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Ranking the Causes of Conflicts from Managers' Perspectives in Industrial Projects Using a Project Management Approach

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ABSTRACT

The construction industry and industrial projects, due to their structural, financial, and operational complexities, are consistently exposed to conflicts and contractual disputes. Such conflicts may lead to project delays, cost overruns, and quality deterioration. The objective of this study is to identify and rank the factors that give rise to conflicts and disputes in industrial projects from a project management perspective. This research is applied in terms of purpose and descriptive–survey in terms of methodology. Data were collected through a questionnaire, and a sample of 55 industrial project managers from various industries, including cement, steel, and construction, was selected. The questionnaires were analyzed using SPSS software, and their reliability was confirmed. The Friedman test was employed to rank and prioritize the factors causing conflicts. The results indicate that the most significant factors contributing to conflicts in industrial projects, in order of importance, are financial and economic factors, employer-related factors, contractor-related factors, and materials and supplies factors. Among these, delayed payment of contractors' claims and changes in project scope and duration have the greatest impact on the occurrence of disputes. In addition, poor coordination among stakeholders and problems in the procurement of materials and supplies are among the factors that further complicate project management processes. The present study emphasizes that, in order to prevent conflicts, contracts must be drafted precisely and transparently, and project management should make use of modern approaches such as value engineering and risk management. Furthermore, strengthening communication among stakeholders and continuous monitoring of project implementation processes can contribute to reducing conflicts and disputes.

Keywords: conflict-causing factors, managers' perspectives, project management approach, industrial projects

Introduction

Industrial projects—particularly in construction, oil and gas, and large-scale infrastructure—are inherently complex socio-technical systems characterized by long life cycles, high capital intensity, contractual multiplicity, and the interaction of diverse stakeholders with heterogeneous interests. These characteristics make such projects especially vulnerable to conflicts, claims, and disputes that may emerge at different stages of the project life cycle, from feasibility and design to execution and close-out (1, 2). In recent decades, the growing scale and technical sophistication of industrial projects have further intensified the frequency and severity of conflicts, transforming

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conflict management from a marginal administrative concern into a core competency of modern project management.

From a project management perspective, conflicts are not merely episodic disagreements but structured outcomes of misaligned objectives, contractual ambiguities, risk allocation failures, organizational weaknesses, and environmental uncertainties. The Project Management Body of Knowledge explicitly recognizes conflict as an inevitable phenomenon arising from constraints related to scope, time, cost, quality, resources, and risk, emphasizing the role of proactive governance and systematic management practices in mitigating its negative consequences (1). When unmanaged, conflicts often escalate into formal claims and legal disputes, leading to cost overruns, schedule delays, deterioration of working relationships, and, in extreme cases, project failure (3, 4).

In industrial and construction projects, claims represent a formal manifestation of conflict, typically rooted in disagreements over contractual rights, obligations, and risk-sharing mechanisms. Prior research has shown that claims frequently arise from changes in scope, delays in payments, design modifications, unforeseen site conditions, and ambiguities in contractual provisions (5, 6). Comparative analyses of standard contract forms—such as FIDIC conditions and Iran's General Conditions of Contract—have further demonstrated that structural differences in contract drafting, claims procedures, and dispute resolution mechanisms significantly influence the likelihood and trajectory of conflicts (7, 8). These findings highlight that conflict is not solely behavioral in nature but deeply embedded in legal, contractual, and institutional frameworks.

Beyond contractual dimensions, organizational factors play a decisive role in shaping conflict dynamics. Organizational structure, leadership style, communication patterns, and decision-making processes strongly affect how conflicts emerge, escalate, or are resolved. Studies in organizational behavior emphasize that inadequate communication, centralized decision-making, weak supervisory systems, and rigid bureaucratic procedures often exacerbate tensions among project stakeholders (9, 10). In project-based organizations, where temporary coalitions of actors must collaborate under time pressure, these organizational weaknesses are particularly pronounced, making conflict management a critical determinant of performance.

Leadership and organizational culture further condition conflict outcomes. Empirical evidence suggests that leadership styles emphasizing transparency, participation, and ethical conduct can transform conflicts from destructive episodes into opportunities for learning and value creation (11, 12). Conversely, authoritarian leadership, weak ethical climates, and tolerance of opportunistic behavior increase the likelihood of adversarial relationships and counterproductive work behaviors (13, 14). In industrial projects, where multiple organizations interact within contractual networks, the absence of shared norms and mutual trust often intensifies conflicts across organizational boundaries (15).

The external environment constitutes another critical source of conflict in industrial projects. Macroeconomic volatility, inflation, regulatory changes, market fluctuations, and force majeure events introduce uncertainties that can destabilize project plans and contractual equilibria. Research on risk and claims management in oil and gas and infrastructure projects demonstrates that external shocks—such as price instability, sanctions, or sudden regulatory interventions—frequently trigger claims related to cost adjustments, time extensions, and compensation (4, 16). These findings underline the necessity of integrating environmental scanning and adaptive risk management into project governance structures.

Negotiation and dispute resolution mechanisms represent a complementary dimension of conflict management in industrial projects. While litigation remains a last resort, contemporary project management increasingly

emphasizes alternative dispute resolution methods—such as negotiation, mediation, dispute boards, and expert determination—to preserve relationships and reduce transaction costs (3, 17). Effective negotiation, grounded in clear information, mutual recognition of interests, and procedural fairness, has been shown to mitigate escalation and foster cooperative problem-solving even in highly adversarial contexts (10, 18).

Despite the extensive body of literature on conflict and claims management, several gaps remain, particularly in the context of industrial projects in developing and transitional economies. Much of the existing research focuses either on legal–contractual analysis or on general organizational conflict theories, with limited integration of project management frameworks and empirical prioritization of conflict drivers from practitioners' perspectives (19, 20). Moreover, while numerous studies identify potential causes of conflicts, fewer attempts have been made to systematically rank these factors and assess their relative importance across different domains—such as employer-related, contractor-related, organizational, contractual, and external factors—within a unified analytical model (21).

In the Iranian context, these challenges are further compounded by institutional complexity, regulatory fragmentation, and the coexistence of domestic contractual standards with international frameworks. Research comparing Iranian General Conditions of Contract with FIDIC provisions reveals structural inconsistencies in claims procedures, risk allocation, and change management that may amplify disputes in large-scale projects (5, 7). Additionally, empirical studies indicate that insufficient application of modern project management tools—such as value engineering, integrated risk management, and systematic claims documentation—remains a persistent weakness in many industrial projects (2, 22).

At the behavioral level, conflict management styles adopted by managers and stakeholders significantly influence project outcomes. Contemporary research highlights that collaborative and problem-solving styles are positively associated with organizational citizenship behavior, trust, and proactive conflict resolution, whereas avoidance and domination styles tend to intensify disputes and reduce performance (18, 23). These insights suggest that effective conflict management in industrial projects requires not only robust contractual and organizational systems but also the development of managerial competencies in communication, negotiation, and ethical decision-making.

Recent advances in organizational sociology and decision-making theory further enrich the understanding of conflict as a dynamic process shaped by power relations, institutional constraints, and cognitive frames. Conflicts often reflect deeper structural tensions embedded in governance arrangements and decision-making hierarchies, rather than isolated interpersonal disagreements (24). Recognizing these underlying dynamics is essential for designing interventions that move beyond symptomatic dispute resolution toward systemic prevention.

Given the multifaceted nature of conflicts in industrial projects, there is a clear need for integrative research that bridges project management standards, organizational behavior theories, contractual analysis, and empirical prioritization methods. Ranking conflict causes based on expert judgment and statistical analysis can provide practical guidance for managers and policymakers by identifying critical leverage points for intervention and resource allocation (19, 21). Such an approach aligns with contemporary calls for evidence-based project management, emphasizing data-driven decision-making and continuous improvement.

In sum, conflicts in industrial projects arise from an intricate interplay of contractual ambiguities, organizational deficiencies, leadership and cultural factors, and external environmental pressures. While conflict is inevitable in complex projects, its negative impacts are not. Through systematic identification, ranking, and management of conflict drivers, project stakeholders can shift from reactive dispute handling toward proactive conflict prevention and value-oriented project governance (1, 15).

The aim of this study is to identify and rank the key factors contributing to conflicts and claims in industrial projects from a project management perspective, in order to provide a structured empirical basis for improving conflict prevention and management practices.

Methods and Materials

This study is applied in terms of purpose. From a methodological perspective, a qualitative approach was first employed to develop the claims package model, and subsequently a quantitative approach (descriptive–survey) using a questionnaire instrument was applied to identify and rank the items within each section of the model. The factors were classified into nine main groups, including employer-related factors, contractor-related factors, consultant-related factors, as well as contractual, financial and economic, materials and equipment, laws and regulations, organizational factors, and finally other external factors, comprising a total of 100 sub-factors under the main categories. The questionnaire was evaluated using SPSS software, and its reliability was confirmed. Following data collection, the most important factors influencing the emergence of claims were identified. The statistical population refers to a set of individuals, units, or, more generally, phenomena to which the researcher can generalize the results of the study. In other words, it denotes the location or project to which the research findings are intended to be generalized. The sampling method in this study included active organizations or companies and certain stakeholders involved in various industrial sectors.

Findings and Results

The demographic characteristics of the respondents indicate that out of a total sample of 55 participants, 38 were male (69.10%) and 17 were female (30.90%). In terms of age distribution, the majority of respondents were between 31–40 years old (50.91%), followed by those aged 41–50 years (34.54%), respondents over 51 years of age (10.91%), and a small proportion in the 21–30 age group (3.64%). Regarding educational attainment, most participants held a bachelor's degree (56.36%), while 30.91% had a master's degree, 7.27% had a diploma or associate degree, and 5.45% possessed a doctoral degree. With respect to work experience, the largest group had 11–20 years of professional experience (41.82%), followed by those with 5–10 years of experience (34.55%), more than 20 years of experience (12.73%), and less than 5 years of experience (10.91%), reflecting a sample largely composed of experienced professionals in the field.

In the present study, through examination and analysis of the collected data and the content of these items, the claims package model will be developed. Subsequently, the components of this model, based on opinions gathered from experts and industrial academics in the form of a comprehensive questionnaire aimed at identifying and ranking the most important items of each section, will be subjected to statistical analysis using SPSS software.

Table 1. Results of the Normality Test (Source: Author)

Research Variables	Normality Indices	Hypothesis Result
Z Statistic	Sig.	
Employer factor	6.415	0.000
Contractor factor	10.394	0.000
Consultant factor	7.228	0.000
Contractual factor	11.849	0.000
Financial and economic factor	5.374	0.000
Materials and equipment factor	7.694	0.000
Laws and regulations factor	9.208	0.000
Organizational factor	5.761	0.000
External factor	12.794	0.000

Based on Table 1, since the significance level of the research variables is less than 0.05 and the value of the Kolmogorov–Smirnov statistic lies outside the critical range, the null hypothesis is rejected and the assumption of normality of the distribution of these variables is not accepted. Given the non-normal distribution of the research variables, the Partial Least Squares (PLS) method was used to validate the model. The PLS estimation method determines coefficients in such a way that the resulting model has the greatest explanatory and interpretive power; that is, the model can predict the final dependent variable with the highest accuracy and precision. The Partial Least Squares method, also known as PLS in regression modeling, is considered a multivariate statistical technique that enables modeling of one or more response variables simultaneously against multiple explanatory variables despite certain limitations, such as unknown response variable distributions, small sample sizes, or the presence of serious autocorrelation among explanatory variables.

The Friedman test is equivalent to repeated-measures analysis of variance within groups. This test is used to compare mean ranks among K variables. It is a nonparametric counterpart to the F-test and is typically applied to ordinal scales instead of the F-test. The F-test requires homogeneity of variances, a condition that is less frequently met in ordinal scales. In addition, the Friedman test is used for two-way analysis of variance (nonparametric data) and for comparing the mean rankings of different groups. In this study, the Friedman test was employed to examine and prioritize the identified main components, and its results are presented in Table 2.

Table 2. Friedman Test for Ranking the Main Components (Source: Author)

Test Statistic (χ^2)	Sig.	Result	
107.67	0.000	Significant difference	
Indicators		Mean Rank (M)	Rank
Employer factor		6.08	4
Contractor factor		6.91	2
Consultant factor		3.82	9
Contractual factor		4.89	6
Financial and economic factor		7.54	1
Materials and equipment factor		4.19	8
Laws and regulations factor		5.84	5
Organizational factor		6.13	3
External factor		4.27	7

Based on Table 2, the significance level of the Friedman test for examining the indicators is lower than the threshold value of $\alpha = 0.05$. Consequently, the effects of the main components are not identical. The results also indicate that, from the experts' perspective, the "financial and economic factor" was evaluated at the highest level, whereas the "consultant factor" was assessed at the lowest level.

The Friedman test was used to examine and prioritize the employer-related factor considered in this study, and its results are presented in Table (3).

Table 3. Friedman Test for Ranking the Employer Factor (Source: Author)

Test Statistic (χ^2)	Sig.	Result	
93.831	0.000	Significant difference	
Indicators		Mean Rank (M)	Rank
To what extent do changes such as scope, duration, and quantities of work outside the contract affect the occurrence of conflicts?		9.00	1
To what extent does delay by the employer in reviewing work-related items such as payment certificates affect the occurrence of conflicts?		5.94	9
To what extent can changes in drawings and specifications by the employer affect the occurrence of conflicts?		6.25	6
To what extent does lack of coordination by the employer with relevant organizations and authorities affect the occurrence of conflicts?		5.94	9
To what extent does delay by the employer in timely site handover affect the occurrence of conflicts?		7.27	3
To what extent does inadequate control and review of project activities by the employer affect the occurrence of conflicts?		6.01	8
To what extent can inefficiency in the employer's technical and qualitative evaluation system affect the occurrence of conflicts?		6.11	7
To what extent does failure to hold effective meetings and negotiations by the employer affect the occurrence of conflicts?		7.15	4
To what extent do changes in senior management and project managers within the employer's organizational structure affect the occurrence of conflicts?		6.94	5
To what extent does the use of identical scopes of services for different projects by the employer affect the occurrence of conflicts?		5.08	10
To what extent can weak coordination by the employer among contractors and different activities affect the occurrence of conflicts?		4.50	11
To what extent can the employer's failure to implement a project management system affect the occurrence of conflicts?		7.82	2

Based on Table (3), the significance level of the Friedman test for examining the indicators is lower than the threshold value of $\alpha = 0.05$. Therefore, the impact of the employer factor is not uniform. The results also indicate that, from the experts' perspective, the component "making changes such as scope, duration, and quantities of work outside the contract" was evaluated at the highest level, while the indicator "weak coordination by the employer among contractors and different activities" was evaluated at the lowest level.

The Friedman test was used to examine and prioritize the contractor-related factor considered in this study, and its results are presented in Table (4).

Table 4. Friedman Test for Ranking the Contractor Factor (Source: Author)

Test Statistic (χ^2)	Sig.	Result	
181.404	0.000	Significant difference	
Indicators		Mean Rank (M)	Rank
To what extent does weak project management and control by the contractor affect the occurrence of conflicts?		8.86	2
To what extent do frequent changes in the schedule and inadequate planning for project execution by the contractor affect the occurrence of conflicts?		7.82	5
To what extent can weak communication and cooperation between the contractor and other execution groups affect the occurrence of conflicts?		6.15	6
To what extent does scheduling incompatibility and inappropriate contractual relationships between the contractor and subcontractors affect the occurrence of conflicts?		5.03	10
To what extent can the lack of constructive interaction and proper communication with the employer, consultant, subcontractors, and suppliers affect the occurrence of conflicts?		5.30	8
To what extent does the contractor's lack of familiarity with project management, project control, and resource allocation affect the occurrence of conflicts?		8.33	3

To what extent does non-compliance with technical specifications and site instructions, as well as delays in preparing site records, affect the occurrence of conflicts?	5.34	7
To what extent do frequent changes in key site personnel, shortages of human resources, and inadequate training of execution staff affect the occurrence of conflicts?	5.13	9
To what extent can the contractor's failure to conduct an accurate site visit affect the occurrence of conflicts?	4.84	11
To what extent does failure by the contractor to timely record events and incidents and to prepare weekly and monthly reports affect the occurrence of conflicts?	4.08	12
To what extent do contractor claims regarding time extensions, cost increases, discount rates, and interest due to delays in payments affect the occurrence of conflicts?	8.20	4
To what extent does the contractor's lack of mandatory and sufficient scientific and technical competence commensurate with the project scope, along with weaknesses in documentation, affect the occurrence of conflicts?	8.93	1

Based on Table (4), the significance level of the Friedman test for examining the indicators is lower than the threshold value of α = 0.05. Therefore, the impact of the contractor factor is not uniform. The results also indicate that, from the experts' perspective, the component "lack of mandatory and sufficient scientific and technical competence of the contractor commensurate with the project scope, along with weaknesses in documentation" was evaluated at the highest level, whereas the indicator "failure by the contractor to timely record events and incidents and to prepare weekly and monthly reports" was evaluated at the lowest level.

The Friedman test was used to examine and prioritize the materials and equipment factors considered in this study, and its results are presented in Table (5).

Table 5. Friedman Test for Ranking Materials and Equipment Factors (Source: Author)

Test Statistic (χ^2)	Sig.	Result	
62.552	0.000	Significant difference	
Indicators		Mean Rank (M)	Rank
To what extent do changes in the type, quality, and specifications of materials during construction affect the occurrence of conflicts?		4.67	10
To what extent can damage to stored materials affect the occurrence of conflicts?		5.82	7
To what extent does failure or delay in procurement affect the occurrence of conflicts?		6.23	5
To what extent does weak planning for the procurement and supply of materials affect the occurrence of conflicts?		5.38	9
To what extent do increases in material prices and shortages of construction materials in the market affect the occurrence of conflicts?		4.55	11
To what extent do difficulties in procuring materials and shortages of construction materials at the estimated price affect the occurrence of conflicts?		7.29	1
To what extent do purchasing restrictions related to the procurement of construction materials affect the occurrence of conflicts?		7.24	2
To what extent does a shortage of equipment and machinery affect the occurrence of conflicts?		5.79	8
To what extent can improper procurement for the supply of materials and equipment affect the occurrence of conflicts?		6.84	3
To what extent do low productivity and efficiency of equipment affect the occurrence of conflicts?		5.83	6
To what extent does the contractor's use of machinery and materials contrary to contractual provisions affect the occurrence of conflicts?		6.36	4

Based on Table (5), the significance level of the Friedman test for examining the indicators is lower than the threshold value of α = 0.05. Therefore, the impact of materials and equipment factors is not uniform. The results also indicate that, from the experts' perspective, the component "difficulties in procuring materials and shortages of construction materials at the estimated price" was evaluated at the highest level, whereas the indicator "increases in material prices and shortages of construction materials in the market" was evaluated at the lowest level.

The Friedman test was used to examine and prioritize the organizational factors considered in this study, and its results are presented in Table (6).

Table 6. Friedman Test for Ranking Organizational Factors (Source: Author)

Test Statistic (χ^2)	Sig.	Result	
62.552	0.000	Significant difference	
Indicators		Mean Rank (M)	Rank
To what extent does the preparation of inaccurate technical and economic feasibility reports for development projects by executive bodies of organizations affect the occurrence of conflicts?		5.73	8
To what extent can failure to use modern approaches, such as value engineering and project management, affect the occurrence of conflicts?		7.27	1
To what extent do changes resulting from revisions by other organizations affect the occurrence of conflicts?		4.55	10
To what extent does failure to enhance the supervisory capacity of executive bodies affect the occurrence of conflicts?		6.12	7
To what extent does failure to employ experienced legal experts in organizations for drafting construction contracts affect the occurrence of conflicts?		4.70	9
To what extent do structural problems in the technical and executive systems of projects affect the occurrence of conflicts?		6.20	6
To what extent does the shortage of specialized human resources and inadequate training of execution staff in organizations affect the occurrence of conflicts?		6.77	4
To what extent can eliminating the practice of awarding projects through negotiated procedures (without formal tendering) contribute to preventing conflicts?		6.79	3
To what extent can holding training workshops on technical and executive regulations and bylaws contribute to preventing conflicts?		6.96	2
To what extent do human resource challenges related to recruitment, hiring, and job–person fit and professional specialization in organizations affect the occurrence of conflicts?		6.60	5
To what extent do unhealthy and inefficient bureaucratic practices, excessive paperwork, and weaknesses in information dissemination and organizational management systems affect the occurrence of conflicts?		4.31	11

Based on Table (6), the significance level of the Friedman test for examining the indicators is lower than the threshold value of $\alpha = 0.05$. Therefore, the impact of organizational factors is not uniform. The results also indicate that, from the experts' perspective, the component "failure to use modern approaches, such as value engineering and project management" was evaluated at the highest level, while the indicator "the presence of unhealthy and inefficient bureaucratic practices, excessive paperwork, and weaknesses in information dissemination and organizational management systems" was evaluated at the lowest level.

The Friedman test was used to examine and prioritize the external factors considered in this study, and its results are presented in Table (7).

Table 7. Friedman Test for Ranking External Factors (Source: Author)

Test Statistic (χ^2)	Sig.	Result	
89.681	0.000	Significant difference	
Indicators		Mean Rank (M)	Rank
To what extent do construction complexity, dispersion, and the wide scope of project execution activities affect the occurrence of conflicts?		4.52	10
To what extent can unforeseen conditions and necessary changes in work affect the occurrence of conflicts?		5.90	7
To what extent can the seasonal nature of certain execution activities (unfavorable climatic and weather conditions) affect the occurrence of conflicts?		6.30	5
To what extent do accidents resulting from non-compliance with safety regulations during construction and subsequent project shutdowns affect the occurrence of conflicts?		4.11	11
To what extent does the unpredictability of economic conditions, inflation, the resulting recession, and changes in global markets affect the occurrence of conflicts?		4.65	9
To what extent does the occurrence of force majeure events such as floods, earthquakes, storms, volcanic eruptions, unrest and strikes, war, and similar events affect the occurrence of conflicts?		7.20	2
To what extent does the emergence of local and cultural problems and disputes during project execution affect the occurrence of conflicts?		6.87	4

To what extent do major disputes and bargaining processes during construction affect the occurrence of conflicts?	6.28	6
To what extent does failure to anticipate administrative bureaucracy in projects, including obtaining permits and required approvals from various organizations, affect the occurrence of conflicts?	7.11	3
To what extent does suspension of the project by administrative, legal, and regulatory bodies outside the project and contract affect the occurrence of conflicts?	5.69	8
To what extent can low adjustment indices relative to cost increases and the existence of base price lists affect the occurrence of conflicts?	7.37	1

Based on the findings, the significance level of the Friedman test for examining the indicators is lower than the threshold value of $\alpha = 0.05$. Therefore, the impact of external factors is not uniform. The results also indicate that, from the experts' perspective, the component "low adjustment indices relative to cost increases and the existence of base price lists" was evaluated at the highest level, while the indicator "accidents resulting from non-compliance with safety regulations during construction and subsequent project shutdowns" was evaluated at the lowest level.

Discussion and Conclusion

The findings of the present study provide a comprehensive and empirically grounded picture of the relative importance of conflict-generating factors in industrial projects from a project management perspective. The results demonstrate that conflicts in industrial projects are not randomly distributed across domains but are systematically concentrated around a limited set of high-impact factors, particularly financial and economic issues, employer-related actions, contractor-related deficiencies, and organizational weaknesses. This pattern confirms the core assumption of contemporary project management theory that conflicts emerge from the interaction between contractual structures, organizational behavior, and environmental constraints rather than from isolated operational failures (1, 2). The prioritization achieved through the Friedman tests highlights that financial and economic factors occupy the highest rank among the main components, underscoring the centrality of cash flow stability, timely payments, cost adjustment mechanisms, and inflation management in maintaining project harmony. This result is consistent with earlier Iranian and international studies showing that delayed payments, inadequate price adjustment indices, and cost escalation are among the most frequent triggers of claims and disputes in large-scale projects (4, 22).

The prominence of employer-related factors as the second-ranked category further reinforces the structural role of the client in shaping conflict dynamics. The results indicate that changes imposed by the employer—particularly those related to scope, duration, and quantities outside contractual provisions—constitute the most influential employer-side source of conflict. This finding aligns with contract law analyses emphasizing that unilateral changes and ambiguous change management procedures disrupt the contractual equilibrium and create fertile ground for claims (5, 8). Prior comparative studies between FIDIC conditions and domestic contract frameworks have similarly shown that weakly defined variation clauses and insufficient procedural clarity amplify disputes when employers exercise discretionary power (7). The current findings extend this literature by empirically demonstrating that, from practitioners' perspectives, employer-induced changes outweigh other employer-related shortcomings such as coordination failures or inadequate supervision in generating conflicts.

Contractor-related factors ranked third among the main components, with the highest-priority sub-factor being the lack of adequate technical, scientific, and professional competence commensurate with project requirements, coupled with weaknesses in documentation. This result corroborates earlier research emphasizing that contractor capability, experience, and managerial maturity are decisive determinants of project performance and dispute

occurrence (6, 20). Weak project management skills, insufficient familiarity with resource allocation and control techniques, and poor record-keeping practices undermine contractors' ability to substantiate claims, manage changes, and respond effectively to project uncertainties. These deficiencies often escalate routine disagreements into formal disputes, particularly in Design–Build and EPC contracts where risk transfer to contractors is substantial (3, 5). The relatively lower ranking of issues such as delayed reporting or insufficient site visits suggests that experts perceive strategic and structural contractor weaknesses as more consequential than isolated operational lapses.

The analysis of materials, equipment, and organizational factors further enriches the discussion by revealing the interconnected nature of technical and managerial sources of conflict. Within the materials and equipment category, difficulties in procuring materials at estimated prices emerged as the most critical factor, reflecting the vulnerability of industrial projects to market volatility, supply chain disruptions, and pricing mechanisms. This finding resonates with risk management studies in oil, gas, and infrastructure projects, which highlight procurement uncertainty as a major driver of claims related to cost overruns and schedule delays (2, 4). Organizational factors, particularly the failure to adopt modern approaches such as value engineering and systematic project management, ranked highest within their category. This result supports the argument that conflicts are not merely reactive phenomena but symptoms of deeper organizational deficiencies, including outdated management practices, insufficient learning mechanisms, and resistance to innovation (1, 19).

The external factors analysis underscores the influence of macro-level conditions on project conflict dynamics. The highest-ranked external factor—insufficient adjustment indices relative to cost increases and the existence of rigid base price lists—highlights the structural mismatch between contractual pricing mechanisms and real economic conditions. This outcome is particularly relevant in contexts characterized by inflationary pressures and regulatory rigidity, where static pricing frameworks fail to accommodate market realities and thus intensify disputes (16). The strong ranking of force majeure events and administrative bureaucratic delays further illustrates that conflicts are shaped by institutional environments beyond the direct control of project actors. These findings are consistent with organizational and sociological perspectives that view conflict as a product of institutional constraints, governance arrangements, and power asymmetries rather than purely interpersonal disagreement (15, 24).

From a behavioral and organizational standpoint, the study's results align with conflict management theories emphasizing the role of leadership, communication, and ethical climate in moderating conflict outcomes. While structural and contractual factors dominate the rankings, the persistence of organizational and human resource issues among high-priority factors suggests that technical solutions alone are insufficient. Prior research demonstrates that constructive conflict management styles, transparent communication, and participatory decision-making can transform potentially destructive conflicts into opportunities for learning and collaboration (18, 23). Moreover, ethical leadership and supportive organizational cultures have been shown to reduce the escalation of conflicts into adversarial disputes by fostering trust and organizational citizenship behaviors (11, 14). The present findings complement these studies by indicating that, in industrial projects, such behavioral mechanisms must be embedded within robust contractual and managerial systems to be effective.

The integration of these results suggests that conflict management in industrial projects requires a holistic, multi-level approach. Financial stability, clear contractual change mechanisms, competent contractors, modern organizational practices, and adaptive responses to external uncertainties must be addressed simultaneously. This conclusion is consistent with network governance perspectives, which argue that value creation in

interorganizational projects depends on balancing control and collaboration while harnessing conflict constructively (15). Negotiation-based and non-adversarial dispute resolution mechanisms, such as dispute boards and structured negotiation frameworks, further support this integrated approach by preventing escalation and preserving working relationships (3, 17). Overall, the discussion confirms that systematic ranking of conflict causes provides actionable insights for prioritizing managerial interventions and aligning project governance structures with empirical risk profiles (21).

Despite its contributions, this study is subject to several limitations that should be acknowledged. First, the findings are based on expert judgments and survey data, which may be influenced by respondents' experiences, organizational roles, and contextual biases. Second, the study focuses primarily on industrial projects within a specific institutional and regulatory environment, which may limit the generalizability of the results to other national or sectoral contexts. Third, while the ranking approach identifies relative importance, it does not capture dynamic interactions among factors or causal relationships over time.

Future research could build on the present study by employing longitudinal designs to examine how conflict factors evolve across different phases of the project life cycle. Comparative studies across countries or contract types could further illuminate the role of institutional frameworks in shaping conflict dynamics. Additionally, integrating quantitative ranking methods with qualitative case studies or system dynamics modeling may provide deeper insights into the causal mechanisms linking organizational, contractual, and external factors to conflict escalation.

From a practical standpoint, the results suggest that project stakeholders should prioritize financial governance, transparent change management, and contractor capability assessment as central elements of conflict prevention strategies. Organizations should institutionalize modern project management practices, invest in training and professional development, and design adaptive contractual mechanisms that reflect economic realities. Strengthening communication channels, negotiation capacities, and collaborative governance structures can further reduce the likelihood of conflicts escalating into costly disputes.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adheried in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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