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A Comparative Study of Leadership Styles and their Influence on Safety-Related Behaviors in the Construction Industry of Chennai

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Abstract
Construction is intrinsically hazardous; thus, safety becomes very crucial and impacts directly on the welfare of the workers and the performance of a project. It analyses how three different categories of leadership styles, transformational, transactional, and laissez-faire style, influence safety-related behaviors among employees in Chennai's construction industry. The study aims at discussing the leadership styles with safety compliance to identify significant behavioral trends, problems, and enablers in the industry's safety practices. This paper outlines the relevance of transformational leadership in encouraging proactive safety behaviors and a wholesome safety culture among construction firms, based on mixed methods where surveys and interviews conducted by practitioners in the construction sector were considered. While transactional leadership is very good at ensuring compliance is achieved, it falls short of what is necessary for long-term behavioral change. Laissez-faire leadership has emerged as a risky trend due to the lack of active involvement in safety management. The results recommend that construction stakeholders need to build leadership skills, and policies will have to be adopted according to the specifics of the industry. Apart from these, this review has analyzed a total of 60 existing studies.
Keywords Leadership Styles, Safety-Related Behaviors, Construction Industry, Transformational Leadership, Transactional Leadership, Laissez-Faire Leadership, Safety Compliance, Worker Well-Being, Safety Culture, Chennai Construction Sector

Introduction

Leadership is very crucial in changing the safety behavior of construction workers. Several types of leadership result in important consequences on how the safety standards are implemented as well as how the employees view the regulations about safety. Transformational, transactional, and laissez-faire leadership often result in the subjective perception of the employees to workable intervention. For instance, transformational leadership can sometimes be perceived as motivating because it motivates workers to put much emphasis on safety, whereas transactional forms of leadership seek compliance by the workers through rewards and punishment. Alternatively, there are laissez-faire leaders who give lesser guidance, which gives a less rigorous attitude to safety. There is a need to know these kinds of leadership and what effects they may have on safety behaviors so that these can be doused through accidents and by promoting the culture of safety in construction. A comparative leadership styles analysis in Chennai construction firms with mixed effects on safety outcomes indicates that transformational leadership would be associated with positive and significant relationships with more safety compliance. Such a leader instills a sense of social responsibility and encourages consistent safety process improvement. Unlike transformational leadership, transactional leadership would not be very effective in creating an optimal long-term culture of safety. Laissez-faire leadership, typically common in less structured organizations, often results in a lower safety level. This study demands the significance of implementing effective leadership styles towards aiding in safer behavior and hazard reduction in Chennai's construction industry. In Figure 1, we find a comparison of three leadership styles - Transformational, Transactional, and laissez-faire- with some crucial workplace safety indicators.

We find a mean score that exceeds 85.4% safety compliance, has a worker engagement of 89.6%, and shows a perception of the safety culture at 91.2%. Meanwhile, the lowest percentage of accident rate reduction occurred at 30% as well as fewer incidents of accidents related to safety at 2.5 per 1000 workers, which confirms that this kind of leadership has a strong level of influence toward a good safety culture and worker involvement as well as compliance. Though effective, Transactional leadership is rated only mediocrely: it generates low compliance with 72.1 and more accidents per 1000 workers with 5.1 as against transformational leadership.

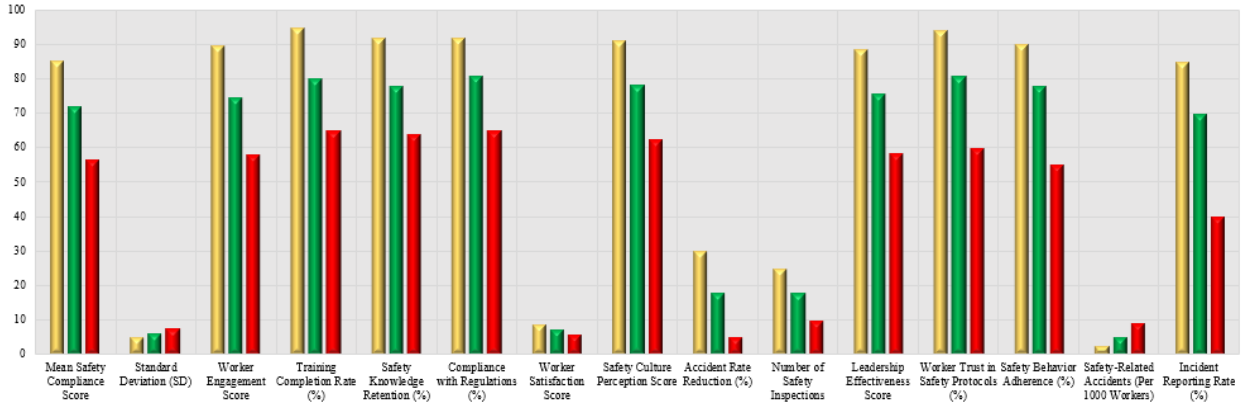

Figure 1: Comprehensive Analysis of Leadership Styles and Safety-Related Behaviors

Laissez-faire leadership has the lowest ratings in most safety indicators, including compliance with 56.8, worker engagement with 58.2, and perception of safety culture with 62.5, and it had the lowest rating in terms of effectiveness in promoting a safety-oriented environment. It also exhibits the highest accident rate at 9.3 per 1000 workers and incident reporting rate, at 40%, showing that it does not make a greater input into maintaining workplace safety. Overall, transformational leadership appears to yield the best results in terms of safety and compliance, while laissez-faire leadership is connected with low safety performance. A comparison of leadership styles in the construction industry in Chennai is tabulated in Table 1.

Table 1: Comparison of Leadership Styles in the Construction Industry in Chennai

Leadership Style	**Efficiency**	**Significance**	**Applications**	**Demerits**
Transformational Leadership	High	Inspires workers to exceed expectations; fosters innovation	Projects requiring high motivation, innovation, and worker engagement	It can be time-consuming to build trust; it may face resistance from conservative workers
Transactional Leadership	Moderate	Focuses on task completion and rewards for performance	Projects with strict deadlines and clear tasks	Can create a rigid environment; lacks flexibility and creativity

Laissez-Faire Leadership	Low to Moderate	Allows autonomy; effective in highly skilled and independent teams	High-expertise teams that do not require constant supervision	Lack of direction can lead to inefficiency; risk of poor safety compliance
Autocratic Leadership	High for short-term tasks	Quick decision-making, especially under pressure	Emergencies or when immediate decisions are needed	Poor team morale; discourages employee input and engagement
Democratic Leadership	High	Encourages team participation, fosters collaboration	Projects that require input from diverse stakeholders	Can be slow due to decision-making by consensus; lack of clear direction at times

Leadership Styles in the Construction Industry

In 2020, Anandh et al. investigated several bits of intelligence in the construction industry, with a strong concentration on middle management about emotional intelligence. It examines leadership relationships with subordinates in line with stress, communication, and teamwork. Emotional intelligence determining factors were derived from that established using SPSS 21.0. Interpersonal skills and emotional intelligence are therefore significant factors at the middle level of management, as established by the findings of this research work. In 2022, Soundarya Priya et al. focus on organizational factors that impact the performance of construction professionals this case, work environment, management, and career advancement. A structured questionnaire indicates that major concerns lie in work outcomes, lower wages, and lack of formal ties. Suggestions underline the importance of improving the organizational climate and sorting out issues of productivity of employees.

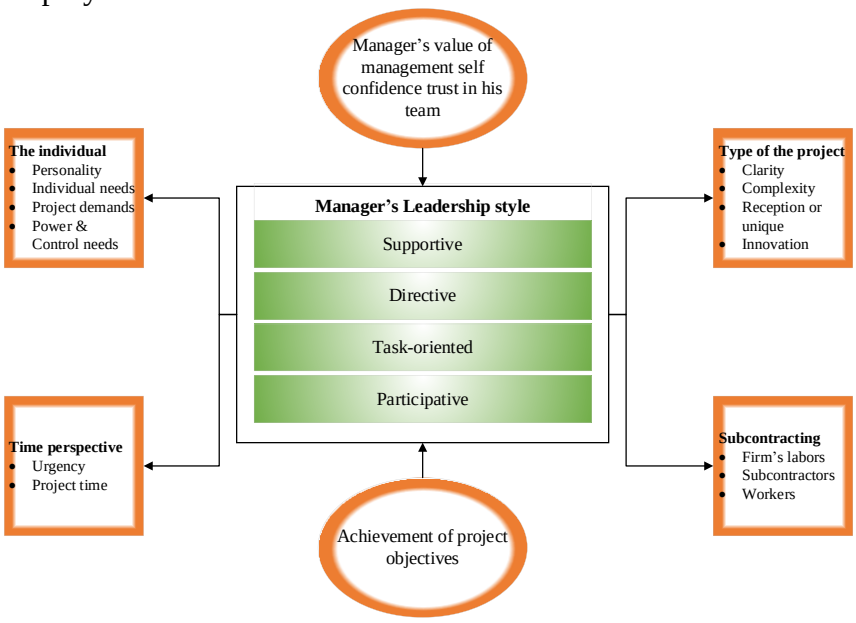

Figure 2: Dynamic of Leadership Style in Construction

In 2021, Srimathi & Narashiman explained the differences in leadership styles that exist between the manufacturing and the service industries related to Lean Six Sigma processes. Welch's test and regression were used to determine the sizeable sectoral differences that exist in instrumental and supporting styles. Participative leadership massively improved the techniques of applying Lean Six Sigma techniques for both industries. In 2024, Rajendran et al. deliberated on the psychological contract of safety (PCS). PCS was established in India's construction industry by structural equation modeling (SEM), and 420 surveys of experts. Safety System, among the major factors of PCS, impinges on the laborer's behavior. Findings higher safety norms, rules, and employer-employee responsibility will increase site safety. In 2024, Rehan et al. A quantitative survey conducted with 109 Australian construction professionals identified three factors that will produce project success: relationship management, self-management, and effective communication. Behavioral strategies applied at the teamwork and cultural levels are necessary to overcome challenges in the areas of supply chain management and technology adoption in digital workplaces. In 2024, Sankar & Anandh analyzed 44 studies from 1978 to 2023 relating to the safety leadership styles as well as how such styles may affect construction industry performance concerning safety. Transformational and transactional leadership styles impact the outcome of safety. Findings are thoughts for improving safety leadership and making safer workplaces. In 2020, Premi et al. emphasized leadership as the most significant driver of change within an organization to enhance employee performance. Leadership is important for both excellent organizational results and more effective leadership skills to solve obstacles in improving general organizational effectiveness. In 2021, Mahalingam suggested the case study of Dr. Brijesh Dixit in Nagpur Metro successfully exhibited a multidisciplinary approach, transparency, and risk-taking. Critical key strategies for stakeholder inclusion and trust were very imperative. The demonstrated BIM adoption showed leadership practices that led to the successful management of megaprojects. In 2019, Ikegami & Maznevski suggested the case study of Carlos Ghosn's leadership has three phases. Building trust was the most important determinant of the early success but he eroded it latterly because of mishandling social dynamics. The case study represents how organizational failure could occur even when the leader was successful initially due to defects in leadership. In 2019, Mathiyazhagan et al. presented a paradigm by taking the TBL approach to assess Indian construction material. BWM and Fuzzy TOPSIS are used to rank the sustainable materials based on 23 sub-criteria. Findings provide a framework for the sustainable selection of eco-friendly materials in an environmentally, economically, and socially balanced manner. Moreover, the following figure 2 shows the Dynamic of Leadership Style in Construction, as well as Table 2, shows the Studies on Leadership Styles and Practices in the Construction and Management Sector.

Table 2: Summary of Studies on Leadership Styles and Practices in the Construction and Management Sector

Author(s)	**Technique Used**	**Problem Statement**	**Significance**	**Leadership Styles**	**Limitations**
Anandh et al. 2020	Statistical analysis	Examines the role of emotional	Highlights emotional intelligence's	Not explicitly mentioned	Limited to middle-level managers

	using SPSS 21.0	intelligence in superior-subordinate relationships in construction, focusing on middle-level management.	role in interpersonal skills and teamwork for middle-level managers in construction.		and emotional intelligence; lacks generalizability.
Soundarya Priya et al. 2022	Structured questionnaire and pilot study, data analysis	Identifies organizational factors (work environment, career growth, etc.) affecting construction professionals' productivity and work-life quality.	Offers insights into organizational climate, addressing challenges like lesser payments and insecure career growth.	Not explicitly mentioned	Focuses primarily on organizational factors, not on broader systemic issues.
Srimathi & Narashiman, 2021	Welch's test, regression analysis	Investigates the impact of leadership styles on Lean Six Sigma practices in manufacturing and service sectors in India.	Demonstrates participative, supportive, and instrumental leadership styles significantly enhance Lean Six Sigma practices.	Participative, supportive, instrumental	Does not explore sector-specific challenges beyond Lean Six Sigma practices.
Rajendran et al. 2024	Systematic review, SEM, RII, chi-square analysis	Explores "psychological contract of safety" (PCS) and its impact on safety climate in Indian construction industry.	Identifies top safety-related factors and emphasizes improving safety norms, procedures, and policies.	Safety-specific transformational and transactional	Limited to Indian construction industry, may not apply to global contexts.
Rehan et al. 2024	Exploratory factor analysis,	Explores leadership practices and	Provides key success factors like	Relationship-oriented,	Study population limited to

	multivariate regression	communication's role in overcoming digitalization challenges in the Australian construction sector.	effective communication and relationship management for project success in digitalized environments.	transformational	Australia; applicability to non-digital environments not discussed.
Sankar & Anandh, 2024	Systematic review, PRISMA protocol, MMAT	Examines safety leadership styles and their impact on safety performance and climate in the construction industry.	Highlights the significance of combining transformational and transactional leadership styles for improved safety performance.	Transformational, transactional, safety-specific	Primarily focuses on existing literature; limited primary data.
Premi et al. 2020	Review of management and HR practices	Explores the role of leadership in organizational change and improving employee performance.	Emphasizes leadership as a critical driver of organizational change and effectiveness.	General leadership	Broad scope with limited focus on construction-specific scenarios.
Mahalingam, 2021	Qualitative analysis	Case study of Dr. Brijesh Dixit's leadership traits in managing the Nagpur Metro project.	Showcases real-life leadership strategies like risk-taking and inclusivity in managing megaprojects.	Risk-taking, inclusive, multidisciplinary	Case-specific; findings may not generalize across industries.
Ikegami & Maznevski, 2019	Historical and Social Process Analysis	Examines Carlos Ghosn's leadership trajectory at Nissan and the factors leading	Highlights the importance of maintaining trust and adapting leadership to changing	Transformational, transactional	Context-specific; focuses on failure rather than transferable success strategies.

		to his downfall.	organizational dynamics.		
Mathiyazhagan et al. 2019	Best Worst Methodology (BWM), Fuzzy TOPSIS	Develops a sustainable material assessment model for the Indian construction industry.	Identifies criteria for sustainable material selection, aiding environmentally-conscious decision-making in construction.	Not explicitly mentioned	Focuses on material sustainability, not directly on leadership styles.

Safety Challenges in the Construction Industry

In 2023, Ahamed & Mariappan analyzed the errors of various stages by the employees working in the construction sector. It finds three main safety issues: failure to provide and apply PPE, inadequate security training, and lack of proper monitoring of the security. Apart from this, it records 140 contributory errors. These results emphasize the point that there are faults at different levels, instead of from a single stratum of workers, leading to accidents. In 2020, Anandraj & Vijayabaskaran developed a research based on construction Safety Audits: Construction safety audit application, as applied to the assessment of potential risks of accidents in improving safety performance, is discussed in this paper. Determination of areas prone to accidents along with accident-contributing variables on construction sites by analyzing the trend of accidents in Chennai for five years was considered to attempt so that injury severity and accident frequency may be reduced. In 2020, Sambandan & Kala analyzed the connection between a safety climate and perceptions toward safety in the safety management systems in construction sites in Chennai. The author established that there exists a positive relationship between a safety climate and the efficiency of safety management systems, hence a good safety culture is therefore crucial for improving safety outcomes. In 2022, Balasubramanian et al. focus on avoidable accidents and therefore minimize cost overrun in Chennai construction projects. It highlights higher-level safety hazards and sets up the steps to be taken thereby preventing accidents and laying special emphasis on the financial implications of accidents. An example of this is worker compensation and indirect costs. In 2023, Kalidass et al. recommended using AI to determine pre-construction hazards and determine the risks associated with the safety of construction sites in Chennai. The AI platform is supposed to automate the process of ascertaining the identification of risks while sensitizing and forcing full compliance with safety regulations by being less accident-prone. In 2023, Meeral et al. examined the incidence and risk factors associated with oral and maxillofacial injuries among construction workers. It encompasses a considerable number of injuries, particularly on the part of untrained and immigrant laborers, and associates them with linguistic-related problems as well as a lack of safety awareness. In 2022, Janani et al. look into how the production of construction waste, especially bulldozing waste, damages the environment and recalls that India has limited landfill capacity. A questionnaire survey carried out among the Chennai gurus of construction determined the following major causes of waste generation: lack of material management, lack of

knowledge, and no legislation from the government. It has been observed that training of employees, rules for waste management in firms, financial incentives, and promotion have been significant techniques of waste reduction. The study focuses on the demand for immediate legal and practical practices that reduce construction waste and improve the procedures followed in waste management. This study is performed concerning risk management in the construction building of Chennai, which is very crucial for the elimination of loss and enhancement of profitability in construction projects. In 2021, Kumar & Narayanan suggested a study using the Risk Management Procedural Index (RMPI) for risk issues categorization and ranking by weighted inputs from the consultant, contractor, and developer survey respondents. From the review, the most fundamental risk variables contributing to the increased or decreased likelihood of success in a project are management (~15%), financial (~12%), and environmental (~10%). The outputs would give actionable insights into risk mitigation, cost and delay reduction, and improvement in construction quality underpinning the notion that such risks need proactive forecasting and management. In 2021, Sambandan et al. analyze the influence of national culture on construction safety management systems. It finds that national culture is relatively strong in strategic and operational aspects of safety management, where strong emphasis is also given to collectivism. In 2022, Umeokafor et al. suggested a research based on construction Health and Safety Research in Developing Countries: In this bibliometric and scientometric study, 31 years of research on the area of construction health and safety in developing nations are evaluated to show trends, knowledge gaps, and future objectives for construction safety, giving more importance to risk management, safety management, and human aspects. Moreover, the summary on Safety Management and Human Error in Construction Industry Research has been tabulated in the following table 3.

Table 3: Summary of Studies on Safety Management and Human Error in Construction Industry Research

Author(s)	**Technique Used**	**Research Aim**	**Problem Statement**	**Performance Attained**	**Dataset Used**	**Limitations**
Ahamed & Mariappan, 2023	Focus Interviews, Three-Dimensional View Strategy	Identify human-related errors in construction safety	Poor safety performance in Indian construction	140 contributing errors identified, categorized by employee level	Interviews at construction organizations in Chennai, South India	Limited to the construction sector and Chennai region
Anandraj & Vijayabaskaran, 2020	Accident Analysis, Statistical Connection	Identify accident-prone areas and factors causing accidents	High accident rates in construction	Statistical connection between accident rates and	5 years of accident statistics	Focused on Chennai, India; may not generalize

				contributing factors		to other regions
Sambandan & Kala, 2020	Cross-Sectional Study, Surveys	Examine the relationship between safety climate and safety management systems	Need for a comprehensive safety management system	Positive correlations between safety climate and safety management systems	Surveys from management and supervisory employees in Chennai	Limited to Chennai; does not include workers' perspectives
Balasubramanian et al. 2022	Questionnaire Survey, Statistical Analysis	Identify factors influencing cost overruns and accidents	High costs and accidents due to ineffective management practices	Statistical analysis showed effective preventive management can reduce costs and accidents	Questionnaire surveys in Chennai	Limited to Chennai; may not generalize to other regions or industries
Kalidass et al.2023	AI Platform Development, Risk Assessment	Create an AI platform for pre-construction danger identification	Lack of a systematic strategy and proper risk assessment	A platform proposed to automate risk identification and improve safety outcomes	Literature review and questionnaire surveys from Chennai construction sites	Focused only on construction sites in Chennai; does not explore AI's scalability beyond the region
Meeral et al. 2023	Descriptive Study, Statistical Analysis	Assess the magnitude and pattern of oral/maxillofacial injuries in construction workers	High rates of oral and maxillofacial injuries	Identified key factors contributing to injuries and provided injury odds ratios	524 construction workers in Chennai	Limited to construction workers in Chennai; may not represent broader demographics or other

						types of injuries
Janani et al. 2022	Questionnaire Survey	Assess knowledge of construction professionals about sustainable construction and waste management	Rising construction scrap, improper waste management, and lack of awareness about waste reduction	Identified key incentives: training, waste management policy, financial reward, and promotion; legislative issues noted	Responses from construction professionals in Chennai	Lack of enforcement of regulations, limited awareness, no comprehensive policy for scrap minimization
Kumar & Narayanan, 2021	Risk Management Procedural Index (RMPI)	Identify and categorize types of risk factors in the Chennai construction industry	Risk management in construction is underdeveloped, leading to financial losses and project delays	Ranked top risk factors: management (~15%), financial (~12%), and environmental (~10%). Reduced cost/time overruns forecasted	Responses from consultants, contractors, and clients in Chennai	Limited scope to specific regions, lack of real-time data integration for dynamic risk assessment
Sambandan et al. 2021	Survey, Pearson Correlation Analysis	Investigate how national culture impacts safety management in construction	National culture influences safety management systems and practices	Positive significant correlations between national culture and safety management practices	Questionnaire surveys on construction safety in India	National culture's impact may vary across different countries; not a global study

Umeokafor et al. 2022	Bibliometric & Scientometric Analysis	Analyze trends in construction health and safety research in developing countries	Lack of research alignment with actual health and safety problems	Growing research focuses in select countries, but knowledge gaps remain in many developing nations	Scopus database and scient metric analysis	Limited to construction health and safety in developing countries; not representative of all countries

Laissez-faire leadership in construction sector

In 2019, Khan et al. analyzed the role of leadership styles in Islamabad and Rawalpindi, private construction firms' project success. Results show that transformational leadership has positive impacts on the success of projects while there are negative effects regarding laissez-faire leadership and some dimensions of transactional leadership. Spiritual leadership vision and hope/faith dimensions have positive relations with project success. In 2022, Thanh et al. studied the relationship between leadership styles and employee engagement in the provincial public sector in Vietnam in 2022. Results indicated that leadership style significantly impacts employee engagement; an effect was found with transformational leadership. In 2019, Oyetunji et al. studied leadership behavior and workers' performance in construction projects. The findings show that transformational leadership had the most positive influence on workers' performance, with a negative impact noted in laissez-faire leadership. In 2022, Sankar et al. established the effect of various safety leadership styles on the organizational safety climate in the Indian construction industry. Four out of six leadership styles (such as LMX and distributed leadership) positively influenced OSC, while laissez-faire and management-by-exception leadership styles were linked to more accidents and fatalities. In 2022, Gumusburun Ayalp examines the relationship between leadership styles and entrepreneurship orientations among architects leading SMEs in the construction industry. It found that individualized consideration was the most adopted leadership style, and proactiveness was the predominant entrepreneurship orientation. In 2020¸ Rajbanshi investigates how different leadership styles (transformational, transactional, and laissez-faire) impact employee motivation in the ICT sector in Nepal. Transformational leadership was found to significantly enhance employee motivation, while laissez-faire and transactional leadership styles had lesser effects. In 2020, Ardana et al. examined the role of leadership in enhancing employee performance in a construction company. Democratic leadership was identified as having the most positive impact on performance, with leadership behaviors influencing about 32.9% of employee performance. In 2023, Rotimi et al. investigated the relationship between leadership styles and worker performance in construction firms in Wellington, New Zealand. Transformational leadership was found to be the most prominent and effective, while laissez-faire and passive management behaviors hindered worker performance. In 2021, Robert & Vandenberghe looked at the negative impact of laissez-faire leadership on employees' contributions and affective organizational commitment, particularly for employees with a strong relational self-concept. The

research found that laissez-faire leadership diminished these factors over time. In 2022, Górecki et al. discuss the challenges of implementing circular economy (CE) practices in construction companies. It shows that leadership in construction firms does not follow a single dominant style but evolves through phases of disharmony, euphoria, and harmony as they mature in CE practices. Table 4 shows the Studies on Leadership Styles and Their Impact on Employee Performance in the Construction Sector correspondingly.

Table 4: Summary of Studies on Leadership Styles and Their Impact on Employee Performance in the Construction Sector

Author(s)	Technique Used	Research Scope	Problem Statement	Efficiency/Significance	Limitations
Khan et al. 2019	Deductive approach, cross-sectional survey	Private sector construction firms, Islamabad and Rawalpindi	Examines the impact of leadership styles on project success	Transformational leadership is positively associated with success; transactional leadership's contingent reward & management by exception active are also positive	Limited to private sector firms in Islamabad and Rawalpindi, a small sample size
Thanh et al. 2022	SPSS statistical analysis, survey data collection	Provincial public sector employees, Vietnam	Investigates the relationship between leadership styles and employee engagement in Vietnam's public sector	Found that leadership style significantly impacts employee engagement; provides insights for improving engagement	Limited to the provincial public sector, potential bias in convenience sampling
Oyetunji et al. 2019	Purposive sampling, questionnaire survey	Construction workers in Lagos, Nigeria	Investigates leadership behavior impact on workers' performance in construction sites	Found that transformational leadership positively impacts performance; laissez-faire has negative impact	Limited to construction workers in Lagos; small sample size may not be fully representative
Sankar et al. 2022	Stepwise regression	Construction profession	Transformational leadership	Four out of six safety leadership styles positively	Focused only on safety leadership in

	analysis, SEM	als in South India	fosters a healthy safety culture, but authoritarian leadership can impair safety outcomes	impact safety outcomes; pessimistic styles cause negative effects	construction industry in South India, which may not generalize widely
Gumusburun Ayalp, 2022	MLQ-5X, Entrepreneurship scale	Architect SMEs in the construction industry	Explores the relationship between leadership styles and entrepreneurship orientations	Found individualized consideration leadership style is most common; proactiveness in entrepreneurship orientation	Small sample size of 50 architects; may not be representative of all SME leaders in construction
Rajbanshi, 2020	Multiple linear regression analysis, survey	Employees in 5 ICT companies in Nepal	Investigates the impact of leadership styles (laissez-faire, transactional, transformational) on employee motivation	Transformational leadership has a significant positive impact on employee motivation	Small sample size (45 employees) and limited to ICT sector in Nepal
Ardana et al. 2020	Quantitative approach, questionnaire survey	Construction company employees	Studies the impact of leadership style on employee performance in a construction company	Found democratic leadership style had the most significant impact on performance; behaviorally-driven findings	Limited to a single construction company, may not represent industry-wide trends
Rotimi et al. 2023	Multifactor Leadership Questionnaire, statistical analysis	Construction workers in Wellington, NZ	Investigates the relationship between leadership style and worker	Transformational leadership found to be most effective; laissez-faire and management by exception hinder performance	Limited to construction industry in Wellington, NZ; worker perspectives might not apply broadly

			performance outcomes		
Robert & Vandenberghe, 2021	Structural equation modeling (3-wave longitudinal study)	Multiple organizations, employees	Investigates the impact of laissez-faire leadership on employee contributions and commitment	Found relational self-concept employees are more negatively affected by laissez-faire leadership	Based on employee perceptions; results may differ in different organizational contexts
Górecki et al. 2022	Literature review, questionnaire	Construction companies, sustainable projects	Examines leadership styles' role in implementing circular economy (CE) in construction	Found no single dominant leadership style; identifies phases for becoming a CE-matured enterprise	Limited to construction sector and sustainability focus; lacks clear recommendations for leadership style

Strengths and weaknesses of each leadership style

In 2024, Senthamizh Sankar & Anandh suggested a study on Construction Safety Leadership. Transformational safety-specific leadership is the best style to enhance the results of construction safety as it focuses on the empowerment of people through shared values and goals. More research is required from poor nations to create a global awareness of safety leadership methods, which are aligned with the Sustainable Development Goals and based on safety and sustainable urbanization. In 2024, Soundarya Priya & Anandh developed a research based on Quality of Work Life (QWL) among Chennai's Construction sector. The investigation ascertained factors influencing the QWL of Indian construction workers, incorporating work commitment, job satisfaction, and career advancement, which were perceived as the most relevant. Utilizing structural equation modeling enables new ways to increase QWL and new research fields, which might be longitudinal studies or qualitative approaches. In 2020, Priyadharshini & Melwyn proposed a study on Leadership and Organizational Success. Leaders are the determinants of organizational success because they drive growth, unity, and team performance. Therefore, this study focuses on the management, interpersonal skills, and problem-solving skills of a leader to guide the teams toward the achievement of organizational goals. Leadership traits are, therefore, outcomes of experience and exposure obtained within an organization. In 2024, Rehan et al. elaborate on whether the construction industry of Australia faces differences in project success due to different leadership techniques and communication. Relationship management, communication, leading by example, and self-management have been found as critical factors of success in facilitating cooperation and conflict resolution to make the projects successful. In 2024, Rehan et al. related globalization with construction project issues like time overruns, cash flow issues, and expectations from stakeholders. It has highlighted the techniques in aspects of leadership and communication as

critical in overcoming these problems while suggesting a new framework to enhance project success based on good communication and relationship management practices. In 2024, Thaloor Ramesh & Nattanmai Swaminathan investigated the application of lean management, and maintainable construction, besides association contract models in a building project. The research demonstrates how Structural Equation Modelling brings about improved efficiencies, lowers environmental impacts, and delivers team integration, among others, with the outcomes. In 2024, Mansour et al. investigated the impact management techniques on risk, quality, and sustainability in the Palestinian construction sector. The focus is on the mediation role of sustainability between interactions of management practices with risk management as well as insight into comprehensiveness for qualitative management to overcome issues. In 2017, Kanagalakshmi suggested the current state of sustainable construction in Chennai is discussed and the elements of importance are identified crucially for future development. Sustainable construction practices within construction enterprises are very nascent, and the introduction of a framework that can help assess project sustainability performance, as well as stakeholder involvement, might expedite its growth towards maturity. In 2021, Moinuddin & Yogeswari focus on identifying and mitigating risks in building projects design defects, financial risks, and accidents in a building project, and also that risk management strategies are very important for the performance of the project and profit, and also address the solutions to most prevalent concerns in the industry. In 2023, Bayhan et al. studied the interrelation of integration between Lean and BIM within construction. The study focuses on significant aspects, such as control and standardization, that favor success in Lean/BIM and would help leaders understand tactics for improving outcomes within projects. Summary of Leadership and Management Practices in Construction Industry Research is tabulated in the following table 5.

Table 5: Summary of Leadership and Management Practices in Construction Industry Research

Study	**Author(s)**	**Technique Used**	**Strength**	**Weakness**	**Performance**	**Data Used**	**Efficiency**	**Limitations**
Safety Leadership in Construction	Senthamizh Sankar & Anandh, 2024	Scientometric analysis, Meta-analysis	Identifies the impact of transformational leadership on safety outcomes	Lack of developing country representation	Improved safety performance	114 papers, 13 studies with 7220 participants	High	Limited geographical focus, need for more diverse studies
Quality of Work Life in Indian Construction	Soundarya Priya & Anandh, 2024	Questionnaire survey, Structural Equation	Provides insights into QWL factors, uses multiple	Limited to the Indian context, may not be universa	Improved job satisfaction and career growth	900 construction professionals (80.44 %	High	Limited to one country, lacks longitudinal data

		Modeling	analytical methods	lly applicable		response rate)		
Role of Leaders in Organizations	Priyadharshini & Melwyn, 2020	Qualitative analysis, Descriptive analysis	Emphasizes leadership's importance in organizational growth	General, lacks empirical data	Improved organizational growth and culture	Not specified	Medium	Lacks concrete, empirical performance measures
Leadership Practices and Project Success in Construction	Rehan et al. 2024	Exploratory factors analysis, Multivariate regression	Identifies key leadership factors for project success	A narrow focus on the Australian industry	Improved project outcomes	66 projects, independent practitioner interviews	High	Limited to the Australian industry context
Globalization and Project Management in Construction	Rehan et al. 2024	Exploratory factors analysis, Multivariate regression	Identifies factors contributing to project success in a globalized environment	Focuses on Australian construction, limited scope	Improved project outcomes	Random responses from experienced professionals	High	Limited to the Australian industry context
Lean Integration in Construction Projects	Thaloor Ramesh & Nattanmai Swaminathan, 2024	Survey, Structural Equation Modeling	Integrates lean practices with sustainable and alliance contract practices	Limited industry-wide scope, focus on specific techniques	Demonstrated significant impact on project outcomes	309 responses from AEC sector	High	Limited to specific practices, lacks broader generalization
Risk Management in	Mansour et al. 2024	Case study analysis	Identifies risk managem	Limited to two	Improved risk manage	Two case studies	Medium	Limited by scope of

Palestinian Construction			ent strategies, emphasizes sustainability	case studies	ment and sustainability	from X and Y companies		case studies, lacks quantitative data
Sustainable Construction in Chennai	Kanagalakshmi, 2017	Literature review, Framework development	Provides a framework for assessing sustainability performance	Lack of empirical validation and data analysis	Offers a comprehensive framework for sustainability in construction	Literature and expert opinions	Medium	Not empirically validated, limited by geographical scope
Risk Management Practices in Construction	Moinuddin & Yogeswari 2021	Risk identification and mitigation	Provides practical risk management strategies	Lacks data on effectiveness of identified solutions	Identifies key risks and offers solutions	Not specified	Medium	Lacks detailed performance data, limited by general focus
Lean and BIM Synergy in Construction	Bayhan et al. 2023	Analytical Network Process (ANP), Literature review	Identifies and validates synergy between Lean and BIM	Focuses on a limited number of projects	Highlights key success factors for Lean/BIM integration	5 construction projects	Medium	Limited by small sample size, focus on U.S. companies

Barriers to Effective Safety Leadership in Chennai's Construction Sector

In 2024, Sankar et al. investigated whether immediate supervisors' safety leadership behaviors affect the perceptions of construction professionals in the southern Indian region regarding the safety climate. A total of 279 construction workers were surveyed, and critical safety climate attributes such as management commitment, equipment and resources for safety, and employees' training were found to get a boost from safety leadership. The article highlights how good leadership and communication make a difference in better safety and regulatory compliance in the Indian construction industry. In 2023, Sankar et al. discussed the link among secure leadership as

well as secure climate at construction sites in India. Based on this research study, at a 79.2% response rate to the survey, the authors concluded that the optimistic leadership style is associated with positive relations to safety outcomes, while a pessimistic one, such as laissez-faire and management-by-exception, has detrimental impacts on the safety climate. The report ends by concluding that active leadership is imperative for effective safety. In 2021, Hire et al. took the 'awareness' survey of BIM with its efficacy in improving safety management among construction manufacturing. The statistics drawn from 171 valid responses established a lack of awareness of BIM and needed its incorporation into education as well as organizational corporate training for effective safety management. In 2023, Waqar et al. developed a study based on the barriers to BIM Adoption in Malaysia Technological, behavioral, and management problems are the challenges in the acceptance of BIM over the construction sector of Malaysia. A survey of 235 professionals indicated those issues, which suggested that though awareness has improved much, practice implementation was still restricted. This report recommends that these barriers be addressed for BIM to truly maximize the cost, time, productivity, and quality benefits of construction projects. In 2023, Khurshid et al. present the current status of IoT adoption in the context of Construction 4.0, both in developed and developing countries. The paper identifies possible barriers that exist in the integration of IoT with BIM, safety, procurement, and structural health monitoring in the construction sector. The research is useful to overcome the barriers to the adoption of IoT for improved efficiency in the construction sector. In 2023, Aravindh et al. examined the benefits of merging lean techniques with alliance contracting in Indian construction projects. Factor analysis and structural equation modeling are applied to identify stakeholder commitment and work transparency as critical barriers to successful integration. Data show that application of these techniques combines to enhance project delivery, quality, and transparency. In 2023, Aidoo et al. evaluated the resilience of SMS in Ghana's construction industry. From the findings, only policy meets a satisfactory level of robustness, while the majority of SMS is weak. In this regard, the report suggests that there is a need to shift from traditional to proactive, resilient safety management systems to enhance safe performance. In 2024, Rebai et al. examined barriers to the adoption of Advanced Work Packaging in construction. Based on an analysis of 59 relevant papers, the study finds significant coordination issues and challenges regarding resource management as important barriers. It gives insights into potential solutions and future research avenues for overcoming such barriers. In 2023, Rameshwaran et al. cover the implementation of Total Quality Management (TQM) in the Indian construction industry. The industry contributes a large portion to India's GDP, and this paper discusses eight critical success factors that can enhance the performance of operations and organizations in the industry. A model for the TQM application is presented to improve the overall construction industry in India. In 2020, Ahuja & Basu explored the skill deficit in Indian construction. It considers the impact that this deficit has on project costs and risk. Specifically, curricular reform and changes to the training schedule are needed so that future professionals can be better prepared for the industry. Governmental skill development efforts are discussed here. Thus, the corresponding Table 6 shows the comparative Overview of Studies on Safety Leadership, Technology Integration, and Construction Industry Development in India and Beyond.

Table 6: Comparative Overview of Studies on Safety Leadership, Technology Integration, and Construction Industry Development in India and Beyond

Author(s)	Technique Used	Research Scope	Uses	Performance	Efficiency	Key Barriers	Safety Effectiveness	Significance	Limitations
Sankar et al. 2024	Quantitative Survey, Convenience Sampling	Southern Indian construction sites	Investigates the impact of safety leadership on safety climate	Positive impact of leadership on safety climate	High	Lack of comprehensive safety leadership training	High	Highlights the importance of safety leadership development	Limited to southern India, the sample size limited
Sankar et al. 2023	Questionnaire Survey, Chi-Square Analysis, Relative Importance Index	Indian construction industry	Examines safety leadership styles and organizational safety climate	Positive impact of optimistic leadership styles	Efficient analysis	Pessimistic leadership styles hinder safety	Improved safety outcomes	Provides insights into leadership styles' impact on safety	Focuses only on leadership styles, doesn't cover other factors
Hire et al. 2021	Questionnaire Survey, SPSS Analysis	Indian construction industry, BIM awareness	Examines BIM awareness, benefits, and barriers to adoption	High response rate	Efficient in identifying BIM-related barriers	Limited awareness and corporate training on BIM	BIM can enhance safety management	Highlights the need for BIM integration in safety management	Awareness gaps and limited BIM implementation

Waqar et al. 2023	Semi-structured Interviews, Exploratory Factor Analysis (EFA), AMOS	Malaysian construction industry, BIM barriers	Analyzes barriers to BIM adoption in small construction projects	Found significant barriers to BIM adoption	Barriers identified lead to slower BIM adoption	Technical and behavioral barriers to BIM implementation	Highlights how BIM can improve safety and quality	Barriers are significant for small projects, needs overcoming strategies	The study may not capture the full range of barriers in other countries.
Khurshid et al. 2023	Literature Review, Article Analysis	Global construction industry, IoT adoption	Reviews IoT integration with BIM, procurement, safety, and SHM	Identified barriers to IoT adoption in construction	Identified roadblocks in IoT adoption	High costs, technical difficulties	IoT integration can enhance safety in construction	Serves as a guide for overcoming adoption roadblocks	Limited to literature review, lacks practical implementation examples
Aravindh et al. 2023	Factor Analysis, Structural Equation Modeling (SEM)	Indian construction industry, Lean and Alliance integration	Investigates the synergy between Lean and Alliance strategies in construction	Found positive synergy when integrated	Effective integration enhances project delivery	Lack of stakeholder commitment, work transparency	Improved delivery and quality of construction projects	Focus on integration of methodologies, not on broader safety aspects	Limited to Indian construction industry, findings may not apply globally
Aidoo et al. 2023	Descriptive Statistics, ANO	Ghanaian construction industr	Assesses resilience of constru	Found only one safety	Low resilience in current safety	Lack of proactive safety approaches,	Emphasizes the need for a proacti	Limited to one country,	Limited to perceptions of constru

	VA, Resilience Analysis Grid (RAG)	y, safety management systems	ction safety management systems	system resilient (policy)	management systems	need for resilience	ve safety management approach	doesn't explore different safety system types	ction managers and directors, not workers
Rebai et al. 2024	Systematic Literature Review (SLR), Scientometric Analysis	Global construction industry, Advanced Work Packaging (AWP) adoption	Identifies barriers to AWP adoption in construction	Found numerous barriers to AWP adoption	Provides a broad understanding of AWP implementation	Resistance to change and lack of knowledge	AWP adoption can enhance project efficiency and safety	Focused on barriers, doesn't address the implementation of solutions	Barriers identified may not represent the latest technological advancements
Rameshwaran et al. 2023	Model Development, TQM Adoption Analysis	Indian construction industry	Develops a model for Total Quality Management (TQM) in construction	Identified key CSFs for TQM in construction	Effective model for TQM implementation	Poor industry practices, resistance to change	Enhances quality and organizational performance	Focus on TQM, not on safety-specific practices	The study doesn't consider long-term effects of TQM implementation
Ahuja & Basu, 2020	Literature Review, Government Policy Analysis	Indian construction education and skill development	Explores skill development initiatives for construction professionals	Identified key government initiatives	Efficient analysis of educational policies	Lack of skilled workforce, outdated training programs	Policy initiatives aim to improve workforce competency	Limited focus on future trends and technology integration	Lack of quantitative analysis to measure the impact of these initiatives

Innovations and Challenges in Sustainable Practices and Advanced Technologies in the Construction Industry

In 2019, Gupta introduced a Circular Economy in the Construction Industry. The building industry in India would have to transform from a linear to a circular economy, with recycling and reuse built into it. The case study notes the restraint and scope of the implementation of a circular economy in the building industry. It points toward long-term sustainability in India's building industries and circular processes. The adoption of circular economy models requires a holistic transformation that should permeate all stakeholders to ensure the survival of the industries in the long run. In 2024, Parameswaran & Ranadewa proposed the Lean Learning Framework for Construction. A lean learning framework for the construction sector is built where the learning-to-learn sand cone paradigm is included. Through a qualitative study, 15 semi-structured interviews and document reviews uncovered 52 sub-activities to improve lean learning. Some of the major practices included record-keeping, performance updates, and publishing hierarchical instructions. These practices help bring on continuous learning for the benefit of the organization at large. Not long ago, in 2023, Fireman et al. established Slack Practices and Buffers in Construction. This project evolves slack practices and resources as socio-technical substitutes to buffers for reducing construction variability. Two case studies on the Last Planner Rs System illustrate 57 slack practices and eight resource types. SPRs also differ from traditional buffers in that they handle variability with a more general method. Five recommendations are provided to assist in identification and evaluation of SPRs for construction projects that would support good risk management. In 2018, Iyer developed a Strategic Environmental Assessment (SEA). It encompasses sustainability considerations within the planning of a construction project that takes care of environmental and health impact assessments. For sustainable development, there is lifespan analysis, safety measures, and social effect assessments included. SEA encourages multi-disciplinary methods and effective environmental management that ensures that sustainability objectives are achieved. It helps to have better decision-making and minimizes adverse consequences associated with construction projects. In 2018, Lee et al. through an investigation, reported the association of board attributes with corporate malfeasance in Taiwan's construction industry. From panel data taken from 45 firms between 2005 and 2014, various directorships, diversified experiences, and high educational levels enhance illegal behavior while diversity hinders such malfeasance and homogeneous backgrounds boost governance. The lesson learned customization of governance practices must be toward industry-specific requests to decrease malfeasance by a corporation. In 2017, Wahaj et al. examined the Indian construction industry and the relationship between procurement frameworks and project success. Despite the fallibility of such narrow contractor involvement, unfamiliarity with options, and so on, traditional systems are prevalent. The report recommends that one should learn from alternative procurement systems apart from merely exchanging knowledge with international consultants. If there existed more of such systems, then their implementation would be advantageous for Indian projects and practices within the industry. In 2019, Edirisinghe & Andamon developed a research based on Heat Stress in Construction. Heat stress is a serious hazard in the workplace which exerts significantly more effects on health, productivity, and safety in construction. In this chapter, risk factors, heat stress indices, and mitigation techniques including water and exposure limits have been discussed. Issues with heat in construction are assessed in the consideration of policies and standards. It emphasizes

wholesome approaches and strategic measures adopted to safeguard the health and performance of workers. In 2017, Srinivasan et al. explored developmental changes taking place during training in consideration of continuous skill development. The results focus more on training capable of better competing and much more expert in the agenda of both employees and organizations. Continuity of investment in the development programs is essential for continuing success in the construction sector. In 2021 Freire et al. are among the contributors to research in 3D Printing in Construction. Low cost and environmental sustainability with materials reuse are the biggest advantages because 3D printing is increasingly used in construction: from homes and bridges to catastrophe reconstruction. Challenges include low regulations and certification. Still, advances in the material could be and are nowadays printed in double after the other. This technique presents innovative Industry 4.0. In 2022, Vijayan et al. researched the fire and impact resistance of SFRC along with its structural applications in beams and slabs. Performance depends on several factors like fiber volume and distribution. Different studies will be conducted on various types of concrete, but special emphasis will be given to SFRC in advanced building construction studies in the future. Summary of Articles on Construction Industry has been tabulated in the following table 7.

Table 7: Summary of Articles on Construction Industry

Author Name	**Technique Proposed**	**Research Aim**	**Problem Statement**	**Challenges**	**Significance**	**Limitations**
Gupta, 2019	Circular Economy (CE) approach	To explore barriers and opportunities in CE for the construction industry in India	The construction industry's limited focus on reuse and other R's beyond recycling	Lack of awareness and adoption of CE practices	Promotes sustainability and stakeholder engagement for long-term benefits	Limited practical case studies from India
Parameswaran & Ranadewa, 2024	Learning-to-Learn Sand Cone Model	To propose a lean learning framework for the construction	Lack of effective lean learning practices in construction	Organizational resistance and complexity of implementation	Continuous improvement through lean learning sub-activities	The first framework at the construction level, not validated at an educational institute level
Fireman et al. 2023	Slack Practices and Resources (SPR)	To explore socio-technical slack as a compleme	Overreliance on buffers without considering	Difficulty in identifying and maintaining SPR	Broader perspective on variability managemen	Limited to case studies; broader applicabilit

		nt to buffers	human agency		t and risk control	y not validated
Iyer, 2018	Strategic Environmental Assessment (SEA)	To integrate sustainability and environmental considerations into project planning	Lack of holistic sustainability assessments in construction	Incorporating multidisciplinary approaches effectively	Promotes lifecycle sustainability and better decision-making	Generalized findings; not construction-specific
Lee et al. 2018	Empirical analysis of board characteristics	To examine the relationship between board diversity and corporate misconduct	Growing corporate misconduct despite governance frameworks	Lack of comprehensive data on governance and misconduct	Identifies education and experience diversity's role in reducing misconduct	Focused only on Taiwan; limited global relevance
Wahaj et al. 2017	Study of procurement frameworks	To analyze the impact of procurement frameworks on project success in India	Lack of contractor involvement in traditional procurement methods	Limited awareness of alternative procurement frameworks	Enhances understanding of alternative systems for success	Not widely tested; requires formal training for adoption
Edirisinghe & Andamon, 2019	Heat Stress Assessment Protocols	To address occupational hazards of heat stress in construction	Rising temperatures and inadequate heat stress management	Lack of standardized guidelines and acclimatization protocols	Provides strategies for better occupational health and safety	Limited to Australian settings and standards
Srinivasan et al. 2017	Training and Developm	To analyze employee developm	Poor employee performanc	High costs and measuring	Improves industry competitive	Limited to preliminary stages;

	ent Program Assessment	ent programs' impact on project success	e hindering industry competitiveness	post-training impact	ness through skill enhancement	lacks longitudinal data
Freire et al. 2021	3D Printing Technology	To explore applications and advancements of 3D printing in construction	High costs and inefficiencies in traditional construction methods	Lack of legislation and material standards for 3D printing	Promotes sustainability, cost-efficiency, and innovation	Current limitations in scalability and regulatory compliance
Vijayan et al. 2022	Steel Fiber Reinforced Concrete (SFRC)	To compare SFRC with conventional concrete in strength and durability	Need for advanced materials to improve concrete properties	Variability in fiber size, shape, and distribution	Enhances structural properties like fire and impact resistance	Requires standardization and further experimental validation

Paper selection:

There has been an increasing number of articles chosen for construction industry leadership research in the past years. It rapidly increases from the year 2017 to 2024. This growth indicates an increased demand for leadership styles over the construction sector, especially in Chennai. The increased peak in 2023 and 2024 means that such a problem is gaining traction, perhaps due to the change in concerns over safety and new industrial management practices. This increased volume of research may also be interpreted as recognition by the industry of their part in leaders' safety-related behaviors and overall project performance. The trend thus indicates a further required research effort into developing effective leadership tactics tailored to the dynamic building industry of Chennai. Moreover, the pie chart in Figure 3 shows the Number of Papers Selected by Year.

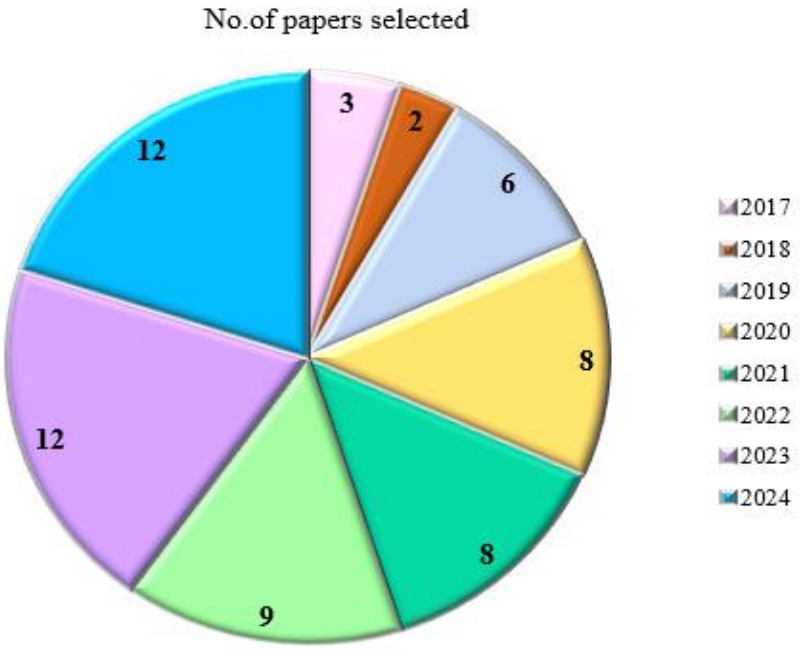

Figure 3: Number of Papers Selected by Year

Research gap:

Despite plenty of research on the style of leadership as well as its effect on work environment security, there is a seriously lacking body of research specific to areas like Chennai's construction industries. Much of what is available is generalist or global in its viewpoints, ignoring the region-specific socio-economic, cultural, and operation characteristics of interest. This makes it difficult for us to understand how leadership styles work in line with the establishment-specific worker dynamics and specific safety issues tied to the construction industry of Chennai. Second, most studies tend to concentrate specifically on particular approaches, such as transformational or transactional leadership, without giving a general overview that could be to develop which method is the safest and most effective in promoting the desirable safety-related behaviors. Also, the behavioral factor of construction safety is those aspects involved with the influence of leadership, which has not been substantively researched. Safety standards and systems are well documented, but how leadership influences the attitudes of workers, their compliance, and proactive safe behaviors have not been adequately researched. This is important because construction work holds high-risk possibilities, and leadership might reduce accidents and improve safety culture. Through these areas of gaps, one might be able to obtain some important information regarding the adjustment of the leadership strategy to ensure better safety outcomes within the Chennai construction industry.

Objectives:

1) To determine the prevalence of various leadership styles among Chennai construction sector leaders.
2) To investigate the impact of various leadership styles on safety-related behaviors such as compliance, risk awareness, and proactive safety measures among construction workers.

3) To identify the primary problems and barriers that executives experience when creating a positive safety culture in Chennai's construction industry.
4) To assess the effectiveness of various leadership styles in minimizing workplace accidents and developing a strong safety management system in the construction industry.
5) To make practical recommendations for leadership development and strategic interventions to improve safety-related behaviors and overall safety performance in Chennai's construction industry.

Conclusion

The paper critically examines the influence of management styles over Chennai's construction sector on safety-related behaviors at work. The results showed that leadership style plays a significant role in creating a safety culture and inspiring workers to exhibit more compliance. Transformational leadership is found to be significant, as it incites proactive forms of safety behavior alongside allowing for shared responsibility among the workforce. This way, situational variation is considered an important aspect of the leadership style. On the contrary, transactional and laissez-faire styles differ in the level of influence while focusing on situational variation as an aspect of the leadership style. Some critical challenges to successful safety implementation have been identified in the study: inadequate employee training, resistance to change, and communication gaps. Overcoming these difficulties requires strategic leadership development along with the establishment of behavioral safety frameworks modified to unique details of the Chennai construction industry. In contrast with other leadership styles, this research throws light upon the processes to which leaders might turn to decrease workplace hazards and improve overall safety performance. The pragmatic ideas shared here are aimed at helping industry stakeholders develop policies and procedures for safety without losing some of their efficiencies in operations. The final recommendation is the development of a teamwork-based safety culture where leadership and worker engagement are synergistically employed in creating a safer work environment. The areas for further research include the impact of long-term interventions made by leaders on the safety behavior at the construction sites, as well as the function of emerging technologies in shifting the construction safety paradigm.

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