Sustainable Conflict Management in Public and Private Construction Projects: A Case Study Approach Using SPSS Software

Afra Kulsoom[1] Dr. G. Vikas Paul[2]
[1]*Student, ME, Department of Civil Engineering with Specialization in Construction Management Lords Institute of Engineering and Technology Himayat Sagar 500091 Telangana*
[2]*Associate Professor -Civil Engineering, Lords Institute of Engineering and Technology Himayat Sagar 500091 Telangana*

***Abstract*—Construction projects in India often face disputes due to complex stakeholder dynamics, vague contracts, and resource limitations. This study examines the causes and resolution mechanisms of such disputes in public and private sector projects using case studies and SPSS-based statistical analysis. Common triggers identified include payment delays, poor communication, design flaws, and approval issues. While public projects are more affected by bureaucratic and policy delays, private ones face financial challenges and informal practices.**

Using descriptive statistics, Chi-square, and Mann-Whitney U tests, the research highlights sector-specific dispute patterns and recommends improved stakeholder coordination, clearer contracts, and early resolution methods like mediation or arbitration. Aligned with SDGs 9 and 16, the study advocates for resilient infrastructure and transparent governance, offering insights for policymakers and practitioners to enhance project outcomes and reduce conflicts.

***Index Terms*—construction disputes, public projects, private projects, case studies, SPSS analysis, conflict resolution, project management, stakeholder expectations.**

I. LITERATURE REVIEW

Hadikusumo and Tobgay (2015) gave a more concrete and clear description of the concept: "When one party believes that the other party has not met the contractual terms or prospects and that they earn financial and/ or time compensation, they may submit a claim." This description gives less clarity of the conception of claims in a design environment.

Acharya and Lee (2006) linked that the main problems affecting construction systems in Korea are fiscal factors, dearth of accoutrements, unforeseen price oscillations, design errors, and scarcity in contract operation.

Alkhamali et al. (2010) linked seven main causes of controversies in the construction industry. The most significant factors include contractual issues arising from inadequately drafted contracts, artistic differences between the constricting parties, pool inefficiency, and frequent changes during the design and implementation phases. also, the design proprietor can be a major source of controversy. possessors may request changes to the contract to accommodate new technological advancements, seek new accoutrements, or encounter dearths of engineering plans.

Goodman (2012) noted that similar controversies can be minimized if the liabilities and pitfalls of each party are easily defined to help avoid any misconstructions. also, investing in the education of construction contract directors can help avoid these controversies.

Leung et al. (2002) found that effective conflict forestallment improves platoon productivity and creativity, aiding handicap resolution. directors should note the relationship between conflict and satisfaction situations. relating to the right stage of conflict is vital for design success, as it fosters positive relations among actors. Controlled conflict can exclude hurdles and enhance party satisfaction, but inordinate task conflict should be avoided during decision- timber.

Gorse (2003) emphasized the significance of considering different types of conflicts before developing resolution strategies. Conflicts can arise

from social mismatches, methodologies in construction systems, and task-related dissensions among platoon members.

1.1. What is the Significance?

- This study holds significant value in the field of construction project management, particularly in understanding the dispute patterns that arise in public and private sector projects. Construction disputes are a major cause of time and cost overruns, legal complications, and project failures. By analyzing and comparing disputes across different project types, this research provides actionable insights for project managers, contractors, and policymakers.
- The application of statistical tools such as SPSS enhances the objectivity and reliability of the findings, allowing for data-driven recommendations. Additionally, the inclusion of real-world case studies bridges the gap between theoretical understanding and practical challenges faced on-site.
- Importantly, the study contributes to the advancement of Sustainable Development Goals (SDGs), particularly:

SDG 9 (Industry, Innovation, and Infrastructure) by promoting more resilient and efficiently managed construction systems, and SDG 16 (Peace, Justice, and Strong Institutions) by encouraging transparent, fair, and dispute-minimized institutional practices in project execution.

- Overall, this research supports the development of more proactive, preventive, and strategic approaches to dispute management, helping enhance the success rate of future infrastructure projects in India and similar economies.

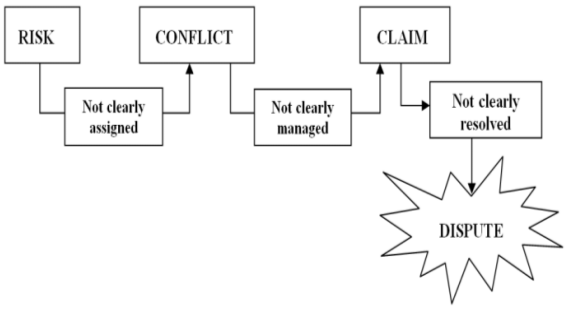


Figure 1: Disputes

1.2. What is the SPSS Software?

- SPSS (Statistical Package for the Social Sciences) is a powerful, user-friendly software used for statistical analysis, data management, and reporting across fields like social sciences, healthcare, and education.
- It supports a wide range of procedures, including descriptive stats, regression, ANOVA, and factor analysis.
- SPSS allows easy data import from Excel, CSV, and databases, and offers advanced tools for data transformation, visualization, and interpretation.

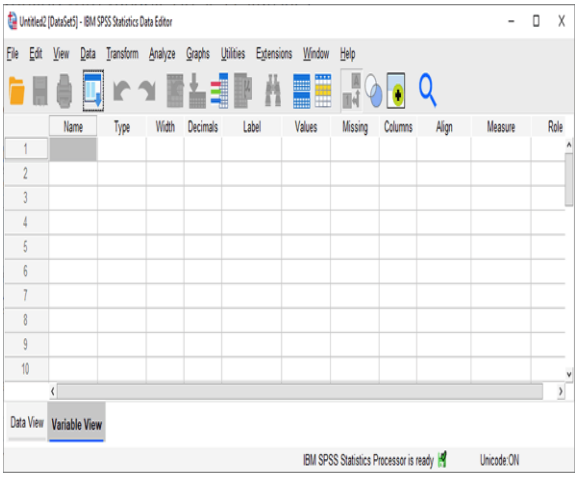


Figure 2: Variable View

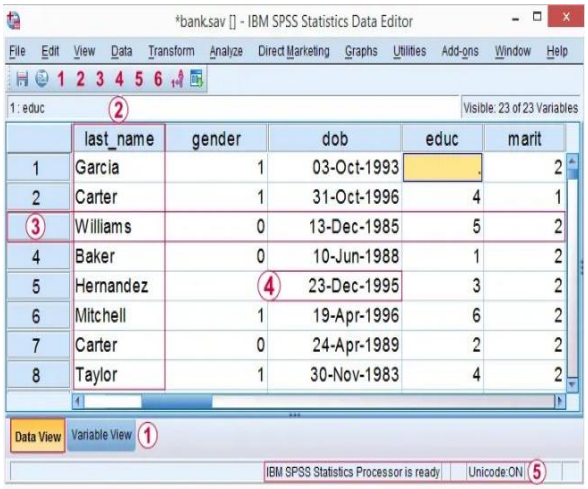


Figure 3: Data View

2. METHODOLOGY

The research employs a case study methodology to provide a nuanced understanding of disputes in both private and public construction projects. Case studies

are selected based on their relevance, complexity, and representativeness of typical challenges in the industry. By analyzing real-world scenarios, the study seeks to derive practical insights and lessons that can be generalized to a broader context.

2.1. Data Collection:

Project documents, contractual agreements, legal records, and industry reports are reviewed to identify patterns and trends in construction disputes.

2.2 Data Analysis Using SPSS and Excel:

SPSS software and Excel are employed for the statistical analysis of collected data. Key analyses include:

- Descriptive Statistics: Summarizing key variables such as the frequency of disputes and average resolution time.
- Correlation Analysis: Identifying relationships between factors such as project size, cost, and the likelihood of disputes.
- Mann-Whitney U Test: To compare non-normally distributed ordinal variables between two independent groups (public vs private projects), the Mann-Whitney U Test was applied. This test evaluated whether the distribution of dispute causes significantly differed between sectors.

3. DATA ANALYSIS USING SPSS

- Descriptive Statistics

Descriptive analysis was conducted using SPSS's Frequencies and Descriptives functions.

Frequency tables technically work on scale (continuous) variables, but are meaningful only with a limited number of distinct categories.

SPSS Path:

Analyze > Descriptive Statistics > Frequencies / Descriptives

Check:

Mean

Std. Deviation

Min/Max

Percentiles

Use this to identify the most common or severe risk categories.

- Cross-Tabulation and Chi-Square Tests

The Chi-Square Test of Independence was employed to assess associations between categorical variables, specifically between dispute cause categories and project types (public vs private). This nonparametric test utilizes contingency tables to examine whether distributions of dispute causes differ significantly across project types. A p-value less than 0.05 was considered statistically significant.

Interpretation:

Small p-value (< 0.05): Strong evidence against the null hypothesis; suggests a significant association between variables.

Large p-value (> 0.05): Weak evidence against the null; suggests no significant association.

SPSS Path:

Analyze > Descriptive Statistics > Crosstabs

Use Dispute Occurred as the dependent variable.

Use Risk Type or Project Type as the independent variable.

Click on Statistics > Chi-square to see if the relationship is significant.

- Mann-Whitney U Test

To compare non-normally distributed ordinal variables between two independent groups (public vs private projects), the Mann-Whitney U Test was applied. This test evaluated whether the distribution of dispute causes significantly differed between sectors.

Identify Variables:

Grouping variable: A binary variable (e.g., Public Private, coded as 1 = Public, 2 = Private).

Test variable(s): These are the ordinal or continuous variables you want to compare across the two groups (e.g., scores for each dispute cause).

SPSS Path:

Analyze > Nonparametric Tests > Legacy Dialogs > 2 Independent Samples.

Move your dependent variable (e.g., "Delay_in_Payment") to the Test Variable List.

Move your grouping variable (e.g., "Public_Private") to Grouping Variable.

Click Define Groups and enter the two codes (e.g., 1 and 2).

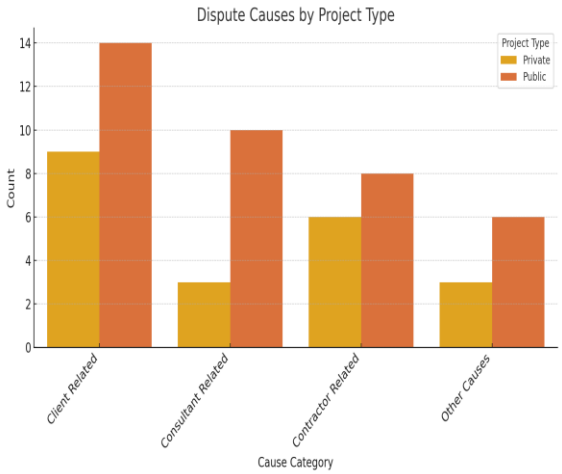
Select Mann-Whitney U under test type.

Click OK.

4. RESULTS AND DISCUSSION

4.1. Frequency Summary by Cause Category:

Cause Category	Private Projects	Public Projects
Client Related	9	14
Consultant Related	3	10
Contractor Related	6	8
Other Causes	3	6



4.2. Dispute Category Chart:

4.3. Chi-Square Test Report:

1. Private Disputes

Cause Category	*0*	*1*	*All*
Client Related	7	9	16
Consultant Related	10	3	13
Contractor Related	4	6	10
Other Causes	3	3	6
All	24	21	45

Chi-square test p-value: 0.237
Interpretation: Since the p-value is greater than 0.05, we fail to reject the null hypothesis.
There is no statistically significant association between cause category and private disputes.

2. Public Disputes

Cause Category	*0*	*1*	*All*
Client Related	2	14	16
Consultant Related	3	10	13
Contractor Related	2	8	10
Other Causes	0	6	6
All	7	38	45

Chi-square test p-value: 0.587

Interpretation: Since the p-value is greater than 0.05, we fail to reject the null hypothesis. There is no statistically significant association between cause category and public disputes.

4.4. Mann-Whitney U Test:

1. No Statistically Significant Differences

All p-values > 0.05, meaning there is no statistically significant difference in how public and private projects experienced these dispute causes.
Even though public and private projects may differ in frequency or type of disputes, the test results do not support a strong statistical distinction.

2. Most Common Disputes in Both Sectors:

These causes had equal and high occurrence (1.00) in both public and private projects:

- Untimely payments
- Delay in payments
- Inefficiencies in cooperation between stakeholders
- Poor communication
- Changes to the scope of work
- Incomplete claims with poor substantiation
- Poorly drafted claims
- Incomplete designs
- Design errors
- Material specification issues
- Rate increase blackmail
- A work stoppage occurred

3. Causes Only Present in Public Projects:

These were reported only in public projects (Private Mean = 0.00, Public Mean = 1.00):

- Client's lack of knowledge
- Project manager's authority level
- People issues
- Construction speed
- Unrealistic expectations
- Errors in design/contract documents
- Client's requirement misinterpretation
- Complexity of contract documents
- Scarcity of capital resources
- Unforeseen site conditions
- Workmanship management

4. Causes Only Present in Private Projects:

These were reported only in private projects:

- Tender pricing
- Uneven responsibilities and obligations

4.5 Comparison Table

ASPECT	PUBLIC CONSTRUCTION PROJECTS	PRIVATE CONSTRUCTION PROJECTS
PRIMARY CAUSES OF DISPUTES	- Bureaucratic delays- Government policy changes- Unrealistic client expectations- Errors in contract/design documents- Authority issues- Capital scarcity	- Budget constraints- Informal communication channels (e.g., Digital communication)- Tender pricing issues- Delays due to stakeholder unavailability
COMMON DISPUTES (BOTH SECTORS)	Untimely payments Delays in payments Poor communication Scope changes Poorly drafted/incomplete claims Material specification issues	Untimely payments Delays in payments Poor communication Scope changes Poorly drafted/incomplete claims Material specification issues
DISPUTE FREQUENCY BY CATEGORY	- Client-Related: 14- Consultant-Related: 10- Contractor-Related: 8- Other: 6	- Client-Related: 9- Consultant-Related: 3- Contractor-Related: 6- Other: 3
DISPUTE TRENDS (SPSS ANALYSIS)	- Disputes heavily influenced by policy and documentation errors- Public projects involve more formal channels but face longer approval and design cycles	- Disputes more tied to operational and cost issues- Private projects face issues in coordination and funding despite faster decision-making
UNIQUE DISPUTE CAUSES	- Client's lack of knowledge- Unrealistic expectations- Project manager authority- Errors in cost/design estimates- Scarcity of resources- Site conditions	- Tender pricing disputes- Uneven responsibility allocation

WORKFORCE/EXECUTION ISSUES	- Work stoppages due to unpaid wages- Disputes in blasting charges and soil conditions	- Execution delays due to miscoordination between laborers and engineers
DISPUTE RESOLUTION CHALLENGES	- Complex due to multiple stakeholders and governmental procedures	- Quicker resolution possible but complicated by financial bottlenecks and informal handling
STATISTICAL FINDINGS	- Higher overall number of disputes than private sector- No statistically significant difference by category (Chi-square $p > 0.05$)	- Fewer disputes overall- No statistically significant difference by category (Chi-square $p > 0.05$)

5. CONCLUSIONS

This study found that construction disputes commonly arise from payment delays, poor coordination, scope changes, and scheduling issues. Public projects face more bureaucratic delays, while private projects often struggle with unclear contracts and shifting requirements.

The case studies showed that public sector disputes are handled through formal procedures, often taking longer, whereas private sector conflicts are usually resolved informally and more quickly. Statistical tests (Chi-square and Mann–Whitney U) confirmed notable differences between sectors in terms of dispute frequency and causes.

Overall, the study highlights the need for a proactive, sector-specific approach to dispute prevention through clear contracts, early risk management, and improved stakeholder communication. These findings support the goals of SDG 9 and SDG 16 by promoting more resilient and transparent construction practices.

5.1. Key Observations:

- Public projects face more systemic issues (policy, regulation, approval delays), often outside direct project control.
- Private projects face financial and interpersonal issues, often due to informal decision-making and limited funding flexibility.
- Dispute management needs to be tailored: Public projects require strong governance and documentation clarity, while private projects benefit from improved communication and budgeting controls.

5.2. Future Scope for Study:

- Include Larger Projects: Future research can explore disputes in infrastructure projects like highways or industrial plants, where conflict dynamics may differ.
- Expand Stakeholder Input: Surveys involving more engineers, contractors, and consultants can strengthen the findings and provide broader industry perspectives.
- Use Advanced Analytics: Applying deeper SPSS methods, such as regression or factor analysis, could enhance the statistical validation of results.
- Leverage Technology: Tools like AI, BIM, and blockchain can be studied for their potential in dispute prevention and real-time issue tracking.
- Academic Publication (SCI Focus): This research can be extended into a high-impact SCI journal paper by adding more real-life case studies, stakeholder surveys, richer visuals, and a conceptual framework for dispute mitigation. Publishing this work will significantly benefit academic growth, PhD admissions, and job opportunities.

REFERENCES

[1] Cheung, S. O., Yiu, T. W., & Yeung, S. F. (2006). A study of styles and outcomes in construction dispute negotiation. Journal of Construction Engineering and Management, 132(8), 805–814.

[2] Love, P. E., Davis, P. R., Edwards, D. J., & Baccarini, D. (2008). Uncertainty avoidance:

Public and private sector procurement. International Journal of Project Management, 26(5), 420–427.

[3] Yates, J. K., & Hardcastle, C. (2003). The causes of disputes in construction. Construction Management and Economics, 21(6), 553–562.

[4] Chan, E. H., & Suen, H. C. (2005). Dispute resolution management for international construction projects in China. Management Decision, 43(4), 589–602.

[5] Meng, X. (2012). The effect of relationship management on project performance in construction. International Journal of Project Management, 30(2), 188–198.

[6] Fenn, P., Lowe, D., & Speck, C. (1997). Conflict and dispute in construction. Construction Management and Economics, 15(6), 513–518.

[7] Arditi, D., & Pulket, T. (2010). Predicting the outcome of construction litigation using rough set theory models. Journal of Computing in Civil Engineering, 24(1), 73–80.

[8] Harmon, K. M. J. (2003). Resolution of construction disputes: A review of current methodologies. Leadership and Management in Engineering, 3(4), 187–201.

[9] Cakmak, E., & Cakmak, P. I. (2014). An analysis of causes of disputes in the construction industry using analytical hierarchy process (AHP). Procedia - Social and Behavioral Sciences, 109, 183–187.

[10] Mbachu, J., & Nkado, R. (2006). Conceptual framework for assessment of client needs and satisfaction in the building development process. Construction Management and Economics, 24(1), 31–44.

[11] Iyer, K. C., & Jha, K. N. (2005). Factors affecting cost performance: Evidence from Indian construction projects. International Journal of Project Management, 23(4), 283–295.

[12] Kumaraswamy, M. M. (1997). Conflicts, claims and disputes in construction. Engineering, Construction and Architectural Management, 4(2), 95–111.

[13] Al-Momani, A. H. (2000). Construction delay: A quantitative analysis. International Journal of Project Management, 18(1), 51–59.

[14] Assaf, S. A., & Al-Hejji, S. (2006). Causes of delay in large construction projects. International Journal of Project Management, 24(4), 349–357.

[15] Doloi, H., Sawhney, A., Iyer, K. C., & Rentala, S. (2012). Analysing factors affecting delays in Indian construction projects. International Journal of Project Management, 30(4), 479–489.

[16] Chan, A. P., Scott, D., & Chan, A. P. (2004). Factors affecting the success of a construction project. Journal of Construction Engineering and Management, 130(1), 153–155.

[17] Gebrehiwet, T., & Luo, H. (2017). Analysis of delay impact on construction project based on RII and correlation coefficient: Empirical study. Procedia Engineering, 196, 366–374.

[18] Zaneldin, E. K. (2006). Construction claims in the United Arab Emirates: Types, causes, and frequency. International Journal of Project Management, 24(5), 453–459.

[19] Olaniran, O. J. (2015). Constructability barriers in the Nigerian construction industry: A case study. Journal of Construction Engineering, 2015, Article ID 982729.

[20] Odeh, A. M., & Battaineh, H. T. (2002). Causes of construction delay: Traditional contracts. International Journal of Project Management, 20(1), 67–73.