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Examining the Relative Importance and Association between Safety Leadership Styles and Factors Affecting Organizational Safety Climate

S. Senthamizh Sankar [1], K. S. Anandh [1,*], Sathyanarayanan Rajendran [2], Che Khairil Izam Che Ibrahim [3] and Mariusz Szóstak [4,*]

[1] Department of Civil Engineering, Faculty of Engineering and Technology, SRM Institute of Science and Technology, SRM Nagar, Chengalpattu District, Kattankulathur 603203, India; ss3069@srmist.edu.in
[2] Engineering Technologies, Safety and Construction Department, Central Washington University, Ellensburg, WA 98926, USA; rajendrans@cwu.edu
[3] School of Civil Engineering, College of Engineering, Universiti Teknologi MARA, Shah Alam 40450, Malaysia; chekhairil449@uitm.edu.my
[4] Department of Building Engineering, Faculty of Civil Engineering, Wroclaw University of Science and Technology, 50-370 Wroclaw, Poland
* Correspondence: anandhk@srmist.edu.in (K.S.A.); mariusz.szostak@pwr.edu.pl (M.S.)

Abstract: This study identifies safety leadership factors affecting construction site safety and organizational safety climate, offering suggestions for adopting optimistic leadership styles and a zero-accident vision. The literature review is done exclusively for identifying factors and improving core knowledge. This study developed a questionnaire to examine the relationships between the organizational safety climate and the safety leadership styles. The questionnaire was distributed to construction companies from all over India. The statistical analysis encompassed 396 verified responses from the survey, yielding an impressive 79.20 percent response rate. The valid responses collected were analysed to find the relative importance index and the association between the categorical variables. The results showed that "personal safety knowledge" ranked the highest while performing the relative importance index analysis. Furthermore, the chi-square analysis found two pessimistic leadership styles, namely "laissez-faire leadership" and "management-by-exception", significantly associated with the safety climate. The study implies that the target audience must avoid adopting the two pessimistic leadership styles to improve the organizational safety climate. This study examines the various safety leadership styles practised among construction professionals for the first time in India. Specifically, it identifies critical factors that affect the organizational safety climate and pessimistic leadership styles that diminish the safety outcomes of the construction site. The results act as an eye-opener for the targeted audience (like senior and middle-level management professionals, academicians, and upcoming researchers) to enhance the safety of construction sites by adopting optimistic leadership styles with an idea of a 'zero accident' construction premises.

Keywords: safety leadership; leadership; occupational health and safety; construction safety; organizational safety climate; organizational behaviour

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1. Introduction

The construction sector is versatile and provides the way for many other works. In general, the construction industry (CI) plays a crucial role in driving a country's economic growth since it heavily influences the development of the country's infrastructure and gross domestic product (GDP) [1,2]. All nations' economic development and progress are based on construction projects [3,4]. It is generally accepted that project cost, quality, safety, and time are critical factors in project success [5,6]. The inherited risk of accidental death in the CI leads to several safety accidents for workers [1]. As a result, CI consistently

experiences increasing mortality and injury/illness rates [7,8]. Globally, the construction industry (CI) holds the unfortunate record for the highest incidence of severe work-related accidents and non-fatal injuries in most countries [9–12]. For example, due to the disjointed, complex, and fragmented nature of construction operations, which leads to occupational mortality and non-fatal injuries, the construction industry has been recognized as one of the most hazardous sectors in the United States of America (USA) [13,14]. The CI contributed to one-fifth of the fatal accidents in the European Union in 2016. In 2020, 40 fatal and 61,000 non-fatal accidents were recorded by the "Construction Statistics in Great Britain" [15].

In recent years, the impact of occupational safety and health (OSH) legislation worldwide has shown a greater focus on reducing accidents in the CI [16]. The CI has been associated with higher rates of workplace injuries in some countries, leading to its classification as a dangerous sector of the economy [17]. The Indian construction industry is making significant strides in adopting advanced technologies. However, a noticeable drawback remains concerning the industry's safety and health aspects [18]. Work-related injuries have a dual impact, harming the workforce and resulting in financial losses. This occurs as it disrupts industrial processes, damages production machinery, and negatively affects the reputation of the company [19]. CI is one of the most labour-intensive sectors on the planet [20]. Construction workers are crucial for every construction company, contributing to project performance and quality. Despite the OSH laws, the frequency of workplace accidents continues to increase; for example, about 2.3 million people are affected by workplace accidents per year [21]. CI generally has a high-demand working environment and longer working hours than average compared to other industries [22]. Construction professionals and managers work unpaid overtime and work six days a week. Most construction professionals face high work pressure and occupational stress when compared to the workforce of other high-risk industries [23]. Compared to senior-level professionals (managers), site engineers face a lot of stress due to the activities at the site that have not yet been completed within the deadline [24]. Work is stressful due to strict deadlines and imposing financial penalties if goals are not achieved [25,26].

Occupational accidents and injuries occur due to these workplace stressors that impact employee well-being [27]. The working conditions in other environments will be soothing for the worker if supportive supervisors, co-workers, and the project manager display an effective leadership style [28]. In addition to this hectic working environment and environment in CI, the industry also faces many global issues for its development and excellence [29,30]. By producing more investment and job opportunities than other industries, India's CI is one of the largest (second) employers and economic contributors [24]. The complexity and multistakeholder nature of the project make it highly probable that there will be multiple interfaces to facilitate interactions at boundary locations [31]. The number of workers in Indian CI constitutes 7.5% of the global labour force; conversely, CI is responsible for 16.4% of all fatal industrial accidents worldwide [32]. According to a new report by the International Labour Organisation (ILO), India has the highest accident incidence among construction workers worldwide. Although the manufacturing sector faces a threat of severe wounds that is only half as much compared to the CI, the risk of death is significantly amplified, being five times higher [18]. Due to accidents on the job site caused by negligence and a lack of safety measures, numerous construction projects in India could not be completed on time, resulting in significant costs [33,34].

Given the enormous financial and human costs of construction site accidents, researchers and practitioners have focused on increasing construction site safety [35]. According to Flin and Yule [36], safety leadership (SL) directly and indirectly affects safety. Through safety-related actions, leaders function as role models for their juniors and reinforce their safety behaviours by monitoring and rewarding them regularly. SL indirectly builds and practises safety processes, creating a distinct safety culture [37]. Workers' safety violations are the leading cause of construction accidents; these violations can be restricted with strict SL [38]. Leadership is a widespread phenomenon influencing followers' be-

haviour and activities [39]. Overall, the CI is undergoing rapid growth. Significant changes are happening in the question of the effectiveness of safety leaders and the prevailing leadership styles adopted towards better safety outcomes. Furthermore, safety leadership is influenced by contextual and personal factors that can reduce safety commitment [35]. Despite significant efforts and efforts from the Government of India and the Occupational Safety and Health Administration (OSHA), construction safety (CS) has not increased. The major drawback is the lack of SL practices contributing significantly to construction accidents. Most accidents occur due to inadequate supervision; thus, worker safety behaviour is diminished and violates safety constraints [18]. To address such safety issues, traditional leadership styles, i.e., hierarchical/vertical leadership style incorporated by owners or safety leaders, are ineffective; therefore, the CI requires a modern leadership paradigm, such as horizontal or balanced leadership styles that enhance the safety culture, safety compliance, and safety behaviour of construction stakeholders. The primary motive of SL is "reducing the rate of construction accidents by boosting worker safety conduct". Although SL enhancement is like a solution to almost all safety uncertainties and difficulties that CI faces, its adoption is not easy. Many traditional leadership styles hinder the way, but the modern paradigm paves the way for adopting DL to enhance compliance and improve organizational safety. Various factors affect the quality of the safety leader's engagement and the implementation of the SL styles adopted. This study aims to identify those factors that affect safety on construction sites. Based on existing factors collected from the literature, the quantitative method research consists of a questionnaire survey to present the construction safety leadership (CSL) styles that prevail in Indian CI with the factors influencing the styles to explore the difficulties faced in adopting DL in safety.

The body of knowledge on CS has seen significant contributions from the United States, China, and Australia [40]. It has been noted that construction personnel in various locations have been found to have varied conceptions of safety [41]. This calls for further international studies to compare how people across different countries view their respective climate conditions of safety [42]. The impact of SL on the safety climate in the CI in India is an area that has not received enough attention from researchers. Given the lack of literature and knowledge on SL and safety climate in the Indian CI, it is time to investigate the interplay between CSL styles and the factors that shape the organization's safety climate from an occupational health and safety perspective [43]. The specific objectives of the study were as follows: (i) to identify the leadership elements necessary for the safety of the construction site safety; (ii) to identify the most influential factors in the given context by administering the RII analysis, which provides a ranking of the importance of different indicators; and (iii) to examine how various safety-focused leadership philosophies impact the organizational safety culture.

2. Literature Review

Using relevant search terms, the research literature was systematically gathered from the two most popular databases, SCOPUS and Web of Science. Combinations like "Safety leadership", "Safety leadership AND Construction", "Construction Safety Leadership", and "Safety leadership AND Construction and India" were used to find relevant articles.

2.1. Outline of Safety Leadership (SL)

Connecting leaders and their subordinates to achieve organizational safety goals is known as 'Safety Leadership' (SL) [44]. Several empirical studies have clarified the significance of leadership concerning safety [21,45]. For example, according to Fang et al., the high occurrence of accidents was attributed to the company's top management [46]. The notion of safety management has not effectively reached the employees, and relying solely on managerial actions cannot guarantee a successful outcome at the construction site. These problems eventually led to the absence of the construction manager from SL [21]. Leadership is wholly compromised in safety, and the Full Range Leadership paradigm, which includes transformational and transactional leadership approaches, has dominated

previous studies [47,48]. Transactional leadership involves observing and paying personnel, but transformational leadership is about truly inspiring them [37]. Idealized influence (charisma), inspiring motivation, intellectual stimulation, and personalized consideration are the four scopes of transformational leadership. Contingent incentives and exception-free management are two transactional leadership characteristics [49]. Apart from the above two leadership styles, an emerging CSL style is "Distributed leadership" (DL). Distributed leadership is one form of horizontal leadership to ease the safety leader's responsibility [50]. Distributed Leadership (DL) is described as dispersing leadership roles across organizational levels so that diverse personalities can take on leadership positions at suitable events while exerting collective impact [51]. Hence, in the construction industry (CI) realm, safety and leadership are interconnected factors crucial for enhancing safety measures at construction sites and promoting safer behaviours among the workforce. In summary, good safety results can be achieved with the continued participation of safety leaders in the business. Figure 1 is an interpretation of the various CSL styles, according to Graham et al. [39].

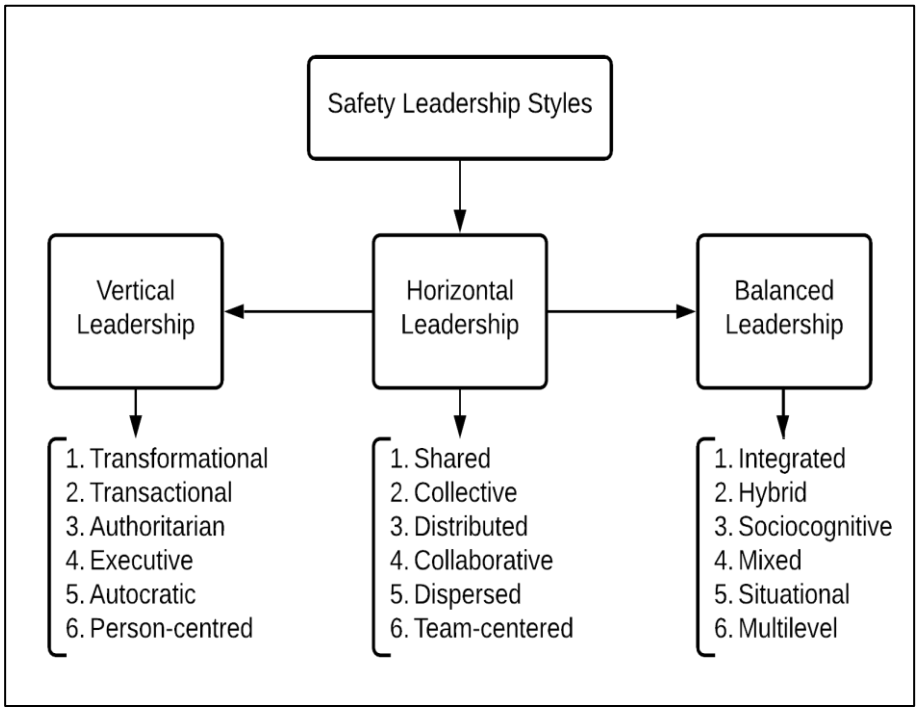

Figure 1. Styles of CSL [39]. *(Source: Authors).*

Vertical leadership is a traditional top–down leadership style where the leader holds centralized decision-making authority and exercises complete control over subordinates. In a vertical leadership model, employees are expected to follow orders and directives from their superiors without much involvement in decision-making processes. The leader is the primary decision-maker and communicates directions downward through the organizational hierarchy. This style is characterized by clear lines of authority and a hierarchical structure. The focus is on achieving goals and objectives efficiently, often through strict adherence to established procedures and protocols. The vertical leadership style can be effective in situations that require quick and decisive actions, especially in hierarchical organizations with clear reporting structures. However, it may stifle creativity and innovation, and employees may feel disengaged if they are not given opportunities for input or autonomy in their roles.

Horizontal leadership, also known as collaborative or network leadership, is a more decentralized and inclusive leadership style. This approach distributes leadership across the organization, and decision-making is shared among team members. Instead of a top-

down hierarchy, horizontal leadership fosters a flat organizational structure, emphasizing open communication, cooperation, and teamwork. In a horizontal leadership model, leaders encourage collaboration, value diverse perspectives, and empower employees to take ownership of their responsibilities. This style is well-suited for organizations prioritising innovation, creativity, and adaptability. It allows for greater flexibility and agility, as team members can respond quickly to changing circumstances and contribute their unique expertise. However, horizontal leadership may require more time and effort to reach a consensus on decisions, and there could be challenges in situations that demand swift and decisive actions.

As the name suggests, balanced leadership seeks to balance vertical and horizontal leadership styles. It recognizes that different situations and contexts may call for varying degrees of centralization and collaboration. Balanced leadership involves transitioning leadership authority between vertical leaders (e.g., project managers or senior leaders) and horizontal leaders (e.g., project team members) based on the specific needs of the project or organization. This dynamic distribution of leadership authority allows for leveraging the strengths of both styles. For instance, vertical leadership may be required to make rapid decisions in critical and time-sensitive situations, while in creative and problem-solving scenarios, horizontal leadership can promote diverse thinking and innovation. Balanced leadership emphasizes adaptability and situational awareness to determine the appropriate leadership approach at different stages of a project or organization's lifecycle.

Additionally, this manuscript discusses two other leadership styles: "laissez-faire leadership" and "management-by-exception". Laissez-faire leadership refers to a hands-off approach, where the leader avoids making decisions and provides little or no guidance to their team members. A lack of active leadership involvement, supervision, and support often characterizes this style. Management-by-exception is a leadership style where the leader intervenes or takes action only when things go wrong or deviate significantly from the established norms. The leader focuses primarily on identifying and correcting deviations rather than proactively guiding or supporting employees.

2.2. Factors Identified

Based on the literature, Table 1 shows the works in the selected literature that focus on all the significant leadership factors that have been identified that affect leadership safety in this article.

Table 1. Factors and their explanations.

Factors	Explanations	Authors
Priority of safety (A)	Safety practises must be included as an organization's goal and production, work planning, and scheduling.	[16,25,52–56]
Commitment to safety (B)	The amount of resources dedicated to safety demonstrates the organization's or owner's commitment. Past studies have discovered connections between management's attention to safety and safety outcomes.	
Leadership style (H, J, K, L, M)	Leadership styles such as decentralization, decisiveness, and transformational techniques are more conducive to good safety outcomes than others. When liberty is vital, the importance of rewards and command levels in management is minimal, and the number of accidents is low.	

Table 1. *Cont.*

Factors	Explanations	Authors
Interactions (C)	When there is good collaboration between personnel and management, a quality safety outcome emerges aided by good casual interaction between professionals and management. The literature has witnessed that lack of interaction and indecisiveness lead to accidents on construction sites.	
Communication (D)	Safety benefits increase when open-door culture is maintained by management and increases employee feedback.	
Involvement in safety (F)	Signs of participation include visibility on the job site approving safety measures, informal safety discussions with workers, and managers' accountability for safety performance. The safety results of the construction organization were linked to the participation of the management in several safety procedures.	
Humanistic management practices (E)	This emphasizes the need for management to treat employees with the utmost respect and show genuine concern for their welfare, including practices related to HSE promotion. Places with better health promotion and surveillance policies had lower accident rates.	
Contingent reward (I)	Establishing "positive transactions or exchanges with followers" is a part of transactional leadership. The leader elucidates prospects and creates the incentives for encountering those prospects.	
Personal Safety Knowledge (G)	The term pertains to the proficiency level of an employee, encompassing qualifications, experience, skills, knowledge, and training. Numerous researchers underscore the importance of worker training, particularly in hazard identification, as it significantly impacts safety at a given location.	

3. Methodology

3.1. Survey Instrument Development

The steps in this paper's approach are as follows: a study of the literature, identifying different SL styles that affect organizational safety climate (OSC) constructs, the construction of a questionnaire, data collection and analysis, and conclusion and discussion. The necessary literature on the issue was collected and studied in the first step. The SL styles influencing the OSC of construction organizations were chosen after thoroughly reviewing the literature. The questionnaire was developed using factors rated as confirmed by exploratory factor analysis. The styles and factors of SL are leader–member exchange, contingent reward, exception management, laissez-faire leadership, DL, and superior empowerment leadership. The priority of safety, the commitment to safety, interaction, communication, humanistic management methods, participation in safety, and knowledge of personal safety are all collective factors that make up the OSC. The factors were chosen after the exploratory factor analysis. Structured interviews and focus group discussions were used to classify the identified variables. The questionnaire formulation took into account the factors identified in the existing literature and those uncovered during the pilot study. The questionnaire was designed using peer-reviewed literature, and construction professionals tested its suitability. Per experts' suggestions, the refined questionnaire was partitioned into four sections: organizational safety climate, safety leadership variables and styles, visibility, and demographic profile. On a 7-point Likert scale ranging from 1 to 7, respondents were asked to rate their level of agreement or disagreement with the

SL styles and OSC, where 1 refers to strongly disagree, 4 refers to neither disagree (nor) agree, and 7 refers to strongly agree. Specific standards such as the Leader–Member Exchange (LMX) 7-item scale questionnaire [57] and the Multifactor Leadership Questionnaire (MLQ) [58] were used to measure the leader–member exchange and the superior's leadership traits, respectively.

3.2. Data Collection

The study focuses on experts employed within the construction industries of India's major cities as its target audience. Permanent professionals who work in the construction sector in major Indian cities are the subject of this study. Temporary professionals (i.e., part-time and contract workers) are excluded because they are allowed to serve on a contract basis and are not aware of the organizations' policies and systems. Before conducting the main survey in a construction company based in Chennai, a pilot study was carried out for sampling convenience. The pilot study involved polling twelve professionals using a questionnaire, and the results obtained were reliable. The participants in the pilot study were middle- and junior-level managers, selected based on their previous professional experience, all having at least 10 years of experience. Following the successful pilot study, the same questionnaire was used to survey construction professionals from various private construction organizations in major metropolitan cities across India. The survey included site engineers, senior site executives, project managers, safety engineers, and safety executives, totalling 500 experts randomly selected from the construction industry. The survey was conducted in person at three randomly chosen sites managed by a tier-one construction company in India. Although the authors recognize the need to conduct research at various levels of the Indian construction sector, in this preliminary exploratory stage of research on the leadership and climate of CS, empirical evidence and focus are a priority due to the lack of study in this area. On the other hand, construction sites managed by top-tier construction firms are typically larger and offer more respondents in a single location. Furthermore, this research provides a benchmark against which future research can be measured at other levels of the Indian construction industry.

The authors used face-to-face survey administration to maximize the response rate because it is India's most reliable method of contacting construction personnel. Due to their work demands, the prospective respondents did not have time to participate in an electronic survey. Given the non-English speaking background and varying dialects of many construction personnel, it was also crucial that they could answer our inquiries face-to-face.

To reduce the risk of social desirability bias, which is inherent in any research on CS, the researchers administered the surveys neutrally and anonymously, without influence from the immediate superiors of the respondents. A seven-point forced-response Likert scale was also used, ranging from strongly disagreeing to strongly agreeing. According to the ethical approval requirements, respondents received information on the research objectives and selection criteria. Participation in the survey was voluntary so that respondents could revoke their information at any time. The survey received 396 responses that were deemed valid, resulting in an impressive 79.20 percent response rate. Subsequently, the collected data underwent rigorous statistical analysis.

3.3. Data Analysis Approach

The descriptive analysis of the quantitative data consisted of calculating the mean responses to the 67 questionnaire items. This analysis seeks to identify the strengths and weaknesses of the recognised safety leadership styles and the items and dimensions of the safety climate based on the respondents' perceptions. The descriptive quantitative analysis was used to supplement the expert responses acquired during and after the pilot study.

4. Results and Discussion

4.1. Descriptive Statistical Analysis

The demographic characteristics of the respondents are summarised in Table 2. Most respondents are male (88%), as CI is a male-dominated sector in India. The most significant proportions among the participants are 18–28 (51.5%) and 28–38 (27.3%). The marital status of the respondents shows that unmarried (or) single (58%) professionals work more in this industry. Most respondents (52%) had completed their post-graduation education in the respective domain. However, 21.2% of the respondents have experience ranging from 6 to 15 years, and 45.5% have work experience of 2 years.

Table 2. Demographic profile of the respondents.

No.	Description		Percentage
1.	Gender	Male	88%
		Female	12%
2.	Age (in years)	18–28	51.5%
		28–38	27.3%
		38–48	6.1%
		48–58	12.1%
		>58	3%
3.	Marital Status	Unmarried	58%
		Married	42%
4.	Educational Qualification	Diploma	6%
		UG	30%
		PG	52%
		PhD/PDF	12%
5.	Overall Experience (in years)	Less than 2	45.5%
		2 to 5	18.2%
		6 to 15	21.2%
		16 to 25	6.1%
		Greater than 25	9.1%

4.2. Kaiser–Meyer–Olkin (KMO) Measure of Sampling Adequacy and Barlett's Test of Sphericity

Table 3 shows that the KMO measure of sampling adequacy is 0.856, higher than 0.800, indicating that the sample size is ideal. The null hypothesis is rejected since Bartlett's test of sphericity is 0.000, which is less than 0.005, and the correlation matrix of variables is not an identity matrix. There would be correlations between the variables in this case.

Table 3. KMO and Bartlett's Test.

Kaiser–Meyer–Olkin Measure of Sampling Adequacy		0.856
Bartlett's Test of Sphericity	Approx. Chi-Square	5184.990
	df	78
	Sig.	0.000 *

* represents significance at a 1% level.

4.3. Reliability Test

A reliability test is carried out as a starting point for the analysis to check the reliability of the data before review. Data are evaluated at the beginning of the section evaluation, and the reliability test is run to ensure accuracy. Typically, the reliability coefficient ranges from 0 to 1. The internal consistency's accuracy increases as it approaches 1 on the scale. With 67 items, Cronbach's Alpha value is recorded as 0.973, signifying strong internal reliability for data collection, which should ideally be above 0.7 for Cronbach's Alpha [59].

4.4. Relative Importance Index (RII)

The following expression was used to generate RII scores for various SL styles and factors that influence the OSC of a construction site (or) organization:

$$\text{Relative Importance Index (RII)} = \sum (W/(A \cdot N)), \quad (1)$$

where

Σ = represents the summation symbol, indicating that you sum up the results of the following calculations for each indicator or variable.
W = the weighting or score assigned to each respondent's response on the Likert scale. In the Likert scale, respondents are asked to rate their level of agreement or disagreement with a statement, typically on a scale from 1 to 7. Each response is assigned a value representing its level of impact, with 1 being the lowest impact and 7 being the highest impact.
A = the highest weight assigned on the Likert scale. In this case, it is usually the highest value used on the scale, which is 7.
N = the total number of respondents or the sample size.

To calculate the RII for each indicator, you multiply the weight assigned by each respondent (W) by the highest weight (A) and then divide the result by the total number of respondents (N) multiplied by the highest weight (A). Sum up these values for all indicators; the result is the RII for that specific set of indicators. The RII provides a ranking of the importance of different indicators, allowing researchers and analysts to identify the most influential factors in the given context. It is a valuable tool for decision-making and understanding the relative contributions of different variables to a particular outcome or phenomenon. The RII is particularly beneficial when comparing and prioritizing factors involving multiple variables, such as in survey data analysis or regression analysis.

Following the responses, the RII technique was used to analyse the data and determine the ranking. Researchers used the RII technique to weigh each item on the questionnaire [60]. The statement with the highest RII or Rank 1 has the most significant impact on awareness safety. On the contrary, the statement with the lowest rank has the most negligible effect, as shown in Tables 4 and 5. RII is carried out in two phases: (i) the first phase computed the values for all the 67 items in the questionnaires together, which shows that the item statement "I think it is vital to encourage others to use safe practices" ranked first with the highest RII. (ii) Similarly, the second phase computed the rankings of factors, indicating that 'Personal safety knowledge' ranked 1st with the highest RII value.

Table 4. Ranking of items as per RII.

	Items	RII	Ranking
F4	I think it is vital to encourage others to use safe practices.	0.876	1
G1	I know how to do my job safely.	0.864	2
C5	Will you encourage your colleagues to work safely?	0.845	3
G2	I know how to use PPEs and standard work procedures.	0.843	4
F2	I believe that safety at work is a critical issue.	0.839	5
G4	I am aware of how to maintain or improve workplace health and safety.	0.837	6
F3	I think it is necessary to put effort into reducing accidents and incidents on the job.	0.826	7
G3	I am aware of the hazards associated with my job.	0.824	8
M10	Explains the decisions and actions to the workgroup	0.795	9
A2	Supervisors and managers always try to enforce safe working procedures by adequately funding them.	0.793	10

Table 4. *Cont.*

	Items	RII	Ranking
F5	I voluntarily carry out tasks or activities that help to improve workplace safety.	0.791	11
A3	The management of your company gives safety the highest priority.	0.788	12
B5	The company provides sufficient personal protective equipment for all personnel.	0.785	13
E1	The company offers comprehensive training to existing workers on workplace health and safety issues.	0.779	14
F1	I follow the correct safety rules and procedures while performing my job.	0.776	15
M7	Pays attention to the work group's efforts	0.776	16
M3	Encourages workgroup members to express ideas/suggestions about safety issues.	0.775	17
M4	Listens to the ideas and suggestions of the work group related to safety issues.	0.775	18
M1	Set high standards for safety performance by his/her behaviour.	0.773	19
M9	Explains the expectations of management to workgroup	0.769	20
M12	It takes the time to patiently discuss the concerns of the workgroup members.	0.769	21
M6	Supports workgroups to see areas where more training is needed.	0.767	22
B2	Management considers safety to be equally crucial as schedule, cost, and quality.	0.766	23
C2	The company has safety committees consisting of representatives of management and employees.	0.763	24
C1	Management welcomes the opinions of employees before making final decisions on all safety-related matters.	0.761	25
M2	Set a good example by the way he/she behaves.	0.759	26
B4	When near-miss accidents are reported, management quickly acts to solve the problems.	0.756	27
M5	Uses the suggestions of the work group to make decisions that affect safety outcome/performance.	0.756	28
M11	Shows concern for the well-being of workgroup members	0.756	29
C3	Management promotes employee participation in safety-related matters.	0.754	30
M8	Helps the workgroup focus on company goals.	0.753	31
L3	Have you had responsibility for organizing work tasks at your construction site?	0.752	32
L4	Have you participated in activities that involve your colleagues in decision-making about safety-specific issues and improved safety outcomes?	0.750	33
B1	Management always takes corrective action after noticing unsafe practises.	0.743	34
A1	The safety rules and procedures followed in my company are sufficient to prevent incidents from occurring.	0.742	35
E2	Recruits are adequately trained to learn safety rules and procedures.	0.738	36
E3	Management encourages workers to attend safety training programmes.	0.731	37

Table 4. *Cont.*

	Items	RII	Ranking
L5	Have you been involved in managing the distribution of resources on your construction site?	0.730	38
E7	Safety week celebrations and other safety promotion activities organized by the management effectively create safety awareness among the workers in my company.	0.728	39
L6	Have you been involved in resolving staff conflicts at your construction site?	0.728	40
D4	There is open communication among workers about safety issues on this workplace.	0.725	41
E4	Safety training given to workers is adequate to respond to emergencies at my workplace.	0.725	42
D1	Management operates an open-door policy on safety issues.	0.715	43
C4	Management regularly consults with employees about workplace health and safety issues.	0.714	44
D2	There is enough opportunity for workers to discuss and deal with safety issues in meetings.	0.706	45
L1	Have you participated in setting goals for the development of your organizational safety outcome?	0.699	46
E6	In my company, employees are rewarded for best safety practises (cash or other rewards, recognition in the newsletter, etc.)	0.697	47
L2	Have you contributed to the promotion of proposals on safety-related issues and the improvement of safety outcomes?	0.691	48
E5	In my company, safe conduct is considered one of the positive factors for job promotions.	0.666	49
E8	There exists a very healthy competition among the employees to find out and report unsafe conditions and acts.	0.665	50
H1	Do you know where you are with your IS. . [and] do you usually know how satisfied your leader is with what you do?	0.542	51
H6	I have enough confidence in my IS that I would defend and justify his or her decisions if he or she were not present to do so.	0.527	52
D3	The target and goals for safety performance in my organization are not adequate for workers.	0.524	53
J3	The Superior/Manager tells workers the safety standards they have to know to carry out their work.	0.523	54
H2	How well does your IS understand your job problems and needs?	0.522	55
H7	How would you characterize your working relationship with your IS?	0.518	56
B3	Did you feel that the management is willing to compromise on safety to increase construction speed?	0.516	57
H3	How well does your IS recognize your potential?	0.500	58
I2	The Superior/Manager provides recognition/rewards when workers achieve their goals	0.487	59
J1	The Superior/Manager is satisfied when workers meet agreed-upon standards	0.476	60
K2	Superior/Manager will execute the works with available resources even though overloaded	0.474	61

Table 4. *Cont.*

	Items	RII	Ranking
H4	What are the chances that your IS would use his or her power to help you solve problems in your work?	0.467	62
I1	The Superior/Manager calls attention to what workers can get for what they accomplish.	0.467	63
J2	As long as things are working, the superior/manager does not try to change anything.	0.461	64
H5	Regardless of the amount of formal authority your IS has, what are the chances that he or she would "bail you out" at his or her expense?	0.450	65
I3	The superior/manager tells workers what to do if they want to be rewarded for their work.	0.437	66
K1	Whatever the workers want to do is OK for the superior/manager	0.361	67

Table 5. Ranking of factors.

	Factors	RII	Ranking
G	Personal safety knowledge	0.842	1
F	Involvement in safety	0.822	2
A	Priority of safety	0.774	3
M	Superior's empowerment leadership	0.769	4
C	Interactions	0.767	5
L	Distributed leadership	0.725	6
E	Humanistic management practices	0.716	7
B	Commitment to safety	0.713	8
D	Communication	0.667	9
H	Leader-member exchange	0.504	10
J	Management-by-exception	0.487	11
I	Contingent reward	0.464	12
K	Laissez-faire leadership	0.418	13

Ranking of Factors Affecting OSC According to RII

Based on the ranking in Table 4, the mean RII and the ranking of factors are shown in Table 5, and the top five most important factors are discussed in what follows.

- **Personal safety knowledge (RII = 0.842).** Knowledge of personal safety, which means self-awareness of how to perform work safely using the appropriate personal protective equipment, is the highest-ranking factor that affects OSC. This was mainly due to the following elements: "I am aware of how to perform my job safely" (RII = 0.864); "I am aware of how to use PPE and standard work procedures" (RII = 0.843); and "I am aware of how to maintain or improve health and safety on the job" (RII = 0.837). The results show that the construction professional must know about workplace hazards and improve workplace health and safety.
- **Involvement in safety (RII = 0.822).** The second most important factor was the participation in safety, whose most significant elements were "I feel it is vital to encourage others to use safe practices" (RII = 0.876); "I believe that safety on the job is a critical issue" (RII = 0.839); and "I feel it is necessary to make efforts to reduce accidents and incidents on the job" (RII = 0.826).
- **Priority of safety (RII = 0.774).** After the 'Involvement in Safety', the 'Priority of Safety' factor became the third most important factor. The significant elements were "supervisors and managers always try to enforce safe working procedures by adequately funding" (RII = 0.793); "Your company's management gives safety the highest priority" (RII = 0.788); and "The safety rules and procedures followed in my company

are sufficient to prevent incidents from occurring" (RII = 0.742). This shows that efforts must be made by each individual (both the immediate supervisor and the subordinate) working on the site to reduce the chances of encountering injuries and fatal accidents.

- **Superior's empowerment leadership (RII = 0.769).** Following the 'Priority of safety', the 'Superior's empowerment leadership' factor ranks fourth most significant. The notable elements of this factor were "Explains the decisions and actions of the work-group" (RII = 0.795); "Pays attention to the efforts of the workgroup" (RII = 0.776); and "Encourages workgroup members to express ideas/suggestions about safety matters" (RII = 0.775).
- **Interactions (RII = 0.767).** The fifth most important factor was the 'Interactions'. The prominent items were "Will you encourage your coworkers to work safely?" (RII = 0.845); "The company has safety committees consisting of representatives of management and employees" (RII = 0.763); and "Management welcomes opinions from employees before making final decisions on all safety-related matters" (RII = 0.761), which deals with encouragement provided by the superior to his subordinates through the appropriate leadership. The remaining factors are also ranked according to their factor loading values.

4.5. Chi-Square Test of Association

This analysis examined the relationship between Safety Leadership (SL) factors and the Organizational Safety Climate (OSC), as shown in Table 6.

Table 6. Pearson's chi-square test.

		Organizational Safety Climate
Leader-member exchange	Chi-square	5544.00
	df	448
	Sig.	0.000 *
Contingent reward	Chi-square	4356.00
	df	352
	Sig.	0.000 *
Management-by-exception	Chi-square	2772.00
	df	224
	Sig.	0.000 *
Laissez-faire leadership	Chi-square	1980.00
	df	160
	Sig.	0.000 *
Distributed leadership	Chi-square	7128.00
	df	576
	Sig.	0.000 *
Superior's empowerment leadership	Chi-square	8712.00
	df	704
	Sig.	0.000 *

* represents significance at a 1% level.

Null Hypothesis (H0). *There is no significant association between SL factors and OSC.*

Alternative Hypothesis (H1). *There is a significant association between SL factors and OSC.*

A chi-square analysis examined the association between SL factors and OSC, as shown in Table 6. The obtained *p*-value was 0.0032. The *p*-value of 0.0032 is less than the chosen significance level (alpha = 0.01). Therefore, we reject the null hypothesis in favour of the alternative hypothesis. These results indicate a significant association between Safety Leadership (SL) factors and the Organizational Safety Climate (OSC). The observed frequencies in Table 6 suggest that certain Safety Leadership factors relate to specific OSC

aspects. Further analysis would be needed to determine the direction and strength of these associations. The chi-square analysis provides evidence supporting the alternative hypothesis, suggesting that Safety Leadership (SL) factors are significantly associated with the Organizational Safety Environment (OSC). These findings may have practical implications for organizations seeking to improve their safety culture by focusing on specific aspects of Safety Leadership. However, caution should be exercised in generalizing these results, and further research is warranted to validate and expand upon these findings.

5. Conclusions

The research comprised a significant portion of participants from major metropolitan areas in India, predominantly representing male construction professionals (88%). The study identified two pessimistic SL styles. In turn, if practised in CI, it paves the way for increased safety hazards in construction sites, such as accidents, injuries, and fatalities. The pessimistic SL approaches are "management by exception" and "laissez-faire leadership." The remaining four types of SL are positive, which helps the CI to obtain a positive safety result. "Leader-member exchange", "contingent reward", "distributed leadership," and "superior empowering leadership" are the four positive SL styles (or) aspects. From the inferences of descriptive statistical analysis, CI is confirmed to be a male-dominated industry with unstable job permanence, resulting in a lack of leader–member exchange.

The RII analysis proved that "personal safety knowledge" is critical to building an ambient OSC in a construction organization. The questionnaire survey confirms the significance of the various SL styles and factors and their influence on OSC. The results of the chi-square analysis offer substantial support for the alternative hypothesis, indicating a significant correlation between Safety Leadership (SL) factors and the Organizational Safety Environment (OSC). These discoveries could hold practical importance for organizations aiming to enhance their safety culture by concentrating on particular elements of SL. Therefore, to withstand the rapid changes happening in the CI, the construction organizations should focus more on "leader-member exchange", "contingent reward", "distributed leadership", and "superior's empowerment leadership". The results of this study practically imply that the management personnel (senior and middle-level managers) and site professionals (site engineers) should be focused on improving their leadership quality to ensure safety for all labour and professionals working on the site premises. The study suggests that authorities emphasize the safety of the construction site and review the organization's HSE policy regularly. This would improve the safety results of the organization. The highest management level must consistently use a leadership stance that embodies virtues like "superior's empowering leadership." By distributing the authoritative abilities among the lower-level experts, it can eliminate the vertical (also referred to as traditional/heroic/monatomic) leadership style. The research provides a road map for the CI to improve top-level management, the department managing the company's human resources, and policymakers. Distributing leadership power to colleagues working in an organization will help them make immediate decisions on a critical issue that prevails on the site. Furthermore, encouragement and empowerment of construction professionals working on-site by providing them with the powers of leadership will motivate them and reduce the misfortunes of the construction site. Therefore, it is concluded that the various styles and SL factors significantly impact the OSC in the Indian CI.

5.1. Limitations

As previously discussed, leadership and its impact on workplace safety is a budding research area. This study is limited to the organizational context of the construction industry in India, which could not cover the complexity of the issues. During and after the completion of this research, the researchers identified several limitations. In this study, the sample primarily comprised younger construction professionals, as the authors encountered challenges in reaching out to older and senior-level professionals. The researchers' ability to distribute and collect research instruments was restricted by the selected construc-

tion companies' HR or senior management involvement. Additionally, some employees declined to participate in the survey, citing its time-consuming nature and perceived lack of personal benefit. The present study involves the quantitative research method with a limited sample size. It is based on the perceptions of white-collar professionals from the three purposely sampled tier-one construction companies. Descriptive analysis, namely relative importance index analysis and chi-square analysis alone, were performed, which satisfied the objectives of this study. One limitation of this study is that it is based on the observed data, which may not represent the entire population. Additionally, other unmeasured factors could influence the relationship between SL factors and OSC.

5.2. Future Directions

The current paper serves as an initial exploration of the connection between leadership styles and OSC in the international setting. Future studies should encompass a wider range of global construction projects to confirm the research findings. Future studies should consider site-based behaviour, influencing factors, and other confounding factors such as culture, funding sources, corporate culture, worker training level, experience, etc. Future studies can be carried out by identifying the underlying mechanism between safety leadership and personnel safety behaviour. Future research may focus on other age groups of executives holding prominent positions. The present study involves the quantitative research method with a limited sample size. In contrast, future research can adopt the qualitative approach, such as interviews, and the quantitative approach with a larger sample size. This study focused on the perceptions of white-collar professionals, whereas further research can be done on the perceptions of blue-collar professionals on their leader's behaviour and traits. Other construction companies of the highest level can be studied in the future to examine the aspects of CSL style and safety climate, which helps to improve knowledge in this research domain. Furthermore, a detailed and extensive statistical analysis must identify the underlying mechanism between the safety leadership style and the safety climate.

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