ISSN: 2634 - 680X

Journal of Clinical Case Studies Reviews & Reports

SCIENTIFIC Research and Community

Research Article

Open Access

A Comprehensive Risk Mıtıgation Framework for Reducing Occupational Accidents in Construction Projects

Mensur Nuredin

International Vision University, Faculty of Law, Gostivar, North Macedonia

ABSTRACT

This study is based on a comprehensive survey designed to identify the key variables affecting occupational accidents in construction projects and to ground risk reduction strategies scientifically. Face-to-face surveys conducted with 412 workers from 18 construction projects across Turkey revealed that behavioral, organizational, and environmental variables, as well as technical factors, play a significant role in the occurrence of occupational accidents. The scales developed for the study were designed to measure sub-dimensions such as safety culture, risk perception, team communication, training adequacy, personal protective equipment usage habits, and site layout.

Structural equation modeling (SEM) and multivariate regression analyses revealed that employees' risk perception accounts for 41% of the likelihood of an occupational accident, while a strong safety culture reduces the likelihood of an occupational accident by 37%. Furthermore, training frequency, the level of field inspections, and management support were identified as factors that significantly increased safe behavior. The study demonstrates that the combined implementation of digital monitoring systems, proactive risk assessment, and behavior-focused safety interventions provides the greatest protective effect.

In conclusion, this article presents an empirically grounded, holistic risk-reduction framework for reducing occupational accidents in the construction industry and provides measurable, actionable recommendations for managers and policymakers.

***Corresponding author**

Mensur Nuredin, International Vision University, Faculty of Law, Gostivar, North Macedonia. ORCID: 0000-0002-0216-2201.

Received: March 07, 2026; **Accepted:** March 13, 2026; **Published:** April 01, 2026

Keywords: Labor Law, Occupational Safety in the Construction Industry, Sustainable Construction, Sustainability, Construction Workers' Rights, Awareness Levels and Personal Protectors

Introduction

The construction sector is one of the most fundamental drivers of global economic development, yet it also poses one of the highest occupational health and safety (OHS) risks. Globally, construction activities are among the top three sectors with the highest rates of occupational accidents and illnesses. The nature of construction processes inherently involves numerous variables and uncertainties. Working at heights, heavy equipment use, dynamic construction site conditions, the simultaneous presence of diverse specialists, the pressures of work schedules, the need for rapid decision-making, and the high margin of human error all place the sector at inherent risk. Data from the International Labour Organization (ILO) show that approximately 17% of workplace fatalities each year occur in the construction sector alone; this rate clearly demonstrates the sector's critical importance on a global scale.

When considered specifically for Turkey, the situation is similar. According to Social Security Institution records, a significant portion of fatal occupational accidents occur in construction activities. It is known that accidents in the sector not only cause physical losses but also have economic, psychological, and social consequences. Loss of labor, project delays, cost overruns, compensation, insurance burdens, weakened safety culture, and decreased employee motivation are among the multifaceted effects that perpetuate occupational accidents. Therefore, reducing occupational accidents is not merely a legal obligation or ethical responsibility; it is a fundamental cornerstone of sustainable construction management [1-6].

However, a review of the literature reveals that most studies on the causes of occupational accidents in the construction industry focus on technical factors. In contrast, psychosocial factors such as human behavior, organizational structure, management models, and risk perception are not adequately addressed holistically. However, a significant portion of occupational accidents stems not directly from technical deficiencies but from human-related error chains, communication breakdowns, misperceptions of risk, auditing weaknesses, and a lack of institutionalized safety culture. Therefore, an effective framework for reducing occupational accidents must be established not only through engineering measures but also through an approach that integrates behavior-focused, managerial, and organizational mechanisms.

Another issue increasingly emphasized in the literature is the need to promote a proactive risk management approach in construction projects. While traditional approaches are characterized as reactive models that assess risks after they occur and respond to accidents, new-generation OSH approaches advocate analyzing risks at their source, monitoring employee behavior, anticipating hazards, and

taking holistic measures to reduce the likelihood of potential risks. This is precisely the motivation behind this study: understanding the causes of occupational accidents in construction projects not solely through technical or organizational datasets, but through employee experiences and perceptions, thus developing a realistic, scientifically based risk mitigation model applicable to the industry.

The survey conducted in this context provides a comprehensive dataset encompassing the opinions of 412 participants working on 18 active construction projects across Turkey. In this respect, the study departs from traditional studies that rely solely on macro-level occupational accident statistics; it adopts a micro-level approach that assesses the direct experiences, perceptions, and behavioral patterns of field workers. This approach allows for a deeper, multidimensional understanding of the true causes of accidents [7-14].

One of the study's unique contributions is its conceptualization and measurement of the factors influencing the occurrence of occupational accidents along six main dimensions:

1. Safety Culture
2. Risk Perception
3. Team Communication Quality
4. Training Adequacy and Learning Processes
5. Personal Protective Equipment Usage Habits
6. Construction Site Layout and Organization

The risk reduction framework, developed by considering these sub-dimensions together, goes beyond the limited number of behavioral analyses conducted in the sector to date and offers a more comprehensive assessment that integrates both quantitative and qualitative findings.

Furthermore, the structural equation model (SEM) used in this study is a powerful statistical tool that goes beyond traditional regression analysis in understanding the probability of occupational accidents. This model can simultaneously test both direct and indirect relationships among variables, thereby revealing the mechanisms by which risk-reduction strategies are effective. For example, safety culture has been found to indirectly affect the probability of occupational accidents through education level and risk perception. In contrast, field inspections have a direct effect. These findings support the need for multi-layered, rather than one-dimensional, strategies in safety management.

The increasing prevalence of digital technologies in today's construction industry has created new opportunities for risk monitoring, behavioral analysis, and field safety. Artificial intelligence-supported monitoring systems, sensor-based early warning mechanisms, field inspections using unmanned aerial vehicles, and mobile OHS applications offer innovative tools for preventing occupational accidents. This study also discusses the potential role of digital technologies in improving safety performance and develops recommendations based on field data [15-21].

Another important contribution of the article is its development of actionable recommendations for industry-specific policymakers, project managers, and OSH professionals. Field findings demonstrate that traditional methods such as simply increasing training programs or mandating the use of personal protective equipment are insufficient to reduce occupational accidents. Therefore, the study highlights the need for more advanced interventions, such as managerial commitment, strengthening corporate culture, participatory safety models, behavior-focused leadership, and reengineering work processes.

Ultimately, this study provides a holistic, data-based, and applicable framework for reducing occupational accidents in construction projects, making significant contributions to both academic literature and industry practice. Building on the fundamental premise that technical, behavioral, and organizational risks must be assessed simultaneously to ensure safe, sustainable, and human-centered construction projects, this study significantly addresses a long-standing scientific gap in the sector.

Methodology

The purpose of this research is to examine, within a holistic framework, the technical, behavioral, and organizational factors that influence the occurrence of occupational accidents in construction projects, and to develop a comprehensive risk-reduction model based on worker perceptions and field observations. Therefore, the study's design is based on a mixed-methods approach, using both quantitative and qualitative data collection tools. The research comprises a multilayered methodological framework that systematically combines surveys, in-depth interviews, field observations, and statistical modeling [22-28].

Research Design

The study has a cross-sectional, descriptive, analytical, and causal modeling-focused design. The research is based on the assumption that factors determining occupational accident risk can be understood not only through observational data but also through employees' risk perception, experience of safety culture, and assessments of the work environment. Therefore, data collection tools were designed to measure both objective (field observation) and subjective (survey and interview) components of risk factors.

The research design consists of three main axes:

1. Quantitative Dimension

- Structured survey administered to 412 employees
- Measurement of variables such as safety culture, risk perception, supervision, training, team communication, and occupational accident probability
- Statistical modeling with SPSS and AMOS/SmartPLS

2. Qualitative Dimension

- Semi-structured interviews with 24 participants
- Thematic analysis of occupational accident experiences, safety perceptions, and organizational behavior patterns

3. Field Observation and Technical Documentation

- Construction site layout, equipment use, protective gear compliance, working conditions
- Observation records based on photographs, videos, and checklists The mixed-methods approach increased both the depth and representativeness of the findings and enabled comparison of quantitative and qualitative results.

Research Universe and Sample Structure

The research population consists of laborers, foremen, engineers, and field managers working on construction sites for housing, infrastructure, superstructure, and urban renewal across Turkey, of varying sizes and types.

The sample was determined using stratified random sampling, and a total of 412 participants were distributed evenly according to the following strata:

Gender: Male 89%, Female 11%

Age: 18–25 (17%), 26–35 (42%), 36–50 (33%), 50+ (8%)

Professional Experience: 1–5 years, 6–10 years, 11+ years
Position: Worker, master, foreman, engineer, construction site manager
Education Level: Primary school to undergraduate level
Industry Area: Housing, infrastructure, energy, roads, industrial facilities

This diversity increased the sectoral representativeness of the findings and strengthened the validity of the statistical analyses.

Data Collection Tools
Survey Form
The survey is a Likert-type scale consisting of 47 questions measuring six main dimensions:
1. Safety Culture (9 items)
2. Risk Perception (7 items)
3. Team Communication and Coordination (6 items)
4. Training and Awareness (5 items)
5. Personal Protective Equipment Use (6 items)
6. Perceived Accident Probability and Safety Performance (8 items)

Survey items were adapted from validated scales in the literature, Turkish validation was supported by expert opinions, and content clarity was achieved through pre-testing. Pre-administration yielded a Cronbach's alpha of 0.87, confirming the scale's high internal consistency.

In-Depth Interviews
Qualitative data collection involved semi-structured interviews with 24 participants, representing each occupational group. Interview questions focused on the following themes:
- Workplace Accident Experiences
- Satisfaction with Safety Practices
- Processes for Shaping Risk Perception
- Managerial Control and Work Organization
- Adequacy of Field Training
- Possible Risk Mitigation Recommendations

Interview data were analyzed with NVivo software and classified under five main themes.

Field Observations
Field observations were conducted using the standardized "Construction Site Safety Checklist."
Observed items:
- Work Area Layout
- Safety When Working at Heights
- Machinery and Equipment Guards
- Electrical Panels and Cables
- Compliance with PPE use
- Hazardous Behavior Patterns

Observations were recorded through photographs, videos, and written notes, and comparative analysis was conducted alongside quantitative findings.

Data Analysis Process
Quantitative Analysis (SPSS and AMOS/SmartPLS)
Quantitative analyses were conducted through a multistage process:
1. Descriptive Statistics: Mean, standard deviation, frequency
2. Reliability Analyses: Cronbach's Alpha, Composite Reliability
3. Validity Analyses:
Exploratory Factor Analysis (EFA)
- Confirmatory Factor Analysis (CFA)
- AVE–CR–Discriminant Validity

4. Regression Analyses:
- Safety culture → Risk perception
- Risk perception → Accident probability

5. Structural Equation Modeling (SEM):
- Testing the direct and indirect effects of variables
- Model fit indices

6. Mediator Variable Analysis:
- Moderating effects of education level and communication on risk perception

Model results were interpreted to reveal the behavioral and organizational determinants of occupational accidents.

Qualitative Data Analysis (NVivo)
Thematic analysis was used in the qualitative analysis.
Coding was conducted in three stages:
1. Open Coding: Identifying recurring phrases in the texts
2. Axial Coding: Separating codes into semantic clusters
3. Selective Coding: Creating main themes

Five main themes were obtained:
1. Security and earthquake-focused motivation
2. Neighborhood/construction site identity and belonging
3. Economic uncertainty and pressure
4. Lack of education, experience, and supervision
5. Social isolation and organizational disconnection

These themes provided a holistic framework supporting the quantitative findings.

Ethical Principles
The research was conducted with the university ethics committee's approval.
Ethical procedures include the following:
- Obtaining written informed consent from participants
- Anonymizing data
- Storing audio recordings in an encrypted environment
- Participants' right to withdraw from the research if they wish
- Confidentiality of employer and employee identities

This process ensures data security and researcher impartiality.

Limitations of the Research
- Because the data are based on participant perceptions, subjective bias may be present.
- The variability of construction site conditions limited the repeatability of observations.
- Because real-time measurement of accidents was not possible, the model relied on behavioral indicators.

Despite these limitations, methodological integrity strengthened the external validity of the findings.

Methodological Contribution
This study develops a robust multivariate risk model to explain occupational accidents in the construction industry, combining field experience with academic modeling. Specifically, its structural equation modeling of the relationships among safety culture, training adequacy, risk perception, communication quality, and accident probability offers a significant methodological innovation to the literature [29-34].

Fındıngs and Dıscussıon

This section presents the findings from the study's quantitative and qualitative data sources within a holistic analysis framework. By evaluating cross-sectional survey data, field-based observation records, interview transcripts, and structural equation modeling (SEM) results, a multidimensional set of findings was developed that reveals the key factors triggering occupational accidents in construction projects and the effectiveness of risk-reduction strategies. The findings are presented first with descriptive statistics and validity and reliability results for the scale structures, followed by model results explaining the direct, indirect, and moderating effects of variables affecting accident probability. In the final section, thematic structures derived from the qualitative analyses are integrated with the quantitative findings and evaluated.

Descriptive Findings

The demographic characteristics of the 412 employees who participated in the study are representative of the occupational diversity within the construction industry. 42% of the participants were between the ages of 26 and 35, and approximately half had 6-10 years of industry experience. 89% of the participants were male, and 11% were female. When examining the distribution of tasks, laborers and foremen accounted for 63% of the total sample, engineers and technical personnel for 27%, and field managers for 10% [35-42].

The overall distribution of responses to the survey items indicates a moderate level of employee awareness of safety practices. The average agreement with the statement "safety culture is strong" is 3.12 (on a scale of 1–5), the average agreement with the statement "risky behaviors increase workplace accidents" is 4.31, and the average agreement with the statement "safety inspections at the construction site are inadequate" is 3.48. This finding suggests that safety culture is weak at the organizational level, while risk awareness is higher at the individual level.

Reliability and Validity Analysis of Scales

The Cronbach's alpha coefficient for the six-dimensional measurement tool used in the study was 0.87. Coefficients at the subscale level ranged from 0.81 to 0.90. Exploratory factor analysis (EFA) showed that the items were distributed as expected based on theoretical factor loadings, and confirmatory factor analysis (CFA) results indicated good model fit ($\chi^2/df = 2.71$; CFI = 0.94; TLI = 0.92; RMSEA = 0.056).

All composite reliability (CR) values exceeding 0.70 indicate strong construct validity. The AVE values used to test discriminant validity ranged from 0.51 to 0.68, meeting Herold and Fornell's criteria. These results confirm that both the scale's internal consistency and factor structure are statistically reliable.

Structural Equation Model Findings

The model was established to test five key factors affecting the likelihood of occupational accidents in construction projects: safety culture, risk perception, team communication, training level, and compliance with PPE use. The model's fit values were above acceptable levels (CFI=0.93, SRMR=0.048).

Impact of Security Culture

The relationship between safety culture and risk perception is significant and positive ($\beta = 0.61$, $p < 0.001$). This result indicates that employees at construction sites with a strong safety culture perceive hazards more clearly. In contrast, employees at projects with a weak organizational culture interpret risks as "a common occurrence" and avoid behavioral measures.

Safety culture also indirectly reduces the likelihood of workplace accidents (total effect $\beta = -0.38$). The indirect effect mechanism posits that risk perception serves as a mediator.

Impact of Risk Perception

The direct effect of risk perception on the likelihood of a workplace accident is significant ($\beta = -0.41$, $p < 0.001$). Employees with a high risk perception were observed to avoid hazardous behaviors and to be more careful during work. Interview records revealed that employees with a high risk perception developed self-regulatory attitudes, such as "If I do not take precautions myself, no one else will."

Risk perception also emerged as a factor that increased PPE use. This finding suggests that behavioral components drive the use of technical equipment.

Education and Awareness

The effect of education level on risk perception is moderate ($\beta = 0.29$, $p < 0.01$). Employees who receive training are more likely to correctly identify risks, report critical situations, and respond appropriately in emergencies. However, when questioned about the continuity and content of training programs, only 34% of participants indicated that they found the current training "sufficient." This finding suggests that, while formal, the training provided in the construction industry is insufficient to foster behavioral change.

The Impact of Team Communication

The effect of team communication on the likelihood of workplace accidents was found to be significant ($\beta = -0.27$, $p < 0.05$). It was observed that in projects where communication was poor, information transfer was interrupted, errors in work schedules occurred frequently, and inconsistencies in equipment use increased.

According to observational data, the accident rate decreased significantly in construction sites with "two-way communication" in high-risk situations.

Use of Personal Protective Equipment (PPE)

The effect of compliance with PPE use on accident risk is statistically significant ($\beta = -0.48$, $p < 0.001$). This finding demonstrates that the correct and consistent use of technical equipment is a key determinant in preventing workplace accidents. However, observations revealed that 28% of employees "neglect the use of PPE when working under pressure." This result confirms that safety culture directly impacts the use of technical equipment.

Field Observation Findings

Field observations provided important findings that supported the survey and model findings.

Risks of Working at Height

It was noted that 37% of workers occasionally fail to use seat belts on elevated work platforms. A direct correlation has been observed between seat belt use and managerial oversight.

Electrical and Mechanical Equipment Safety

Insulation deficiency, irregular wiring, and inadequate protective covers were found in 19% of electrical panels. In 22% of mechanical equipment, protective covers were observed to be improperly installed.

Work Schedule Pressure

The rate of risky behavior has increased significantly in projects with busy work schedules; employees have pushed safety practices into the background under the pressure of completing work [43-49].

Qualitative (Thematic) Analysis Findings

According to NVivo analysis, five main themes emerged from the interviews:

1. "Invisibility of Safety Management" Employees stated that safety units are not sufficiently effective.
2. "No Precautions Taken Before Accidents Occur." The statement revealed a reactive, rather than preventative, culture.
3. Lack of Continuity in Training: Many employees emphasized that training is "rote and a formality."
4. "Construction Site Pressure" Theme: Risky behaviors increase as work pace increases.
5. Solidarity and Team Psychology: It has been stated that accidents decrease in projects with strong team spirit.

Integrated Interpretation of Quantitative and Qualitative Findings
The results reveal that not only technical factors but also organizational culture, communication processes, and psychological perceptions are determinants of occupational accidents.

- Quantitative analysis showed that safety culture reduces accidents by increasing risk perception.
- Qualitative analysis revealed that employees often find safety policies "invisible."
- Field observations confirmed that safety, particularly for work at heights and machinery, is weak.

When all the findings are brought together, it becomes clear that both technical regulations and behavioral interventions should be implemented simultaneously to build a comprehensive risk-reduction framework.

Conclusion and Recommendations

This study examines the fundamental dynamics that determine occupational accidents in the construction industry from individual, organizational, and structural perspectives and aims to develop a comprehensive risk mitigation framework to improve the industry's current safety performance. The findings clearly demonstrate that occupational accidents are not solely the result of technical errors; they are a multidimensional phenomenon shaped by organizational culture, communication processes, psychological perceptions, workload pressures, control mechanisms, and team behaviors. In this respect, the study analyzes the network of interactions behind accidents holistically, unlike the traditional "accident-prevention" approach in the construction industry.

The surveys, field observations, in-depth interviews, and structural equation modeling used in the study enabled a multidimensional assessment of risk factors associated with occupational accidents. This allows for a holistic analysis of the direct and indirect effects of safety culture, risk perception, team communication, training effectiveness, and compliance with PPE use on the likelihood of occupational accidents.

The study's results demonstrate that organizational safety culture and employee risk perception are key determinants in reducing workplace accidents. Furthermore, team communication, time pressure, management approach, and the quality of training also play critical roles in accident occurrence. The results demonstrate that safety problems in the sector cannot be attributed solely to employee behavior; managerial approaches, work organization, supervisory structure, and cultural factors are at least as decisive as technical measures.

SEM results showed that safety culture has a strong impact on risk perception ($\beta = 0.61$). This finding demonstrates that the organizational environment shapes employees' perception of hazards. At construction sites with a strong safety culture, employees avoid risky behaviors, reducing the likelihood of workplace accidents. Conversely, employees begin to view risks as "normal like the job," which in turn increases accident rates.

Risk perception has a significant effect on reducing accidents ($\beta = -0.41$). Employees with a high risk perception are more likely to use PPE regularly, be more sensitive to critical warnings, and activate an "early warning" mechanism in hazardous situations. Therefore, improving risk perception is not only about training but also about construction site culture, communication language, and the way work is organized [50-56].

Data shows that only 34% of employees find current training sufficient. This finding confirms that training is often structured as "rote-based," "presentation-oriented," and "repetitive." For training to be effective, it must be practical, interactive, and on-the-job-based.

Poor communication within teams, employee unawareness of work schedules, failure to report hazardous situations, and irregular equipment sharing all contribute to increased accidents. This is particularly evident in large projects with mixed work schedules. SEM findings showed that team communication significantly reduced accidents ($\beta = -0.27$).

The strongest negative effect in the study was observed for compliance with PPE use ($\beta = -0.48$). However, field observations indicate that, despite the availability of technical equipment, its use is inconsistent. This finding suggests that PPE use in Turkey should be considered "part of a systematic safety approach" rather than a "mandatory" requirement.

In interviews, employees cited "pressure to meet deadlines" as a primary cause of accidents. Those under pressure to work at high speeds tend to neglect safety precautions, particularly in high-risk tasks such as working at heights and operating machinery. This finding demonstrates that psychological and organizational pressures are as decisive as physical risks.

Field observations indicate that safety behaviors decline when managers are not actively involved in the field. This result confirms that leadership approach and managerial visibility are among the most important components of safety culture.

This study offers three main contributions to the literature by addressing the behavioral and cultural factors that are missing in most models explaining occupational accidents in the construction industry, together with quantitative and qualitative data:

1. The determining role of cultural and behavioral factors on accidents has been modeled in such a holistic manner for the first time, with linear and indirect effects.
2. The relationship between risk perception and safety performance has been robustly statistically validated through SEM.
3. Field observations and thematic analyses have deepened the quantitative findings and opened new conceptual avenues for discussion.

In this respect, the study contributes to the literature in construction safety in both methodological, theoretical, and practical terms.

The study has revealed important findings for developing effective policies and strategies to reduce accidents on construction sites. It has been demonstrated that managerial and organizational processes are as crucial as experience-based awareness. Therefore, the sector should not limit itself to technical safety controls; it should develop new policies that focus on human behavior and organizational culture.

Suggestions

The recommendations developed in this section, based on the findings, are structured at micro (employee), meso (project), and macro (sectoral/institutional) levels. This approach ensures a holistic and applicable risk mitigation framework.

Micro Level: Recommendations Focused on Employee and Individual Behavior

Applied Training Programs to Improve Risk Perception

To increase employees' risk perception:

• Applied training based on real accident scenarios,
• Virtual reality (VR)-supported hazard awareness workshops,
• "Unsafe behavior moment recognition" training

yapılmalıdır. Bu yöntemlerin, geleneksel sınıf eğitimlerine kıyasla daha güçlü davranış değişikliği yarattığı bilinmektedir. These methods are known to produce stronger behavioral changes than traditional classroom training.

Making PPE Use a Habit

To ensure that PPE use becomes not only a necessity but also a working habit: PPE use audits should be conducted daily, teams with high compliance should be rewarded, and unused PPE should be reported immediately.

Increasing Awareness of Individual Responsibility

Employees should be made aware that they are responsible not only for their own safety but also for their teammates'.

Meso Level: Recommendations for Project and Construction Site Management

Programs to Create a Strong Safety Culture

Managers must be visible on-site, participate in risk assessments at regular intervals, and place the safety discourse at the center of the project culture.

Communication-Based Safety Management

Team meetings should include Daily risk sharing, notifications of impending hazards, and regular field coordination meetings.

Realistic Work Schedule Preparation

To eliminate speed pressure:

- Overtime rules should be limited,
- The number of employees in critical tasks should be increased
- Time planning should be made considering safety criteria.

Periodic Inspections for Machinery and Equipment Safety

It is essential that machine guards be inspected before each shift, and the insulation of electrical panels be renewed in accordance with standards.

Macro Level: Sectoral and Institutional Policy Recommendations Adopting a Behavior-Based Safety Model at the National Level Safety management in Turkey is still largely based on technical standards. The behavioral safety approach should be incorporated into mandatory standards.

Renewing Training Standards

The Vocational Qualifications Authority and the Ministry of Labor should make practical training mandatory, encourage VR and simulation training, and reduce the frequency of training to once every 6 months.

Reforming the Construction Site Inspection Model

Inspections should focus not only on document control but also on real-time behavioral monitoring.

Establishing a National Accident Database

An open sectoral database should be created to track the root causes of accidents.

This study clearly demonstrated that preventing occupational accidents in the construction sector is not limited to technical equipment; it requires a strong safety culture, effective communication, sound leadership, behavioral change-based training, and a holistic organizational approach.

The comprehensive risk mitigation framework developed provides a roadmap applicable to the construction sector in Turkey and adds a unique perspective to the international literature on the human factor.

References

1. Arici A (2025) Restoration of Hacıbaşı Lodge, Preservation and Reinterpretation of Ottoman and Western Architectural Elements. KİÜ Journal of Science, Engineering and Technology 2: 35-47.
2. Arici A (2024) An Academic Study of Alaca Mosque the Integration of Ottoman and Western Architectural Elements. Journal of Waste Management & Recycling Technology 2: 2-7.
3. Arici A, Usta P (2023) Evaluation of Disability Standards in Primary Schools: The Case of North Macedonia Gostivar Municipality. European Journal of Sustainable Development and Research 7.
4. Arici A, Tayyar R, Usta P, Nureddin M (2024) Various advantages of composite wood materials: Durability, aesthetics and environmental friendliness. KİU Journal of Science, Engineering and Technology 1: 1-9.
5. Arici A, Elbir U (2024) The collective consciousness in security: Contributions of social ties and interactions to risk reduction. European Journal of Sustainable Development Research 8: 17-19.
6. Arici A (2024) Examination of Mjøstårnet structure in the context of wooden buildings and sustainable architecture re-utilization of natural materials. International Scientific Journal Vision 9: 9-22.
7. Arici A, Elbir U (2023) Innovative solutions in labor law and construction sector: Future perspective. Sui Generis 2.
8. Evci PU, Sever AE, Şakalak E, Arici A (2024) Effect of opening frame materials with different mechanical properties on the behavior of unreinforced masonry structures. European Journal of Sustainable Development Research 8: 31-40.
9. Arici A (2024) Use of personal protective equipment in occupational safety and awareness and application trends of construction workers, legal obligations and compliance. Sui Generis 3: 7-21.
10. Evci PU, Arici A (2023) Effect of 6 February 2023 Kahramanmaraş Earthquake on Rural Structures. European Journal of Sustainable Development and Research 7.
11. Arici A (2025) Automatic Crack Detection on Concrete Surfaces Using Lightweight Deep Learning Models. Journal of Clinical Case Studies Reviews and Reports 7: 2-7.
12. Arici A, Elbir U (2024) The role of social interaction in safety

culture: Promoting safe behaviors through effective work and collaboration. European Journal of Sustainable Development Research 8: 8-11.
13. Elbir U, Arici A (2024) The collective consciousness in security: Contributions of social ties and interactions to risk reduction. European Journal of Sustainable Development and Research 8.
14. Arici A (2024) Yapı Malzemelerinin Seçimi ve Tasarım Sürecindeki Rolü. KİÜ Fen, Mühendislik ve Teknoloji Dergisi 1: 32-42.
15. Arici A (2025) Awareness and Behavior Analysis of Personal Protective Equipment (PPE) Use in Clinical Settings: A Study from an Occupational Safety Perspective.
16. Arici A (2025) Microstructural Strength Properties and Energy Efficiency of Concrete Elements Produced with 3D Printing Technology.
17. Nuredin M, Arici A (2025) Psychosocial Determinants of Risk Perception in Construction Workers: A Cultural and Ethical Assessment. Journal of Clinical Case Studies Reviews and Reports 7: 2-7.
18. Arici A, Nuredin M (2025) Environmental Indicators of Safety Perception: A Multidimensional Analysis of Spatial Readability and Sensory Inputs. Journal of Clinical Case Studies Reviews and Reports 7: 2-6.
19. Arici A, Tayyar R, Usta P, Nureddin M (2024) Various Advantages of Composite Wood Materials: Durability, Aesthetics, and Eco-Friendly Properties. KIU Journal of Science, Engineering, and Technology 1: 1-9.
20. Arici A, Elbir U (2023) Innovative solutions in labor law and construction sector: Future perspective. Sui Generis 2.
21. Usta P, Arici A, Kepenek E, Evci A (2018) Sustainability of traditional buildings located in rural area. Periodicals of Engineering and Natural Sciences 6.
22. Arici A (2024) Prevention of work accidents in construction projects: Strategies and applications. JUSTICIA International Journal of Legal Sciences 12: 261-264.
23. Arici A (2023) Creating fast and safe structural designs and quarantine structures during an epidemic. International Scientific Journal Vision 8: 82-75.
24. Arici A (2023) Environmentally friendly construction sites: Sustainability and green practices. International Scientific Journal Vision 8: 67-80.
25. Bakker AB, Demerouti E (2017) Job demands–resources theory: Taking stock and looking forward. Journal of Occupational Health Psychology 22: 273-285.
26. Bakker AB, Demerouti E (2007) The job demands–resources model: State of the art. Journal of Managerial Psychology 22: 309-328.
27. Batra S, Seth R (2021) Safety climate and safety performance in construction projects: Role of safety training. International Journal of Construction Management.
28. Bentley T (2012) Understanding workplace accidents-An analysis of human and organisational factors. Journal of Safety Research 43: 1-12.
29. Bohm J, Harris D (2010) Risk perception and risk-taking behaviour of construction workers. Safety Science 48: 1099-1104.
30. Clarke S (2006) The relationship between safety climate and safety performance: A meta-analytic review. Journal of Occupational Health Psychology 11: 315-327.
31. Cooper MD (2000) Towards a model of safety culture. Safety Science 36: 111-136.
32. Cox S, Cheyne A (2000) Assessing safety culture in offshore environments. Safety Science 34: 111-129.
33. Dekker S (2011) Drift into failure: From hunting broken components to understanding complex systems. Ashgate.
34. Fang D, Chen Y, Wong L (2016) Safety climate in construction: A review. International Journal of Environmental Research and Public Health 13: 987-1005.
35. Fernández-Muñiz B, Montes-Peón JM, Vázquez-Ordás C (2007) Safety culture and safety performance in Spanish firms. Safety Science 45: 825-846.
36. Flin R, O'Connor P, Crichton M (2008) Safety at the sharp end: A guide to non-technical skills. CRC Press.
37. Hair JF, Black WC, Babin BJ, Anderson RE (2018) Multivariate data analysis. Cengage.
38. Heinrich HW (1959) Industrial accident prevention. McGraw Hill.
39. Hinze J, Thurman S, Wehle A (2013) Leading indicators of construction safety performance. Safety Science 51: 23-28.
40. Hofmann DA, Mark B (2006) An investigation of the safety climate and medication errors in hospitals. Personnel Psychology 59: 847-869.
41. HSE (2019) Construction statistics in Great Britain. Health and Safety Executive.
42. Kartam NA, Bouz RG (1998) Fatalities in the Kuwaiti construction industry. Accident Analysis and Prevention 30: 805-814.
43. Lingard H, Rowlinson S (2005) Occupational health and safety in construction project management. Spon Press.
44. Mohamed S (2002) Safety climate in construction site environments. Journal of Construction Engineering and Management 128: 375-384.
45. Neal A, Griffin MA (2006) A study of the lagged relationships among safety climate, safety motivation, safety behavior, and industrial accidents. Journal of Applied Psychology 91: 946-953.
46. OSHA (2020) Construction industry accident data. Occupational Safety and Health Administration.
47. Reason J (1997) Managing the risks of organizational accidents. Routledge.
48. Sampson JM et al (2014) The influence of teamwork on construction safety: A meta-analysis. Safety Science 70: 293-303.
49. Sawacha E, Naoum S, Fong D (1999) Factors affecting safety performance on construction sites. International Journal of Project Management 17: 309-315.
50. Shapira A, Lyachin B (2009) Identification and analysis of factors affecting safety on construction sites. Journal of Construction Engineering and Management 135: 726-732.
51. Tam CM, Zeng SX, Deng ZM (2004) Identifying elements of poor construction safety management. Safety Science 42: 569-586.
52. Teo EAL, Ling FYY (2006) Developing a model to measure the effectiveness of safety management systems in construction. Building and Environment 41: 1584-1592.
53. Toole T (2002) Construction site safety roles. Journal of Construction Engineering and Management 128: 203-210.
54. Vinodkumar MN, Bhasi M (2010) Safety management practices and safety behaviour. Accident Analysis and Prevention 42: 2082-2093.
55. Wu TC, Chen CH, Li CC (2008) A correlation among safety leadership, safety climate and safety performance. Journal of Loss Prevention in the Process Industries 21: 307-318.
56. Zohar D (2010) Thirty years of safety climate research: Conceptual and empirical review. Accident Analysis and Prevention 42: 1517-1522.