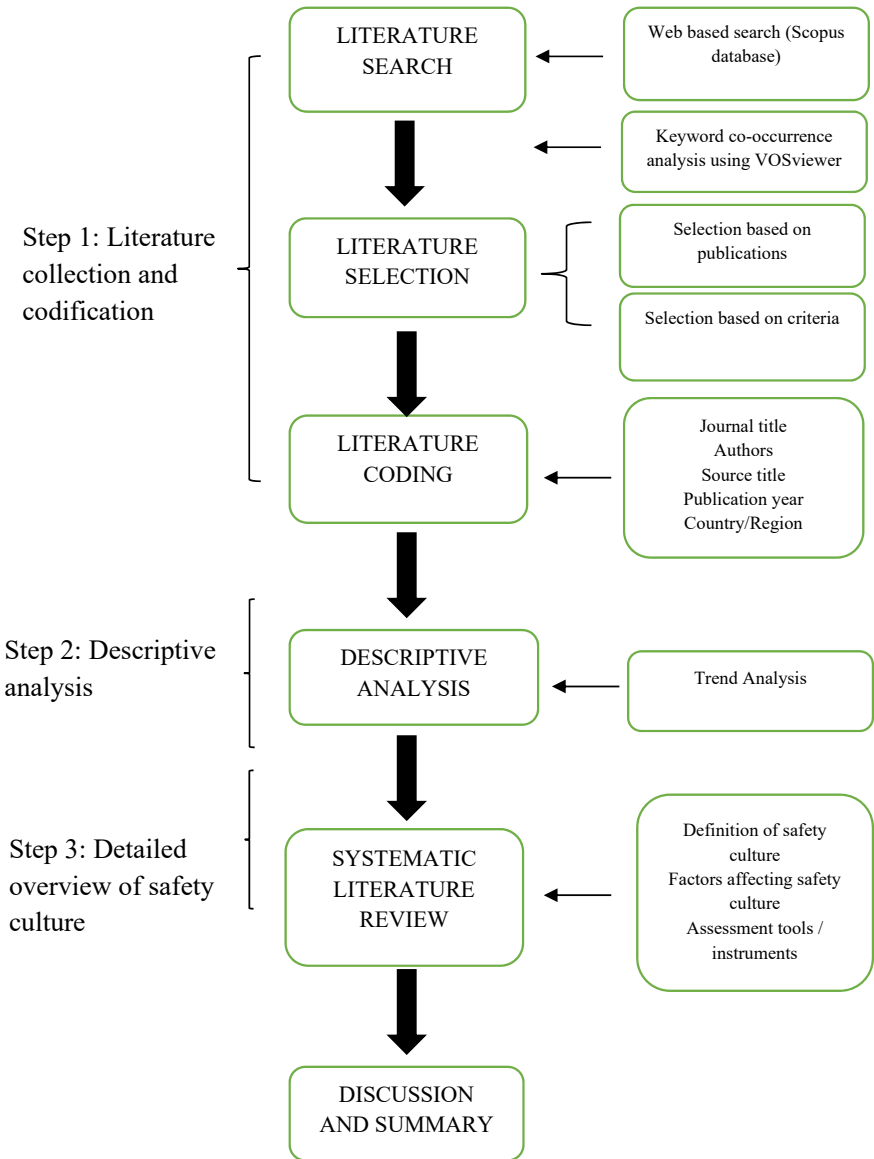


Fig. 1 Methodology map

3.3 Literature Selection

The obtained articles were further scrutinized based on certain criteria of the study since the objective of the review is not focused on gathering sufficient articles, but to provide insight on current trends on the topic. Also, exclusions were made even

though they match the subject on safety culture. Exclusion criteria include; (i) No direct relevance of the search keywords to safety culture in construction sector. Keyword ‘construction’ in many cases does not refer to construction sector but is used as a ‘construct’ of an event in general. (ii) Only the words matching the criteria were considered for the study. As a result, 51 relevant articles were obtained after exclusions.

3.4 Literature Coding

The next step is analyzing the relevant articles by coding the selected articles based on ‘title’, ‘authors’, ‘source title’, ‘year of publication’ and ‘country/region’ (Country/region-specific information was gathered based on the actual place of study and not merely the author’s country/origin). When the necessary information was not obtained from literature-search method, then the entire article was assessed to aid coding.

3.5 Systematic Literature Review

The last step of the proposed 3-step methodology is to conduct a systematic review to have a comprehensive overview of safety culture studies. While this systematic literature review limits its focus on construction sector, some of the essential papers that focus on safety culture studies were included because of limited theoretical studies being done on construction sector. These studies serve as a new perspective for exploring the commonalities among multiple industries that can be applied to construction sector. Traditional literature review limits its focus on proper identification of research area and knowledge structure. Together, these are considered subjective as they are generally determined by the author’s decision. In this regard, a structured systematic literature review addresses these aforementioned issues and outlines the conception of safety culture in organizations. This majorly covers an overview of defining safety culture in organizations, conceptualizing various safety culture factors that define these concepts, and lastly, assessment tools for measuring the level of safety culture in organizations.

4 Analysis and Results

4.1 Keyword Co-occurrence Analysis of Safety Culture Research Areas

Results of keyword co-occurrence analysis offer key insight into important topics and trends of safety culture research domain. This mapping of interrelated keywords gives an accurate representation of empirical knowledge development with respect to themes, linkages, and cognitive structure of the topic of interest (Bautista-Bernal et al., 2021; Jin et al., 2019). Results of keyword co-occurrence analysis network are shown in Fig. 2. From the analysis, the magnitude of the circles denotes the occurrence of a term (Goerlandt et al., 2021). The distance between the terms offers information about their relationship. This relationship of the terms is signified based on the occurrence of the terms (Li et al., 2021). Different colors distinguish one another from belonging to different groups. Most common keywords obtained are; safety culture, accident prevention, human, safety, safety climate, safety performance, surveys, occupational safety, safety engineering, and construction safety.

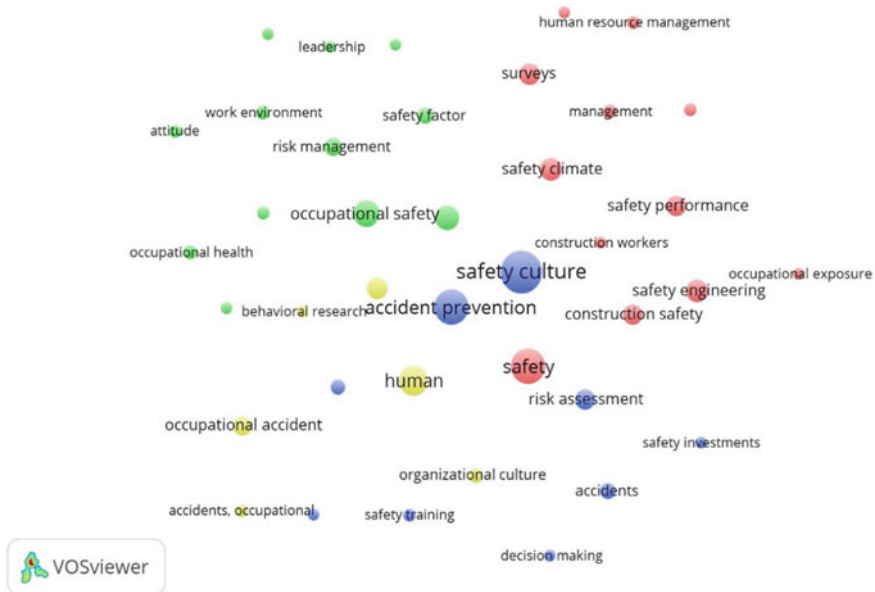


Fig. 2 Keyword co-occurrence analysis network of safety culture articles (2000–2021). *Source* www.vosviewer.com

4.2 Descriptive Analysis of Safety Culture Research

Descriptive analysis is conducted to get a broad picture of the current status of safety culture studies in construction sector. Results that are attained from the data of codified articles are presented in this section. Recent trends in this area are analyzed by presenting the distribution of safety culture articles based on; (i) journal, (ii) year of publication, and (iii) country/region-specific.

The amount of scientific articles published in a specific research area can be considered as an essential indicator to quantify its recent trends (van Nunen et al., 2017). These 106 articles obtained are analyzed based on the type of journal. Figure 3a provides information on most journal articles on safety culture topics. Key journals in the field are ‘Safety Science (SS)’, ‘Journal of Construction Engineering and Management (ASCE)’, ‘Journal of Management in Engineering (JME)’, ‘Advances in Intelligent Systems and Computing (AISC)’ and ‘International Journal of Occupational Safety and Ergonomics (JOSE)’. The number of safety culture articles showed an uptrend from 2006 and 2017 as indicated in Fig. 3b. Then, there is a constant increase in the growth rate of articles except in 2010, 2011, and 2014. Highest number of articles have been published in 2019 (n = 16) and 2021 (n = 16); with declining trend in 2014 (n = 1) and 2016 (n = 4). However, the development maturity point has already been reached in this particular area or field with lack of consensus on its features and concept of safety culture in construction sector.

Careful examination of cumulative number of articles over the years indicated that the importance of the topic has increased tremendously (Fig. 3c) and has become an

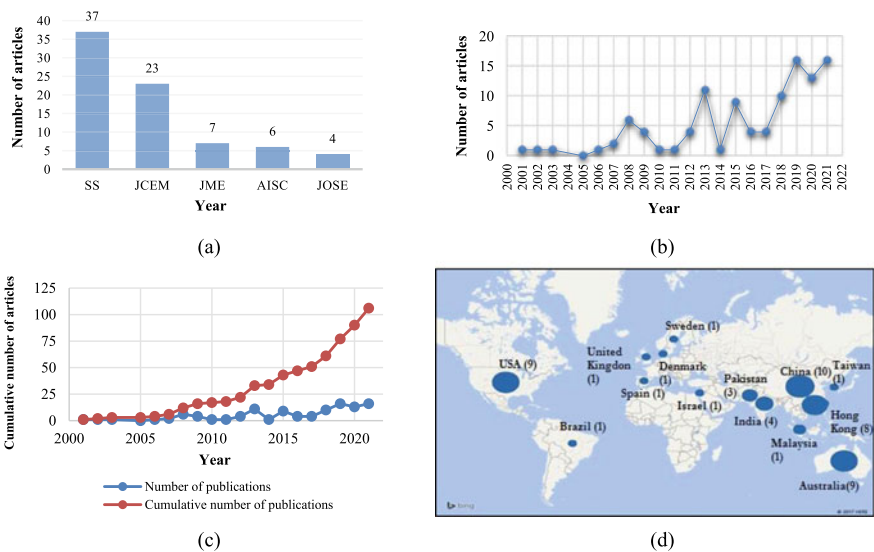


Fig. 3 Descriptive analysis of safety culture articles

important part of construction management research. This increased pattern can be compared with other safety-related articles as demonstrated in Li and Hale (2016).

Safety culture articles related to construction sector were majorly from 16 different countries or regions and the worldwide distribution of the contributing countries or regions is shown in Fig. 3d. China has contributed with most articles ($n = 10$), then by USA and Australia ($n = 9$), Hong Kong ($n = 8$) and India ($n = 4$). In these countries, there has been an increase in articles due to pressing concerns towards safety management in construction sector.

4.3 Systematic Literature Review on Safety Culture Studies

Primary focus of conducting this review is to ensure a complete overview of safety culture studies. The systematic literature review methodology outlines the conceptualization of safety culture and at first, provides an overview by defining in construction sector-specific. Then, various factors that define the concept of safety culture are examined. Lastly, the assessment tools for measuring the level of safety culture are highlighted.

4.3.1 Defining Safety Culture in Organizations

The term safety culture was recognized soon after the Chernobyl accident (IAEA, 1986). However, no exact explanation of the term was provided for two main reasons: (i) several researchers highlight numerous safety culture elements as most significant, and (ii) culture of any kind is a tough thought to compactly outline. Some of the commonly used definitions that are believed to capture the essence of safety culture have been listed in Table 1.

The first scientific conceptualization of the term safety culture was proposed by Zohar (1980), and this empirical study was developed based on a survey conducted amongst Israeli production workers. This study is recognized as a seminal study that has established the current direction for research as much of the work on this topic focuses on a pragmatic approach rather than conceptual or theoretical issues of safety culture. Further improvements on defining the concept were made and these are summarized in Table 1. Most definitions mentioned in Table 1 are analogous in their beliefs and perceptions with each of them focused on varying degrees in relation to safety. Even though the definitions differ from one another, yet there is common agreement that safety culture is being regarded as a proactive approach concerning safety management.

Definitions mentioned in Table 1 are extracted from various disciplines (human psychology, healthcare sector, manufacturing sector, construction sector, etc.). The observable degree of effort put forth by all employees to increase safety knowledge and actions in the workplace is referred to as safety culture (Cooper, 2000). This

Table 1 Safety culture definitions

Author and article	Definitions
Guldenmund (2000)	“Aspects of the organizational culture that will impact on attitudes and behaviour related to increasing or decreasing risk”
Cooper (2000)	“Observable degree of effort by which all organizational members direct their attention and actions toward improving safety on a daily basis”
Mohamed (2003)	“A sub facet of organizational culture that affects workers’ attitudes and behaviour in relation to an organization’s on-going safety performance”
Fang and Wu (2013)	“A mixture of attitudes, beliefs, values, behaviours, and norms held by the individuals and groups from different parties in a construction project team, and it is gradually formed and evolved in the construction project environment that would influence the commitment to, and the style and proficiency of how all parties involved in the project and its personnel act and react in terms of the ongoing safety performance”
Al-Bayati and Panzer (2019)	“The principles and policies of a construction firm that guide safety decision-making at the firm management level”
Trinh and Feng (2020)	“A culture that can be created in a construction organization by systematically responding to the potential threats against which resilience protects: project hazards (regular threats), human errors (irregular threats), and unexpected failures (unexampled events) in the construction environment”
Bhagwat and Delhi (2021)	“The management personnel (top and middle management) perceive the existence of safety culture through compliance with safety practices and compare and contrast it to the workers’ perception of the adequacy of such compliance”

would in turn affect an individual’s perception, attitude, and behavior in the organization (Sudiarno & Sudarni, 2020). These measurable attributes are indicated as safety climate. Hence, safety climate is considered to be the reflective state of the organization’s safety culture. Moreover, the concept of defining safety culture in construction sector truly reflects the concept explained in other disciplines. Among these, the definition provided by Fang and Wu (2013), has attempted defining safety culture at construction project level. This seems to be more practical, as it clearly outlines the concept of safety culture relevant to construction sector. Further, this indicated that the definition of safety culture is clear and clarified in the context of construction sector.

4.3.2 Factors Affecting Safety Culture in Organizations

Keyword co-occurrence analysis as explained in the earlier section only shows the most occurring terms in a given text. But, a detailed analysis of terms is considered necessary for safety culture research that truly reflects the concept; which ultimately

results in identifying the factors that affect safety culture. In this regard, the focus is on identifying the key factors considered among various sectors. These factors signify a clear association existing among safety culture concepts and highlight the fundamental areas of safety management research. But it is challenging to comprehend the underlying interactions existing between the antecedents and consequences of safety culture research, as these influencing factors are not consistent but are fragmented. Also, there exists little agreement on safety culture factors that suggests multiple features and complexity of safety culture concept.

Most safety culture models mainly address three dimensions to define the concept (i.e., personal, behavioural, and situational) (Ismail et al., 2021). Various factors that affect safety culture are categorized under these dimensions. Detailed descriptions of safety culture dimensions with influencing factors are mentioned below:

- i. **Personal factors:** This comprises of psychological aspects in terms of perceptions, attitudes, competencies, and values of individuals and groups towards safety and describes “how people feel within an organization safety management system?” and is evaluated through safety questionnaires. Factors under this dimension include; co-worker’s commitment and involvement to safety, worker competence, and control, safety attitudes, trust among employees, subcontractor involvement, and safety incentives and disincentives (Liao et al., 2014; Mohammadi et al., 2020; Pandit et al., 2020; Zhou et al., 2015).
- ii. **Behavioural factors:** This deals with actual ongoing safety-related actions and behaviours and describes “what people do within an organization safety management system?” and is evaluated through safety checklists. Factors under this dimension include; supervisor commitment to safety, risk management, safe work conduct, and workplace safety practices (Chen et al., 2013; Mohammadi et al., 2020).
- iii. **Situational factors:** This encompasses situational features that include policies, procedures, regulations, organization structure, and the management system. It describes “what the organization has or has to put in place?” and is evaluated through safety audits and inspections. Factors under this dimension include; safety policies, resources and training, management commitment, safety communication, and top management safety response (Fang & Wu, 2013; Han et al., 2014; Mohammadi et al., 2020).

The categorization scheme for grouping each of the factors under safety culture dimensions is based on the author’s consideration of these factors in their safety culture studies. These factors greatly influence the level of safety culture in any organization. Hence, more focus has to be given to these influencing factors for achieving positive safety culture in the workplace.

4.3.3 Assessment Tools for Measuring Safety Culture in Organizations

Numerous definitions of safety culture have caused lack of consensus to include factors required to develop safety culture measures. Nonetheless, while the literature

on the subject has progressed conceptually, it is still in its early stage in terms of the development of quantitative instruments for measuring and evaluating safety culture at the workplace, which reinforces the necessity of addressing the idea; as well as a holistic strategy that takes into account technology, organizational, and human factors (Olugboyege & Windapo, 2019; van Nunen et al., 2017). As discussed in the previous section, there exist several factors affecting safety culture that is considered in different sectors. Proper identification of measuring instruments is essential to assess safety culture in respective organizations. In real-time applications, one needs an effective assessment tool to measure the level of safety culture; and, in this regard, five most prominent tools in different sectors with their features and limitations are enumerated in Table 2. These assessment tools obtained from different sectors typically consider quantitative questionnaires which are based upon any number and combination of the factors mentioned in the earlier section. Among these tools, Safety Climate Assessment Tool (S-CAT) is an assessment tool that is holistic in nature and is specifically designed for construction sector (Probst et al., 2019). This tool is developed based on recommendations and inputs provided from multiple stakeholders concerned in construction projects and this practical tool can be utilized by contractors to improve safety culture at their job sites. The existence of variety in safety culture measures acts as a key indicator of how safety research is quickly developing as a meaningful assessment tool in construction sites.

When choosing a safety culture instrument for examining the level of safety culture, one has to consider its applicability to specific industry and whether all the factors are within its scope. These assessment tools are primarily based on conducting perception survey among the employees (Deepak & Mahesh, 2021; Zhou et al., 2015). These surveys aim to capture perceptions of employees in the organizations accounting for safety culture practices (Guldenmund, 2000). Clear and positive understanding of workplace safety elements contributes to the development of positive safety climate and in turn, enhances safety culture. Also, Mohamed (2003) recommended that safety culture deals with factors that have the ability to manage top-down organizational safety; whereas, safety climate deals with the view of front-line workers on the role of bottom-up workplace safety. Survey instrument helps in determining the strong and weak points of safety management practices being adopted in organizations. Assessing safety culture factors is essential to distinguish the level of safety culture in various sectors. Although, some of the ethnographic studies make the measurement approach difficult as they consume time and money. To overcome this, assessment tools are developed to measure the level of safety culture.

5 Conclusions

Despite continuous improvements in safety management studies in construction sector over the years, occupational safety-related issues are still in existence. Many organizations have shown greater attention towards facilitating safety culture as a

Table 2 Safety culture assessment tools

Instrument/tools	Industry	Features/highlights	Drawbacks/Limitations
Score your safety culture checklist (Reason, 2001)	Transport and medical service	<ul style="list-style-type: none"> • Comprises of 20 statements. It is based on 'yes', 'no', 'I don't know' type answers • Convenient for interpreting the calculation-based result and does not require an expert for using the checklist 	<ul style="list-style-type: none"> • Questions are complex and need necessary modification for applying to different industries
Loughborough University Safety Climate Assessment Toolkit (LSCAT) (HSE, 1999)	Offshore	<ul style="list-style-type: none"> • Comprises of forty-two statements and adopts triangulation rule for assessment 	<ul style="list-style-type: none"> • Triangulation of results can be difficult for inexperienced professionals
Safety Health of Maintenance Engineering (SHoME) Tool (SHoMe, 2003)	Aviation	<ul style="list-style-type: none"> • 3 different sets of survey instruments for different management levels; can also be used for varying project sizes 	<ul style="list-style-type: none"> • Not universal and yet specially designed for aviation industry
Nordic Occupational Safety Climate Questionnaire (NOSACQ-50) (Kines et al., 2011)	Production and service sectors	<ul style="list-style-type: none"> • The survey consists of 50 questions. It is developed in different languages and is universal and can be applied to different management levels and industry sectors 	<ul style="list-style-type: none"> • Involves complex questions and thus results are difficult to interpret
Safety Climate Assessment Tool (S-CAT) (Probst et al., 2019)	Construction industry	<ul style="list-style-type: none"> • Consists of 8 leading indicators that have been shown to predict employee injury rate • Responses to these indicators are provided with customized feedback report; also give information on success areas and provide suggestions for improvements 	Advantages <ul style="list-style-type: none"> • Holistic approach • Designed specifically for the construction industry

means to decrease accidents, incidents, and risks occurring at the workplace. Safety culture research is important and essential since it is a component of any organization that focuses on increasing the organization's safety. In this regard, the amount of peer-reviewed articles published and the diversity of study topics have been increasing in this area. However, the amount of literature available on this topic makes it challenging for practitioners and researchers to have a structured outline of the topic.

Therefore, a systematic review is undertaken to synthesize existing research articles on evidence-based approaches required for planning and implementing several interventions to enhance the workplace safety culture in construction sector. This review is considered as a systematic methodology for reviewing the detailed aspects in the existing safety management literature and uncovers significant findings and reveals knowledge gaps for future work. Since systematic literature review adopted in this study limits its focus on construction industry, it thereby facilitates in exploring the concept of safety culture in terms of formulation and advancement towards the body of knowledge. This limitation can be overlooked by conducting a deeper content analysis on articles of safety culture research. Another minor limitation of this study is that the data collected and thorough review of articles is done from international studies; as construction industry of each country has somewhat unique characteristics, which can be taken into account in future research.

While exploring the studies on safety culture, this chapter defined safety culture, identified actionable factors, suggested assessment tools for construction sector, and emphasized that these can assist researchers and practitioners to have consensus on industry-specific standards. Furthermore, this systematic literature review has helped to conceptualize safety culture in construction sector.

This review's main objective is to understand the conception of safety culture in terms of its definition and assessment required to predict and explain health and safety outcomes in construction sector. The information presented here offers a comprehensive image of research progress in the field of safety culture research, and it can help academicians and practitioners identify fundamental influence from these published articles. Also, this provides insights on various constructs of safety culture studies in construction sector till date and makes an effort to identify the recent trends and advances towards creating a safe working environment within construction sector. It is assumed that this review will encourage further studies on safety management aspects in construction sector.

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