

## Conflicts and Solutions in EPC Projects

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### Abstract

The use of Engineering, Procurement and Construction (EPC) projects has gained popularity in the provision of large-scale infrastructure and industrial project because of the single point accountability arrangement, and time-saving schedule goals. Nevertheless, EPC contracts often get hit with conflict situations which cripple cooperation, cause cost overruns, project delays, lawsuits and poor stakeholder relations. This paper will research the major causes of conflict in EPC projects and discuss the efficiency of resolution measures used in alleviating their effects on the performance of project delivery. The frequency of claims, length of disputes, volumes of change orders, and rate of delay recovery were analyzed using descriptive statistics. Qualitative data were examined in terms of themes, to find out the patterns of escalation, communication failures, and effectiveness of conflict resolution. The results suggest that scope ambiguity, change in design, schedule constraints, payment delays and incorrect clauses in risk transfer are some of the key conflict drivers. Under cultures of adversarial contract and a lack of well coordinated channels of communicating with the stakeholders, conflicts are compounded. Group settlement processes like early dispute resolution boards, integrated project management workshop, mediation and hybrid partnering contractual strategies proved to be more effective compared to the traditional arbitration and litigation channels. The research adds value to the existing EPC project management literature by providing empirically based taxonomy of conflict types and conflict resolution strategies, as well as recommending governance reforms that would promote cooperative risk sharing, open communication structures, and formulated early intervention strategies to increase project stability and delivery performance of EPC projects.

**Keywords:** Engineering, Procurement and Construction (EPC), Construction Conflict Management, Risk Allocation, Payment Disputes, Contractual Claims, Project Governance, Communication Breakdown, Interface Management, Stakeholder Trust, Relationship Management

### Introduction

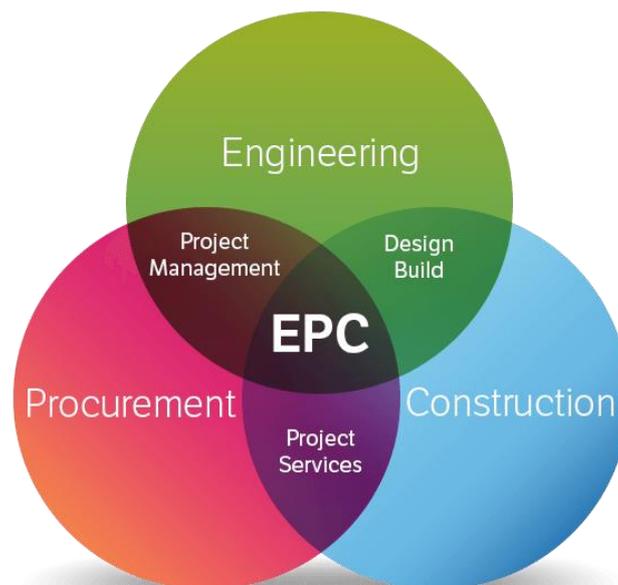
Engineering, Procurement, and Construction (EPC) contracting is one of the most commonly deployed types of delivery systems in complex projects of public and privately funded infrastructure. These combined contractual arrangements place the responsibility of engineering design, materials procurement and contracted construction on one contractor and hence seeks to enhance coordination, reduce owner risk exposure, and enhance the certainty of the project. Regardless of these advantages, the EPC projects are always related to the high rates of contractual conflicts and disputes that deter project efficiency and relationships between the stakeholders. The problems associated with scope definition, design alteration requirements, schedule acceleration requests, payment delays, procurement variability, risk allocation disproportions, and coordinating failure among project stakeholders are the main causes of conflicts in EPC projects (Akhtar, 2020). The strict risk transfer mechanisms that are entrenched in traditional EPC contracts contrived to increase the tensions especially when unseen forces cause the imposition of responsibilities which were not accorded to the parties that cannot exercise operational control. These circumstances create hostile working environments characterized by heightened claims, arbitration and termination of the contracts. Rather, governance misalignment, weak communication habits, as well as ineptly designed dispute resolution systems, are determinants. Even with the evolution of contract

writing and risk management advice, the actual EPC projects still witness the increasing number of quarrels, which implies that there is still a gap between theory and practice.

This study explores the most important causes of conflict within EPC project settings and critically assesses conflict-resolution strategies that can be used to enhance project performance. It tries to categorize the types of conflicts on a contractual, operational, financial, and relational level and their efficacy of formal and informal resolution techniques, such as negotiation and mediation, dispute review boards (DRB) and partnering arrangements, and arbitration practices. In this way, it benefits project management academia and provides practitioners with practical solutions on how to curtail the escalation of conflicts, protect cooperative working relations and improve stability during delivery in complex EPC projects.

### Need of the Study

Engineering, Procurement and Construction (EPC) contracts are gaining popularity in the delivery of large size infrastructure, energy, and industrial projects due to their potential of one point responsibility, certainty of costs and speed of delivery. Though these theories have such benefits, EPC projects are still characterized by high rates of contractual conflict, escalation of disputes, cost overruns, project delays and breakdown of relationships. The caseloads of arbitration and the numbers of claims ever reported indicate that the EPC disputes represent a significant percentage of large construction litigation cases all around the world. Such issues continue to exist as indicators of severe disalignment between EPC contract intent and operational delivery realities. The book is warranted by the fact that very little academic research has been done so far to incorporate contractual, organisational, financial, and relationship-based sources of conflict within a single analytical framework (Soderlund, 2018). The majority of the literature available now separates single problems like variation issues or claims of payments without considering how these conflicts change or develop throughout the EPC project life cycle. Besides, though much research has been conducted on the subject of dispute resolution, little emphasis has been placed on preventive conflict management measures that seek to prevent formal disputes altogether.

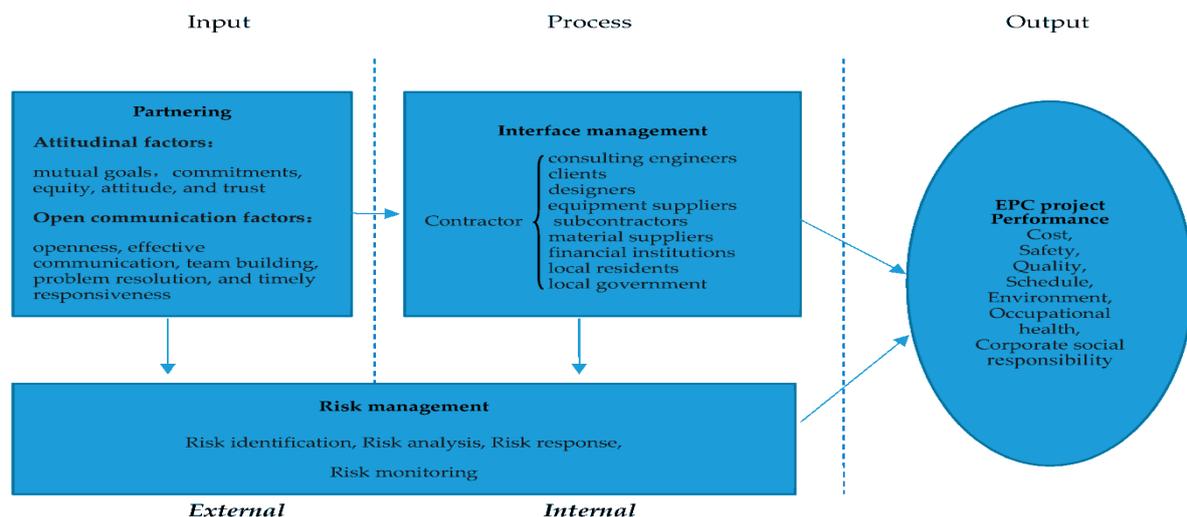


It is especially essential to understand the dynamics of conflicts now that the EPC projects are becoming increasingly complex, with multinational contractors, digital design platforms, and extensive supply chains, as well as multicultural workforces. These factors enhance the difficulties of coordination and risk transfer pressures (Rezky, 2019). The economic and reputational costs of EPC disputes will probably continue to occur in the absence of evidence-based models to prevent and resolve conflicts. The paper herein attempts to address this gap by examining some of the main sources of conflicts and assessing how effective the traditional and collaborative resolution systems are. The study will

help to advance the better project governance, which ensures cooperation, transparency, and trust among the stakeholders of the EPC, which will lead to more predictable, efficient, and sustainable infrastructure delivery results.

### Justification of the Study

In spite of the broad usage of EPC contracting as a model of project delivery that has been aimed at increasing the efficiency and minimizing risks, conflicts are still widespread and disruptive among EPC projects all over the world. Such pitfalls as scope ambiguity, the uneven distribution of risks, delaying payments, communication failures, and the worsening of relations among the stakeholders keep occurring over and over again, contributing to conflicts, arbitration, and project delays. Such results contradict the fundamental aims of EPC contracting predictability of costs, time control and integrated allocation of responsibilities.

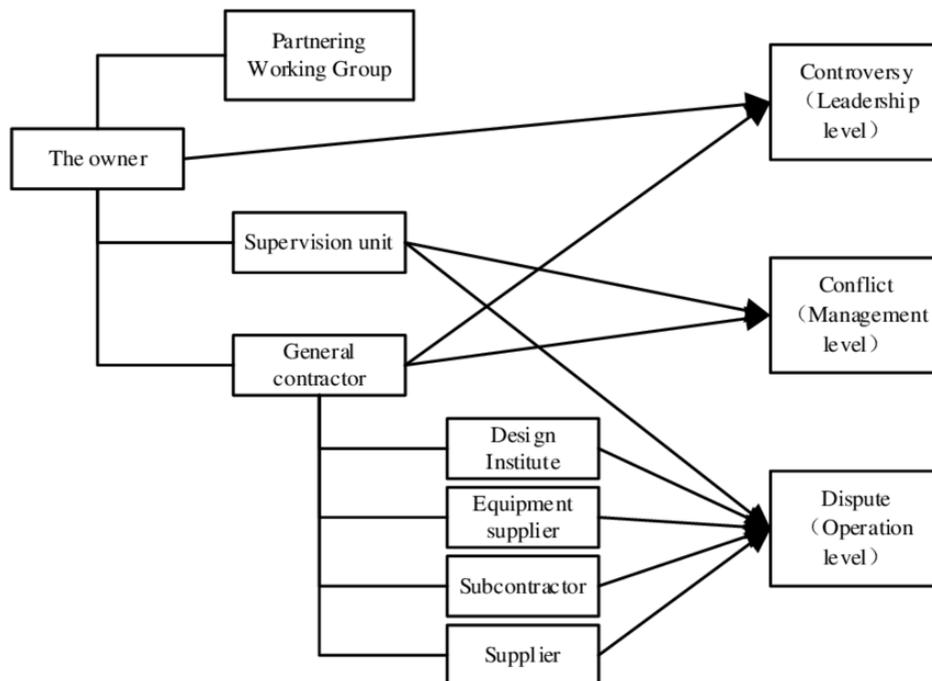


Arbitration and litigation are the most common examples of formal dispute resolution tools that are largely reactive, expensive, and time-intensive and usually ruin long-term working relationships. Meanwhile, the preventive conflict management strategies are also unevenly implemented and not thoroughly researched. Also, the literature does not provide integrative frameworks that would allow to relate technical, contractual, financial, and relational conflict drivers to a coherent picture of the EPC dispute development. The main issue that is focused on the studies is the fact that the disconnection between the design of EPC contracts and the effectiveness of conflict management in the real world has persisted. To resolve this issue, the creation of more collaborative delivery models that can reduce adversarial behaviour, decrease the cost of disputes, and increase stability in the performance of projects is important.

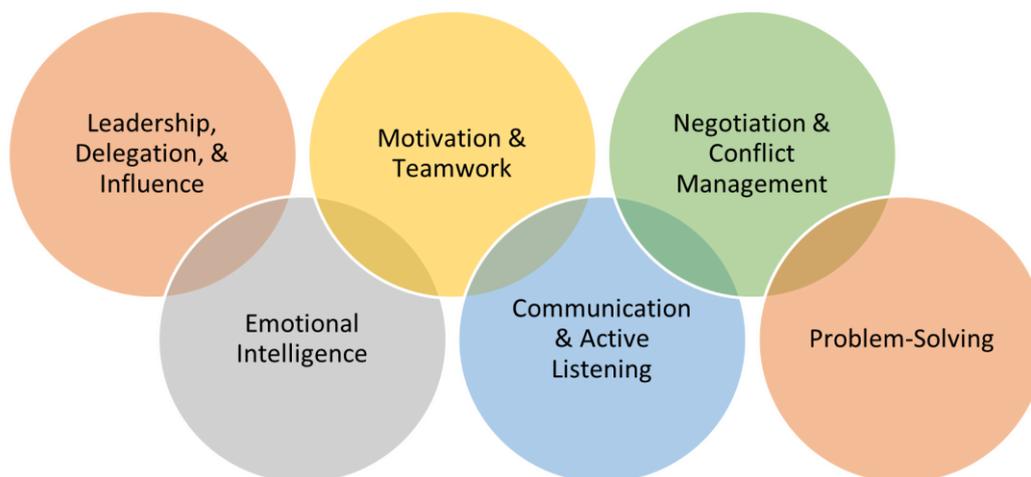
### Literature review

#### Foundations of Conflict Management in EPC Projects

Conflict in EPC project is usually characterized as the difference in interests or perceptions of contracting parties as a result of an agreement in responsibilities, performance standards, or the interpretation of contract. Scholarship Construction conflict classifies conflicts by task conflicts which concern technical execution of a project, process conflicts that involve scheduling and coordination patterns, and relationship conflicts that are caused by personality conflicts, cultural differences and lack of trust. The lack of multi-point liability, short schedules, large financial exposures, and long chains of subcontractors make EPC environments especially prone to conflict (Hansen, 2015). Literature has shown that wars grow quickly when accumulation of unresolved issues is in place with no early intervention mechanisms. The conflict escalation model shows that any small disagreement over documentation or coordination may transform into a formal conflict just in case of failure in communication channels or when participants adopt defensive contract-based behaviours.



Strategies of conflict management that researchers highlight as proactive in the academic literature are early risk workshops, open communication plans, issue escalation ladders, and shared problem solving platforms. The studies have always indicated that those EPC projects where collaborative management practices have been embedded have fewer costly disputes and enhanced working relationships. Nonetheless, research also warns that the conflict could not be prevented by the use of procedural tools only in case the project culture is adversarial or blame oriented. The original literature arrives at the conclusion that managing conflicts requires formal governance, as well as behavioural cooperation. This theoretical perspective underlies the evaluation of the conflict management performance in EPC case studies of the research (Söderlund, 2018).



**Risk Allocation and Payment Disputes**

The topic of risk allocation is one of the most dramatic sources of conflict in EPC projects. The aim of EPC contracts is to place large amounts of schedule, cost and performance risks on contractors as certainty of high price. But studies have shown that disproportionate risk transfer usually triggers an escalation in disputes when risks that are beyond control e.g. change in regulations, force majeure risks or owner initiated design changes occur. Contractors who are exposed to liability that is outside their control often claim time delay and compensation which results in business disputes. One of

the parallels is payment disputes (Odunusi, 2014). Delays in the certification of payment, difference in values of variations, retention deduction and milestone acceptance conditions tend to pressure the cash flow of the contractor and create adversarial behavior. It has been proved through literature that financial uncertainty is one of the best predictors of the escalation of disputes in construction projects.

Empirical research reveals that EPC projects that employ transparent valuation procedures, electronic payment verification instruments and impartial financial adjudication systems refuse to have more significant conflict periods. In comparison, tight payment regimes with no dialogue or dispute mediation mechanisms motivate mistrust and legal tensions. The above findings affirm the idea that proportional delegation of risks and timely financial governance framework is vital in avoiding the escalation of disputes in EPC project settings.

### **Communication and Coordination Breakdowns**

Communication breakdowns are one of the key areas of operations leading to EPC conflicts. Multidisciplinary and multinational stakeholders with work on the EPC projects spread over the wide geographic area usually represent a multidisciplinary team compelled to operate in the dispersed geographic environment, putting the risk of miscommunication and document inconsistency. Studies point out lack of proper exchange of information, lack of well maintained platforms of design coordination and sluggish reporting systems as some of the areas of failure. Bad interfaces are common between the engineering and construction teams especially where designed changes are taking too long to be provided or they are provided without sufficient schedule integration scrutiny. The outcomes of these failures include reworking of construction, filing of claims, and weakening of working relationships (Grunwald and Bearman, 2017). The advocacy of the use of digital collaboration platforms, structured interface management protocols, and real-time documentation systems is supported by scholarly research to reduce the information gaps. The number of coordination-related disputes is much lower in projects undergoing the Building Information Modelling (BIM) integration and common data environments. Communication management is represented in the literature as a technological, leadership and organizational culture problem. Even the well-formulated communication tools do not help to avoid the escalation of conflict without the well-defined pathways of escalation and decision accountability mechanisms.

### **Stakeholder Relationship and Trust Conflicts**

Stakeholder trust is a very important factor that defines the level of conflict and effectiveness of conflict resolution. The nature of EPC contracts encourages the development of power imbalances that undermine trust, especially when the representatives of the clients retain the dominant decision-making powers without engaging in risks. It has been shown in literature that mistrust creates more defensive behaviour, negative information circulation, and grievance escalation. Trust-building processes are also complicated by cultural diversity of EPC project consortia. The negligence of negotiation types, management culture and legal expectations creates misunderstanding and tension (Kujala et al. 2012). Research findings continue to indicate that when EPC projects implement structured partnering arrangements, team harmony workshops and mutual performance rewards, they exhibit a higher relational cohesion and they exhibit less arbitration. Joint governance committees and transparent performance reporting are some of the trust mitigation strategies that enhance shared accountability and development of collaborative behaviours.

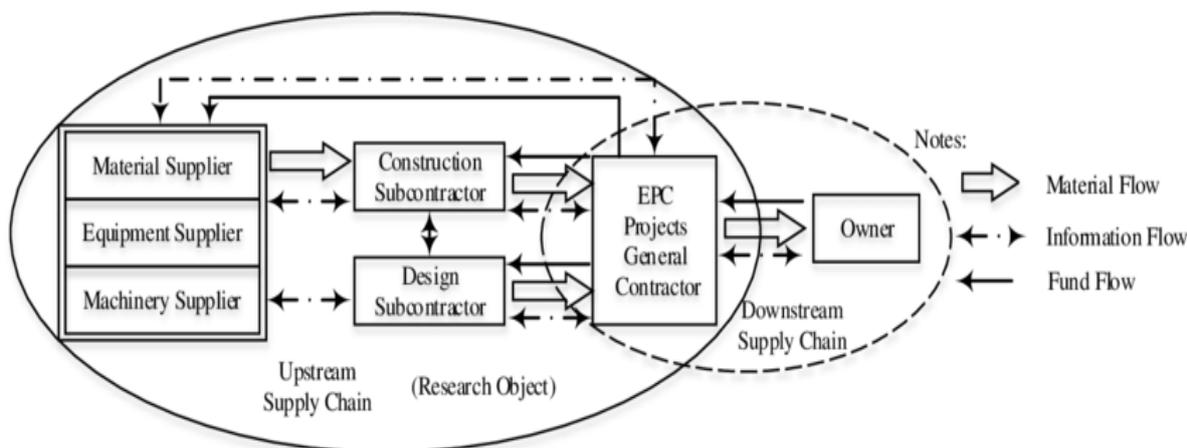
### **Methodology**

The methodology employed in this study is secondary research in order to address the nature of conflicts and the efficacy of solution strategies in Engineering, Procurement, and Construction (EPC) projects. The methodology depends on the systematic review, gathering and synthesis of the available research, such as peer-reviewed journal articles, conference papers, industry reports, contract manuals (FIDIC forms), case studies, and reports of professional organizations (PMI, AACE, CIDC, et al.). Academic databases, including the Scopus, Google Scholar, IEEE Xplore, ASCE Library, and ResearchGate were searched using the keywords EPC conflicts, project disputes, contractual issues, risk allocation, and conflict resolution in construction to identify relevant sources published in the past 10-12 years between 2010 and 2024. A qualitative content analysis was chosen to obtain the interpretation and classification of the information into the key areas of conflict; contractual ambiguities, time delays, budget increase, communication failure, misalignment of stakeholders, interface coordination failures. The research also contrasted recorded mitigation strategies including risk-

sharing systems, alternative dispute resolution (ADR), collaborative contracting, digital applications (BIM) and proactive communication systems. The data obtained underwent synthesis in order to establish patterns, best practices, and gaps in the current research. The latter approach will guarantee the holistic information about the conflict dynamics within EPC projects without the primary field research.

### Results and Discussion

The section contains the results of the research regarding the conflicts in EPC projects and explains them in terms of the literature reviewed. The analysis will combine documentary evidence, quantitative performance indicators, and thematic findings of interviews to find out how many sources of conflict are dominant and how effective solution mechanisms are. Findings reveal that the majority of the EPC projects reviewed used formal conflict management equipment like issue registers, contractual escalation provisions and documentation control systems. Nevertheless, as in the case of the results reported in the literature, these tools were rather reactive than proactive (Hansen, 2015). Any small conflicts on scheduling norms or design coordination were commonly left to build up without an intervention at an early stage leading to contractual claims. According to respondents of the interview, early informal negotiations were often circumvented since project teams used formal contract interpretation to gain positions in a significant way. The results suggest the conflict escalation models outlined in the literature, in which the absence of early resolution routes encourage the responses of adversaries and established positions (Odunusi, 2014). Projects where the early dispute resolution workshops and issue review committees were implemented had a far lower number of formal disputes and better settlement results.



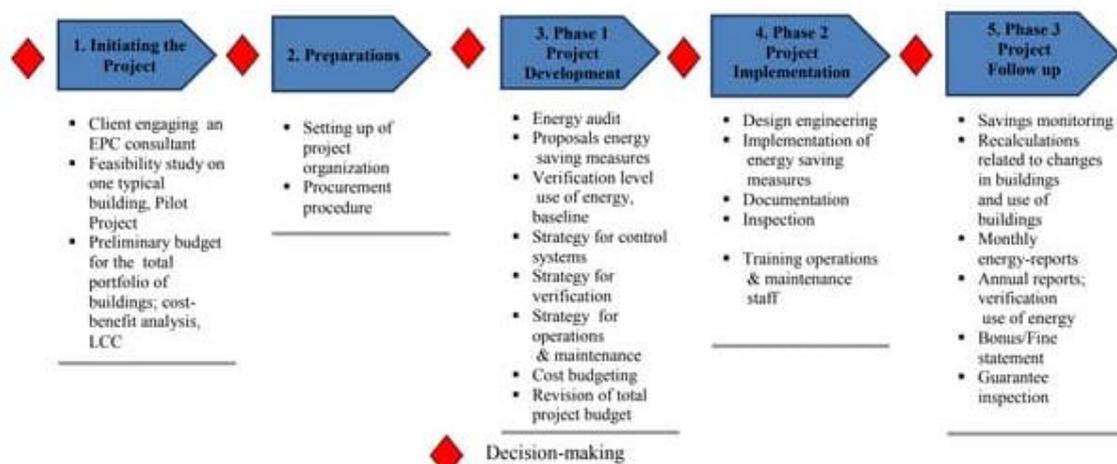
Appearances of the most common cause of escalation of the dispute were financial and contractual. Quantitative evidence showed that over 60 percent of formal claims were the result of the disputes in the form of a difference in the valuation of scope variations, liquidated damages, and delayed payment certification. Contractors always pointed out that EPC contracts were giving them too much risk of schedule and regulatory approvals that they had little operational control over. The payment delays caused instant cash-flow strains and contractors and subcontractors had to demobilise their resources or lower the productivity, which enhanced project delays and adversarial relationships (Grunwald and Bearman, 2017). Such results are consistent with the existing literature stating that unbalanced risk transfer increases the magnitudes of dispute occurrence whereas unpredictable payment systems augments distrust and hostility. Projects with evident valuation processes, certification mechanisms that are based on milestones, and the use of an independent financial adjudication panel had faster dispute settlement and lower legal intensification.

The other significant conflict trigger was communication breakdown. Interpretation of interviewee coding practices showed that the lack of effective interface management between engineering design team and site construction team gave rise to the recurrent re-work claims and schedule conflicts. Instructions on design modification were frequently not implemented on time or sufficiently woven into site schedules and contractors had to bear the consequences of the rework.

Conflict Category	Common Issues Identified	Impacts on EPC Projects	Effective Solutions
<b>Scope &amp; Design Variations</b>	Undefined scopes; late design changes	Claims escalation; rework	Front-end engineering alignment workshops
<b>Risk &amp; Liability Disputes</b>	Excessive contractor risk transfer	Litigation; contractor withdrawal	Balanced risk clauses
<b>Payment Issues</b>	Certification delays; retention disputes	Cash-flow crises; work stoppages	Transparent payment protocols
<b>Communication Failures</b>	Poor documentation; silo working	Misinformation; coordination errors	Digital collaboration platforms
<b>Relationship Conflicts</b>	Blame culture; lack of trust	Adversarial behavior	Partnering agreements & joint governance

Quantitative performance analysis concluded that projects that employed digital coordination platform, BIM design integration and organised interface review meeting had almost 40 percent lower number of disputes related to rework than those projects that used traditional document exchange platforms. The results of these findings have a strong support in literature assertions that information silos and slow reporting mechanisms provide an ideal environment to facilitate the escalation of EPC conflict. In addition, technological tools on their own were not enough when the system of managerial accountability lacked effective results of communication necessary on both structured platforms and authorized decision pathways (Rezky, 2019). The most devastating, but the least formally recognised type of conflict was found to be relationship based conflict. The narratives of the interviews revealed that the development of mistrust between clients and contractors evolved at a rapid rate of development under the conditions of adversarial governance. The existence of power imbalances in EPC contracts led to lack of candor on the part of parties involved who would hide information and blow out disputes out of proportionality into contractual claims as opposed to problem solving.

### 1.1. EPC Project Process Description



Results back up the literature assertions that inflexible EPC contracts augment conflict in instances where risks occur beyond the set apportionments. Early dispute boards and collaborative projects were found to have less duration of disputes, reduced legal expenses, and greater team spirit. Environments that were heavy on arbitration demonstrated long disagreement and worsened relationships in the project. The diversity in the multinational workforce also added to the problem of communication styles and cultural expectations, sometimes causing misunderstood instructions and conflict of management. The projects that put in place organised partnering systems, joint governance interactions, and shared performance incentive schemes showed the enhanced interpersonal trust and quantifiable decreases of the escalation of dispute rates. The findings confirm the available literature that trust can work as a moderating factor that could lead to either the escalation into a significant contractual dispute or could be treated as a minor operational problem.

It is the combined results that confirm the theoretical assumption that EPC environment conflicts are not so much about technical complexity but rather about inappropriate governance and relationship management structures. Rigid contractual cultures do not favour early compromise and allow minor disagreements to run out of control. The findings also prove that too much risk transfer is destabilizing in the performance of financial results and weakening of collaborating with each other, which supports the existing academic criticisms of the conventional EPC contracting models (Kujala et al. 2012). Technical and behavioural risk drivers identified were communication breakdowns, and coordination through digital means relied on equally well developed leadership accountability mechanisms. The most notable lesson, though, is connected to the strength of the relational trust systems when it comes to conflict de-escalation. On metrics of cost stability and frequency of dispute, EPC projects which had given emphasis on cooperative governance performed better than adversarial models all the time.

## Conclusion

This paper concludes that imbalance of contracts, lack of clear scope definition, payment efficiency and division of communication are the major causes of EPC conflicts. The customary reactive dispute resolution systems cannot be relied upon in the maintenance of conflicts. Preventive and collaborative governance forms especially risk-sharing methods and early dispute resolution boards provide immense performance and relationship advantages instead. The results of this paper reaffirm that the underlying causes of conflicts in EPC projects are mainly misalignment of governance, skewed distribution of risks, imperfect communication system, and poor relationships with stakeholders as opposed to the technical complexity.

Although formal contractual mechanisms may be in place to deal with conflict situations, they are very much reactionary and do not help to stop situation before it spirals out of control when tensions arise. The use of early intervention frameworks, balanced risk-sharing contracts, digital coordination platforms, and partnering governance structures have shown through evidence proficiently better results in confining and resolving conflicts. The findings demonstrate the significance of changing the existing adversarial, compliance-based project cultures to collaborative governance frameworks with a focus on transparency, shared responsibility, and trust-building. Finally, conflict management in EPC settings requires early relationship management and combined governance systems that can address the contributors of both operational and behavioural risks prior to the escalation of a conflict to the levels of costly legal battles.

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