DISPUTE EMERGENCE MECHANISMS FOR A LARGE INFRASTRUCTURE CONSTRUCTION PROJECT USING INDUCTIVE THEMATIC ANALYSIS

Matthew Arikosi Otim[1], Apollo Tutesigensi, PhD[2] and Harrison E Mutikanga, PhD, Eng.[3]

[1]Manager & Researcher, Uganda Electricity Generation Company Ltd. (UEGCL), P O Box 75831, Kampala, Uganda; email: matthew.arikosi@uegcl.go.ug (Corresponding author)

[2]Associate Professor in Infrastructure Project Management, School of Civil Engineering, University of Leeds, Leeds, LS2 9JT, UK; email: A.Tutesigensi@leeds.ac.uk

[3]Chief Executive Officer, Uganda Electricity Generation Company Ltd. (UEGCL), P O Box 75831, Kampala, Uganda; email: harrison.mutikanga@uegcl.go.ug

ABSTRACT

Construction disputes are widely regarded as detrimental to project delivery. While many studies have explored their causes, most tend to isolate discrete factors and overlook how disputes emerge from an accumulation of interrelated events, decisions and behaviours over time. Recent scholarship has called for more layered approaches to dispute causation, but empirical research that traces the interaction between proximate, intermediate and root causes within real project contexts remains limited. This paper addresses that gap by using inductive thematic analysis, facilitated by NVivo software for coding, theme identification and visualisation, to examine the emergence mechanisms of two major disputes in a single-case study of a large hydropower infrastructure project. Drawing on extensive secondary qualitative project data, the study reconstructs the chronological relationships among dispute causal factors and identifies their root causes. The findings reveal that causal factors, broadly categorised under poor contract, poor contract administration and poor contractor performance, were linked to breaches of professional responsibility, competence and integrity. The study contributes to ongoing discourse on dispute causation by demonstrating how professionalism-related lapses can escalate into disputes. It also highlights the value of inductive thematic analysis in uncovering layered mechanisms of disputes and offers practical insights for dispute avoidance in complex project settings.

PRACTICAL APPLICATIONS

This paper highlights how disputes in large infrastructure projects can emerge from accumulations of professionalism-related lapses across actors and time. Practically, it underscores the need for project stakeholders to focus on reinforcing professional responsibility, competence and integrity. Project owners and consultants should allocate sufficient time during early project phases to ensure contract clarity, particularly around scope, roles and procedures. Contractor prequalification should place greater emphasis on demonstrated technical competence and execution history. Additionally, building capacity in contract administration—for both client and contractor teams—can help address issues before they escalate. The paper also demonstrates the value of inductive thematic analysis as a tool for project dispute diagnosis. By systematically reviewing project documentation and reconstructing the chronological relationships among contributing factors, practitioners such as contract managers, auditors and dispute resolution boards can gain deeper insight into how disputes emerged and how similar patterns might be prevented in future projects. Embedding structured dispute resolution mechanisms—such as ADR—early in the contract framework further strengthens the capacity to manage disputes proactively.

AUTHOR KEYWORDS

construction contracts, construction disputes, dispute causes, large infrastructure projects, professionalism, thematic analysis

INTRODUCTION

Disputes in construction projects are widely regarded as inevitable, particularly in complex projects (Hardjomuljadi, 2020). These disputes are generally detrimental to a project, often interfering with the achievement of its objectives (Kisi et al., 2020; Ahmed and El-adaway, 2023). Nonetheless, disputes can be managed, minimised, or even avoided entirely—provided the events and conditions that lead to them are well understood (Tanriverdi et al., 2021).

Although a wide range of studies have examined construction disputes, most tend to identify isolated causal factors and treat them as discrete triggers. This framing often overlooks how disputes evolve from an accumulation of interrelated decisions, behaviours, and institutional dynamics over time. In response to this limitation, recent scholarship has called for more layered models of dispute causation—

those that consider the hierarchy of causes i.e. root causes, which are the origins or fundamental underlying factors; intermediate causes, which are the factors that stem from root causes and, in turn, lead to proximate causes, also known as triggers, which are the immediate factors that directly spark disputes—to reveal the interdependencies of the various causal factors (Viswanathan et al., 2020; Tanriverdi et al., 2021). However, empirical research that traces how these factors unfold and interact within real project contexts remains limited. This study addresses that gap by applying inductive thematic analysis to reconstruct the chronological and relational dynamics of dispute emergence in a large infrastructure project—an approach well suited to capturing decision-making and behavioural patterns over time and across institutional layers (Franz and Roberts, 2022).

The research from which this paper is derived explores the emergence mechanisms of major disputes in a single-case study of a large hydropower infrastructure project. We identify high-value and/or high-impact disputes based on cost (≥ USD 1 million) and/or schedule delay (≥ 1 year), and then trace the chronological relationships among the contributing factors. Then, we trace the chronological relationships among the disputes' contributing factors. By focusing on a comprehensive case study, the paper contributes to the existing knowledge by highlighting the layered and chronological interactions that produced major disputes in this particular context, as well as their root cause. The paper proceeds with a review of relevant literature, an overview of the adopted methodology, findings and discussion, and a conclusion.

CONSTRUCTION DISPUTES

Definition

The words 'disputes' and 'conflicts' have various definitions in literature and are often used interchangeably (Reid and Ellis, 2007). While specific definitions of disputes may vary, they generally revolve around the idea of a disagreement between parties requiring extra effort and resources to resolve. Similar to the definition in FIDIC (2017), this paper considers a dispute to arise when a determination made on a claim or assertion by one party regarding contract performance is formally rejected by the other party.

Causes of Construction Disputes

Disputes in construction projects can have several causes, as revealed by various studies. Rowlinson (2019) states that the seeds of dispute are sown when any of the parties engaged in a project feels dissatisfied and, according to Cheung and Pang (2013), construction disputes frequently arise due to conflicting interests between contracting parties. Other common causes include poor contracts, poor contract administration, changes in project scope, technical ineptitude of key stakeholders, poor communication, lack of collaboration, and opportunistic behaviour (Kisi et al., 2020; Viswanathan et al., 2020; Arcadis, 2021; Arcadis, 2022; Abdul Nabi and El-adaway, 2021; Wang et al., 2023). Moreover, it is said that early decisions on project delivery methods, procurement systems and contract types can affect the frequency and severity of disputes on projects (Hasanzadeh et al., 2018). Love et al. (2010) also suggest that disputes may ultimately be caused by lack of professionalism. The subject of professionalism has been covered by many authors, such as Hill et al. (2013), with various but related views on it, usually revolving around ethics, particularly the responsibility and accountability of professional bodies and individual professionals. Professionalism, as per APM (2019), is "the application of expert and specialised knowledge within a specific field and the acceptance of standards relating to that profession". Interestingly, whereas lack of professionalism is rarely explicitly mentioned as a cause of disputes, many of the known dispute-causing factors can be considered to be manifestations of lack of professionalism, such as incompetence, poor communication and opportunism, to mention but a few (Love et al., 2010; Otim et al., 2022).

Furthermore, research has shown that causes of disputes are typically multiple interacting factors rather than a single factor (Love et al., 2010; Abdul Nabi and El-adaway, 2021). However, most studies on the causation and manifestation of construction disputes present independent factors—conceptualising all these factors as immediate/proximate causes. This ignores the causal relationships between the different factors (Viswanathan et al., 2020; Tanriverdi et al., 2021), yet the proximate causes are often preceded by other layers of causes/factors, i.e. the intermediate and/or root causes. As suggested by Tanriverdi et al. (2021) and Viswanathan et al. (2020), there is lack of research that captures this

conceptualisation. This implies that the assertion in Love et al. (2010) that there is insufficient empirical evidence to support the various theories on dispute causation remains relevant.

Studies to that seek to understand the nuanced, layered and interrelated causes of disputes could harness inductive thematic analysis (ITA) as it enables a progressive interpretation of conditions, decision-making behaviours and events across time and institutional layers. Compared to other methods like grounded theory, which is aimed at theory generation, or structured content analysis, which often relies on quantifiable coding frames, thematic analysis enables interpretive flexibility while maintaining analytical rigor (Nowell et al., 2017). Studies such as Franz and Roberts (2022), which used Braun and Clarke's (2006) process to develop behavioural themes from qualitative interviews, helping to explain project team performance dynamics, affirm the method's value in construction-related research. Similarly, Kyalisiima et al. (2024) employed ITA to identify competence gaps as root causes of disputes in a complex project. Saseendran et al. (2020), while adopting a grounded theory stance, used inductive coding and thematic categorization to examine how specific contractual provisions influence dispute occurrence. These studies reinforce the value of ITA in highlighting layered relationships in construction contexts.

Management of Construction Disputes

Disputes are ubiquitous in construction projects (Wang et al., 2023), and their detrimental impact on project objectives underscores the need for efforts to mitigate or avoid them entirely. Proactive management is essential for addressing construction disputes (Alrasheed et al., 2023). To avoid or mitigate disputes, it is crucial to understand the events and conditions that cause them and be able to anticipate and predict their occurrence (Tanriverdi et al., 2021). Standard construction contracts typically include measures for dispute management. For instance, FIDIC (2017) prescribes the use of dispute avoidance/adjudication boards (DAAB), amicable settlements, or arbitration as suitable options. Similarly, El-Sayegh et al. (2020) suggest methods such as negotiation, risk allocation, early non-binding neutral evaluation, and partnering for dispute avoidance. For dispute resolution, they recommend negotiation, conciliation, mini-trials, arbitration, mediation, litigation, adjudication, and Dispute Review Boards. But ultimately, the ideal approach to construction dispute management is

rooted in prevention rather than resolution. Understanding the underlying causes of disputes is essential for implementing proactive dispute avoidance measures.

Construction Disputes and Large Infrastructure Projects

Large infrastructure projects—typically valued from hundreds of millions to several billion dollars—are characterized by significant public sector involvement, extended delivery timelines, complex decision-making structures and multiple stakeholder interfaces (Sheng, 2018). These features introduce high levels of risk and interdependence, making such projects especially vulnerable to conflict and disputes. Arcadis (2018) reports that infrastructure/public sector projects accounted for the highest number of construction disputes globally, underscoring the need for specific for more nuanced understanding of dispute drivers in such projects/environments. Moreover, scholars such as Othman (2013) note that in many developing and resource-constrained contexts, large infrastructure projects face additional challenges—including limited technical capacity, governance complexity, and socio-political pressures—that may further influence dispute risks. Recognizing these layers of complexity provides a richer foundation for analysing how disputes emerge in such projects and highlights the value of context-sensitive analytical approaches.

Framing the Research Gap

Although recent scholarship has emphasized the need to understand disputes through layered causation models, research on this remains limited (Viswanathan et al., 2020; Tanriverdi et al., 2021). In particular, few studies have examined how proximate, intermediate, and root causes interact over time to shape the emergence of disputes in complex projects. This study addresses that gap by applying inductive thematic analysis to reconstruct the chronological and relational sequence of dispute-fostering factors in a large infrastructure project.

METHODOLOGY

The research was a cross-sectional qualitative study that adopted a single case study strategy and an interpretivist philosophy, using thematic analysis to examine dispute emergence. Interpretivism seeks to generate descriptive theory to provide new and deeper understanding/interpretation of particular or

categorical phenomena and contexts (Hallebone and Priest, 2009; Saunders et al., 2016). It is inherently subjectivist as it entails looking at the different perspectives with an emphasis on multiple interpretations, depth and creating meaning (Saunders et al., 2016). This approach is well-suited to the research goal of exploring how disputes emerged through context-specific processes, decisions and interactions.

The Case Study

The single case study selected was a large hydropower infrastructure project located in Uganda, delivered under a bespoke Engineering, Procurement and Construction (EPC) contract, based on the FIDIC Silver Book (FIDIC, 2017). The project adopted a Principal-Agent governance approach involving three main actors: the Employer (comprising the responsible government ministry and a state-owned implementing agency), the Project Manager (appointed as the Employer's representative), and the EPC Contractor (tasked with the design and construction of the project). The contract was effective in 2015, with construction works lasting 47 months until substantial completion was achieved in 2019 and the Employer took over the facilities, signalling the start of the Defects Liability Period (DLP). The total cost of the project was over USD 500 million, with 85% financed through a bilateral loan from China and the remaining 15% contributed by the Employer. The EPC Contractor was a Chinese state-owned corporation. These characteristics of the project align closely with China’s Belt and Road Initiative (BRI) model, particularly in terms of sovereign-backed lending, contractor nationality and project scale (Han and Webber, 2020; Bega and Lin, 2024). For additional context, the construction industry in Uganda—based on the Construction Capacity Framework (ICED, 2018)—can be described as underdeveloped and relatively young, with local contractors generally lacking the technical capacity to deliver complex infrastructure projects.

A single case study was selected due to the need to focus on and understand specific disputes in a large infrastructure project to map their mechanisms of emergence, since a case study allows for such a detailed investigation of a topic or phenomenon (Yin, 2014). The project for the case study was chosen due to its complexity, significant economic impact and the involvement of multiple and diverse stakeholders. These are conditions known to be conducive to disputes. On top of being one of the

flagship large infrastructure projects in Uganda in the 2010s, the project was also a convenient choice due to its accessible data. In such case study research, the goal is not statistical generalisation but rather theoretical (analytic) generalisation (Yin, 2014); hence, we seek to offer insights that could inform or resonate with other contexts.

Data Collection

The case study from which the findings in this paper are derived principally relied on secondary data. This was obtained from a collection of 159 project letters, 15 progress reports, 13 expert review reports, 8 contract documents, and 11 sets of minutes of meetings, all adding up to over 8,000 pages. The selection of the relevant documents was purposive, focusing on the major disputes, i.e. disputes considered to be high-value and/or high-impact from the data. This was determined by their effect on the project's cost and schedule performance, i.e. those involving at least one million US Dollars and/or impacting the schedule by at least one year. All data on the chosen disputes were acquired through reference-tracking to retrieve the relevant documents. However, research of this type requires the consideration of important ethical issues, including confidentiality of data collected, anonymity of participants and informed consent (Saunders et al., 2016). As such, considering participant preferences, most data are presented anonymously in this paper. Whereas we identified three major disputes in the case study, we report on only two of them in this paper. The third major dispute—the first extension of the project's defects liability period—is reported in Otim et al. (2022).

Data Analysis

The data collected were analysed reflexively through inductive thematic analysis (ITA). ITA was selected due to its flexibility and capacity to identify patterns and themes that are strongly linked to the data themselves, without trying to fit the data into a pre-existing coding frame or the researchers' analytic preconceptions (Braun & Clarke, 2006). This made it particularly suitable for analysing the large qualitative datasets (Saunders et al., 2016; Nowell et al., 2017) i.e. the complex, text-based project documentation available in this case. It also aligns with this study's interpretivist stance, which emphasises subjective construction of meaning through participants' decisions and records (Braun et al., 2019; Saunders et al., 2016). The thematic analysis involved familiarisation with the data collected,

coding the data, identifying emerging themes (dispute causes/factors) and relationships among the codes, and then refining the themes. Familiarisation with the data began with a thorough review and transcription of relevant documents. This involved reading and re-reading the data to identify initial meanings, recurring themes, and patterns. This immersion process continued throughout the research project, ensuring a deep understanding of the data.

Data Coding

The coding process was carried out using NVivo (Release 1.6.2), a computer-aided qualitative data analysis software (CAQDAS). Coding involved categorizing data with similar meanings and labelling each unit of data with descriptive codes. These codes represented various factors contributing to disputes, such as technical issues, management practices, and stakeholder interactions. Codes were derived from the terms used in the data (in vivo codes), researcher-developed labels, and existing theory (a priori codes). This process helped manage the large qualitative data set, making each piece of data accessible for further analysis. Throughout the coding process, memos and annotation tools in NVivo were utilized to capture insights, reflections, and observations. Memos provided a space to document thoughts on emerging themes and their potential interconnections, while annotations allowed for detailed notes directly on the data, facilitating a deeper engagement with the content.

Identifying Themes and Relationships

Following the coding, the search for themes and patterns began in earnest. This involved examining the long list of codes to identify broader categories or themes that were relevant to the research objective. NVivo's querying tools, such as word frequency and matrix coding queries, were utilised to identify common terms and explore the relationships between themes. To aid in the exploration and illustration of the data, various visualisation tools in NVivo were employed. Maps were used to visually represent the spatial relationships between different themes and codes, while hierarchy charts provided a structured view of the relationships and nested themes, helping to clarify their organisation and layering, especially chronologically. Explore diagrams (an NVivo visualisation tool) facilitated examination of connections and interactions between different themes, offering a dynamic way to understand the data's complexity.

Refining Themes

The identified themes were refined iteratively to ensure they represented the data accurately. This involved re-reading the coded data and evaluating the relationships between themes. It also involved testing propositions to develop a coherent set of themes. Some themes were combined, separated, or discarded based on their relevance and the strength of the data supporting them. This iterative process ensured that the final themes provided a well-structured analytical framework for further analysis.

Trustworthiness

Trustworthiness is a crucial aspect in qualitative research, such as the research from which this paper is derived. A well-established framework for enhancing trustworthiness is presented in Stahl and King (2020), which considers four key criteria: credibility, transferability, dependability and confirmability. Credibility, which concerns the congruence of findings with reality (Stahl and King, 2020), was achieved through triangulation across multiple data sources—including meeting minutes, internal memos, correspondence between stakeholders, consultant reports, and contractual documentation. This is consistent with the strategies recommended by Nowell et al. (2017), Korstjens and Moser (2018) and Ahmed (2024), allowing cross-verification and substantiation of findings from different perspectives. To ensure transferability, aimed at ensuring replicability (Stahl and King, 2020), detailed descriptions of the project context, decision environment and stakeholder structures were provided. This enables one to assess the relevance of the findings to similar settings, as put forward by Nowell et al. (2017), Korstjens and Moser (2018) and Ahmed (2024). In line with recommendations by the same scholars, dependability—which seeks consistency and reliability of findings (Stahl and King, 2020)—was enhanced through an internal peer review process. The researchers independently reviewed the theme development process, coding structure and supporting evidence for the emerging themes, thereby promoting methodological transparency and accountability. Finally, confirmability, which addresses the objectivity and neutrality of research findings (Stahl and King, 2020), was ensured by maintaining an audit trail through reflexive journaling and annotations in NVivo, which documented the analytic decisions made during theme refinement, maintaining a connection between data and findings. Additionally, the data used were archival project documents generated independently of the research

and, therefore, free from author influence and bias. These practices are consistent with best-practice recommendations for enhancing confirmability (Nowell et al., 2017; Korstjens and Moser, 2018; Ahmed, 2024).

FINDINGS AND DISCUSSION

Reflexively considering the two disputes covered in this paper and their respective dispute-fostering factors, the overarching, inductively-derived finding—as emerged during analysis—is that the fundamental causes of the disputes are linked to and/or rooted in professionalism—or lack thereof. Further to Otim et al. (2022), this demonstrates and reinforces the role of lack of professionalism in causing multiple and independent disputes in a project, aligning with the assertion of Love et al. (2010) that *lack of professionalism* may ultimately manifest as a dispute. In this case study, we consider professionalism under three basic tenets/pillars: (1) *competence* - bearing relevant knowledge and expertise for any work undertaken; (2) *integrity* - being honest, objective, impartial, and true to moral values; (3) *responsibility* - acting with skill, care and diligence. The contravention of the tenets of professionalism—competence, responsibility and integrity—seems to have initiated or, at least, catalysed the series of factors that culminated in the case study's major disputes, as illustrated in the following disquisition on the disputes and the series of factors leading up to them.

Dispute #1: Modification of a Major System

34 months after the case study project's takeover by the Employer, the Project Manager made a determination on some installations and systems that the Employer was dissatisfied with and rejected. The Employer was calling for their replacement or modification at the Contractor's cost. The Contractor raised a notice of dissatisfaction with the determination. This formally gave rise to disputes over the respective installations and systems in question. The mechanism of only one of these disputes is presented hereafter: a dispute over the modification (redesign) of a major mechanical system in the facility.

At the time of the study, this dispute was still unresolved and was the subject of negotiations. The Contractor insisted that the major system met the Employer's functional requirements and that, even if

a modification could be done, it would have to be through a change order at the Employer's cost. Ultimately, the proximate cause of the dispute was found to be the system not being fit for purpose, as expressed by the Employer. Fig. 1 presents the mechanism of the dispute, illustrating the chronological relationship of the factors that led to its emergence, as per the data analysis. Table 1 highlights typical examples of evidence used to identify the various dispute-fostering factors.

System Not Fit for Purpose

The major system was deemed to be not fit for purpose by the Employer because, at its installed location, it was found to be extremely difficult to access safely. This meant that it was very challenging to maintain. Further, some unexpected failures of the system were experienced during the operation of the facility during the defects liability period (DLP). These failures necessitated shutdowns for their rectification. The system, according to the Employer, needed to be modified by relocating it to a more accessible part of the facility, which was what was prescribed in the system's original design.

Following the Contractor's proposal, the original design of the system had been changed early in the project during the review of the project's basic design. Change proposals are usually meant to be value engineering proposals, yet this particular change later turned out to be an *unnecessary design change* as the new design proved to be inferior to the original one. The project's contract did specify that any change proposed by the Contractor should be necessary or desirable to improve the quality, efficiency or safety of the facilities. However, this particular change did not meet that condition, as was later discovered.

Since the unnecessary change meant that the Contractor realised a cost-saving, it could be put down to self-serving *opportunism* by the Contractor—a contravention of the integrity tenet of professionalism. On the other hand, the unnecessary change in design could be attributed to the *incompetence* and/or *negligence* of the then Project Manager. This is because the Project Manager was responsible for scrutinising the Contractor's proposal and advising the Employer to reject or approve it, as per the project's contract. It is not unreasonable to expect a consultant (the Project Manager), procured for their experience and expertise, to identify the weaknesses and potential downsides of the Contractor's

proposed changes. Incompetence and negligence contravene the competence and responsibility tenets of professionalism.

The change in the major system's design also exposed a *weakness in contract administration* since the change procedure stipulated in the project's contract was not adhered to. The contract stipulated that upon receipt of the change proposal from the Contractor, and after mutual agreement between the parties on all matters therein contained, the Employer would—if they intended to proceed with the change—issue the Contractor with a Change Order within 14 days after such agreement. In the case of the major system in question, no such Change Order was issued, and the Contractor executed the design change based on the agreement reached in the basic design review meeting. This oversight would later create doubt and discussion over the legality and validity of the design change. Ultimately, this oversight/weakness in the administration of the contract can be attributed to *negligence* of the Project Manager and the project management team, who should have been conversant with and enforced the change procedure in the contract—a contravention of the responsibility tenet of professionalism.

Figure 1 summarises and presents the chronological flow of Dispute #1's causal factors, and **Table 1** (with factors listed in reverse chronological order) then provides typical supporting evidence for each factor. The dispute causal factors in the figures and tables in this paper are labelled in a "number-letter-number" alphanumeric format. Using label 1A-6* for illustration, the number 1 is the dispute's number (dispute #1), the letter A denotes the immediate/proximate causal factor of the dispute, and the number 6 shows that this is the sixth factor preceding the proximate factor, A in dispute #1's mechanism. The asterisk (*), however, denotes a dispute's root cause i.e. factor 1A-6* is a root cause of dispute #1. Meanwhile, the chronology of the factors is shown relative to time T (when the Employer took over the facility). The italicised font represents analyst-inferred factors, and the regular font represents data-derived factors.

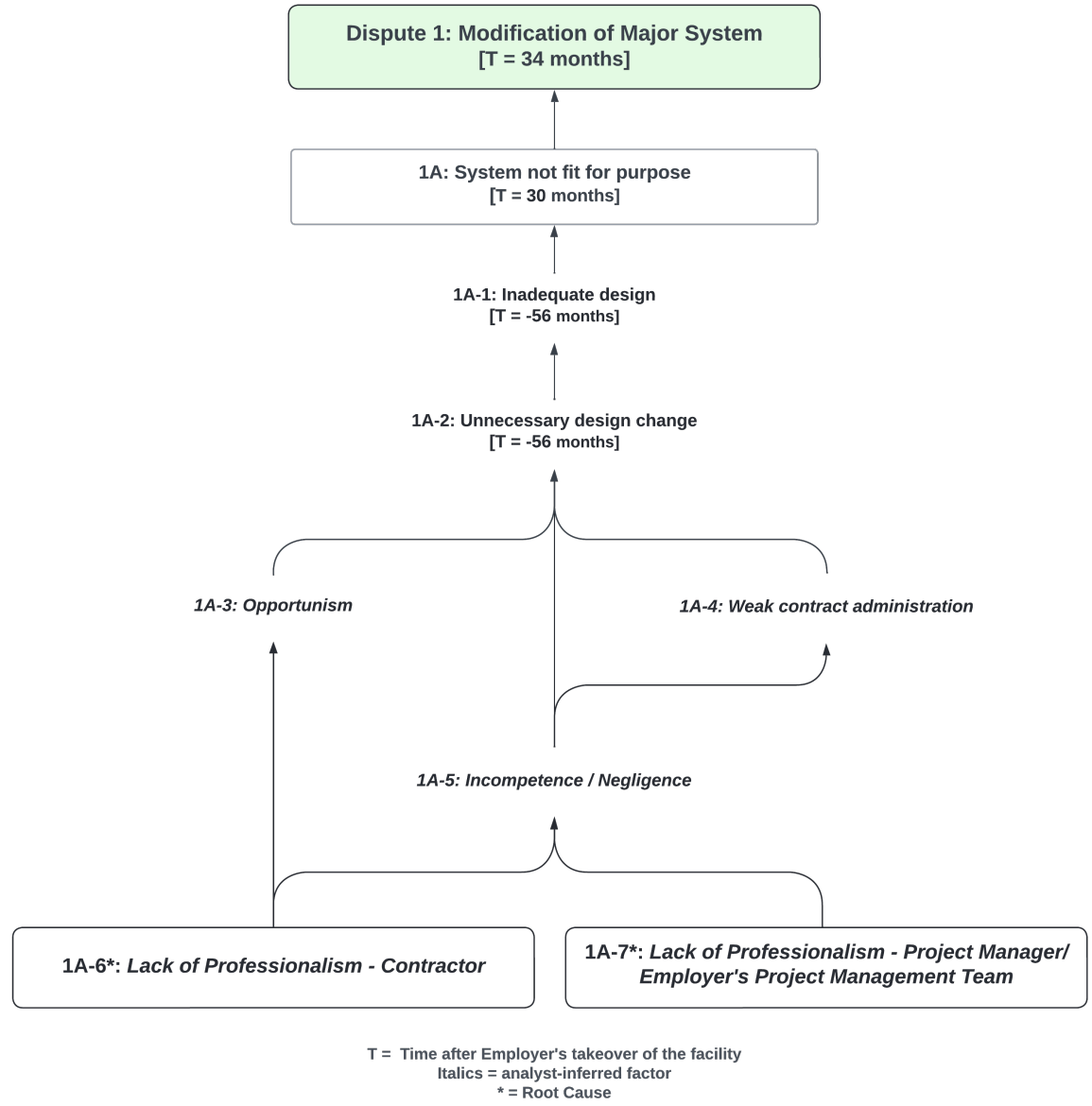

Fig. 1. Mechanism of Major System Modification Dispute

Table 1. Typical Evidence of Dispute #1 Causal Factors (listed in reverse chronological order)

Causal Factor	Typical Evidence from Data
1A	Owner's letter to the Contractor: "… the current system is unfit for purpose and does not meet the functional requirements." [T=27 Months]
1A-1	Owner's letter to the Contractor: "… the system has created fundamental maintenance challenges as a result of defective design and poor installation …" [T=27 Months]

1A-2	Owner's report: "… the Employer has rejected this system and the Contractor has to revert to what was originally specified …"
1A-3	Owner's letter to the Contractor: "Despite there being no approval by the Employer for these changes, the Contractor supplied and installed the system …" [T=27 Months]
1A-4	Owner's letter to the Contractor: "… the documentation for the change order was not provided … the Employer as mandated by the EPC Contract did not approve the design …" [T=27 Months]
1A-5	Contractor's letter to the Project Manager: " … based on the aforementioned correspondence between the Contractor and the OE/Employer, we understand that the system was approved …" [T=29 Months]
1A-6*	Basic tenets of professionalism were breached in 1A-3 and 1A-5
1A-7*	Basic tenets of professionalism were breached in 1A-5

Dispute #2: Further Extension of DLP

Towards the end of the DLP—which had already been extended by one year—the Employer yet again raised a claim for a further 12-month extension when they anticipated the Contractor's failure to complete all the outstanding works and close out all the defects on the project on time. The extension would allow for the completion of outstanding works, rectification of defects, and observation of newly completed works. The Project Manager's ensuing determination, after the requisite consultations, was for the DLP to be extended by a further 12 months. This was on account of the long outstanding works, long notified defects and emerging defects affecting the facility. The Contractor gave notice of their dissatisfaction with that determination, officially giving rise to a dispute, as per the contract. The immediate causes of this dispute were revealed to be delays in completing works and differences in contract interpretation. Fig. 2 presents the mechanism of the dispute, while Table 2 highlights typical examples of evidence used to identify the various dispute-fostering factors.

Delays in Completing Works

During the negotiations for the first/preceding DLP extension of 12 months, the Contractor, among other agreed positions, committed to complete the outstanding works (including defects rectification) within the first 6 months of the extension. This was meant to allow the Employer time to observe/monitor the completed works for acceptable performance. It was also agreed that the Contractor's failure to uphold that commitment would warrant a further extension of the DLP by a period equivalent to the delay. As it happened, the Contractor failed to uphold that commitment as the outstanding works were not completed within the agreed time. The Contractor mainly attributed that failure to 3 factors: non-payment by the Employer, slow action of the Project Manager (in reviewing and approving submitted documentation) and delayed/inadequate access to the facility.

Non-payment of the Contractor:

During the negotiations for the first DLP extension, it was also agreed that a payment (USD 15 million) would be released to the Contractor. The payment was contingent upon the complete rectification of some defects. As it turned out, this payment was not certified due to disagreement over the completion status of milestones attached to it i.e. *incomplete milestones/works*. This *non-payment of the Contractor* reportedly created *cashflow challenges* for them. Consequently, the Contractor struggled to support their activities, effectively stunting the completion of outstanding works.

Slow action of the Project Manager:

The Project Manager was notably late in reviewing and approving document submissions by the Contractor, including as-built drawings and operation/maintenance manuals, which were listed among the Contractor's outstanding obligations. This, naturally, slowed the progress of works (hitting milestones/completing works). The slow review/approval of the Contractor's submissions was partly attributed to the *low quality of the documents,* necessitating a lot of restructuring and editing. This was put down to a *lack of quality assurance* by the Contractor in preparing those documents—a contravention of the responsibility and competence tenets of professionalism. The Project Manager's

slow action was also ascribed to *insufficient staffing* to review/approve submitted documents as well as inspect executed works.

Delayed/inadequate access to the facility:

The Employer was contractually required to afford the Contractor all necessary access to the facilities and the site to enable the Contractor to perform their obligations under the contract. The Contractor, however, accused the Employer of failing to grant them adequate and timely access to the facility to complete works. With the facility in operation, it was not always readily accessible to the Contractor, as it would mean temporarily halting the Employer's operations and revenue generation by extension. Access, therefore, needed to be requested and approved in advance of any works in parts of the facility under operation. Delays in issuing work permits for the Contractor to access the facilities, as well as delays in shutting down the required facilities, affected the planned activities. When access was granted, however, *inadequate resource deployment* by the Contractor meant that, often, works could not be completed in time, nonetheless. The Project Manager pointed out the Contractor's *sluggishness and underutilisation of the time* they were given to perform and complete scheduled tasks, especially due to *poor planning and preparation for activities/works*—a contravention of the responsibility tenet of professionalism. This record also contributed to the Employer's reluctance to consistently grant access when requested.

Differences in Contract Interpretation

The Contractor contested the Project Manager's determination on a further DLP extension as they believed that the contract was misinterpreted. They, for instance, insisted that the DLP was a period for notification of defects and not necessarily for rectification of all the notified defects since any notified defects could still be addressed after the DLP had ended. The Contractor was, therefore, strongly opposed to extending the DLP on account of the unrectified defects. This position was derived from their interpretation of the contract clause that stated that "*In order that the facilities and the contractor's documents, shall be in the condition required by the contract by the expiry date of the Defect Liability Period or as soon as practicable thereafter, the Contractor shall: (a) complete any work which is outstanding on the date stated in the Taking-Over Certificate, within such reasonable time as is*

instructed by the Project Manager, and (b) execute all work required to remedy defects or damage, as may be notified by (or on behalf of) the Employer on or before the expiry date of the Defects Liability Period for the Facilities." The Contractor expressed that the addition of "*as soon as practicable thereafter*" gave them room to complete outstanding works and rectify defects after the DLP.

In another instance, the Contractor stressed that the requirement for an observation period for completed works stated in the Employer's claim did not have a contractual basis and could not justify a further DLP extension. Interestingly, however, the agreement that the Contractor would complete works within 6 months to allow for observation/monitoring, and a further extension of DLP in case of any delay, was recorded in the negotiation minutes that became part of the addendum to the contract through which the DLP was initially extended by 12 months. Furthermore, the Contractor argued that they were effectively relieved of their commitment to complete works within 6 months of the initial DLP extension when the Employer failed to meet their obligations as agreed in the negotiation meeting for the DLP extension i.e. certifying and effecting payments for "completed" milestones and granting access to the facilities when needed. This selective interpretation of the contract can be put down as *manoeuvring*—a contravention of the integrity tenet of professionalism—since, according to Clegg (1992), the *ambiguity of contracts* often poses challenges as they require interpretation that is inevitably shaped by bias, interests, and the limited knowledge of the interpreting party. The selective interpretation could, therefore, also be attributed to *ineptitude in contract interpretation*—a contravention of the competence tenet of professionalism.

Figure 2 summarises and presents the chronological flow of Dispute #2's causal factors, and **Table 2** (with factors listed in reverse chronological order) then provides typical supporting evidence for each factor.

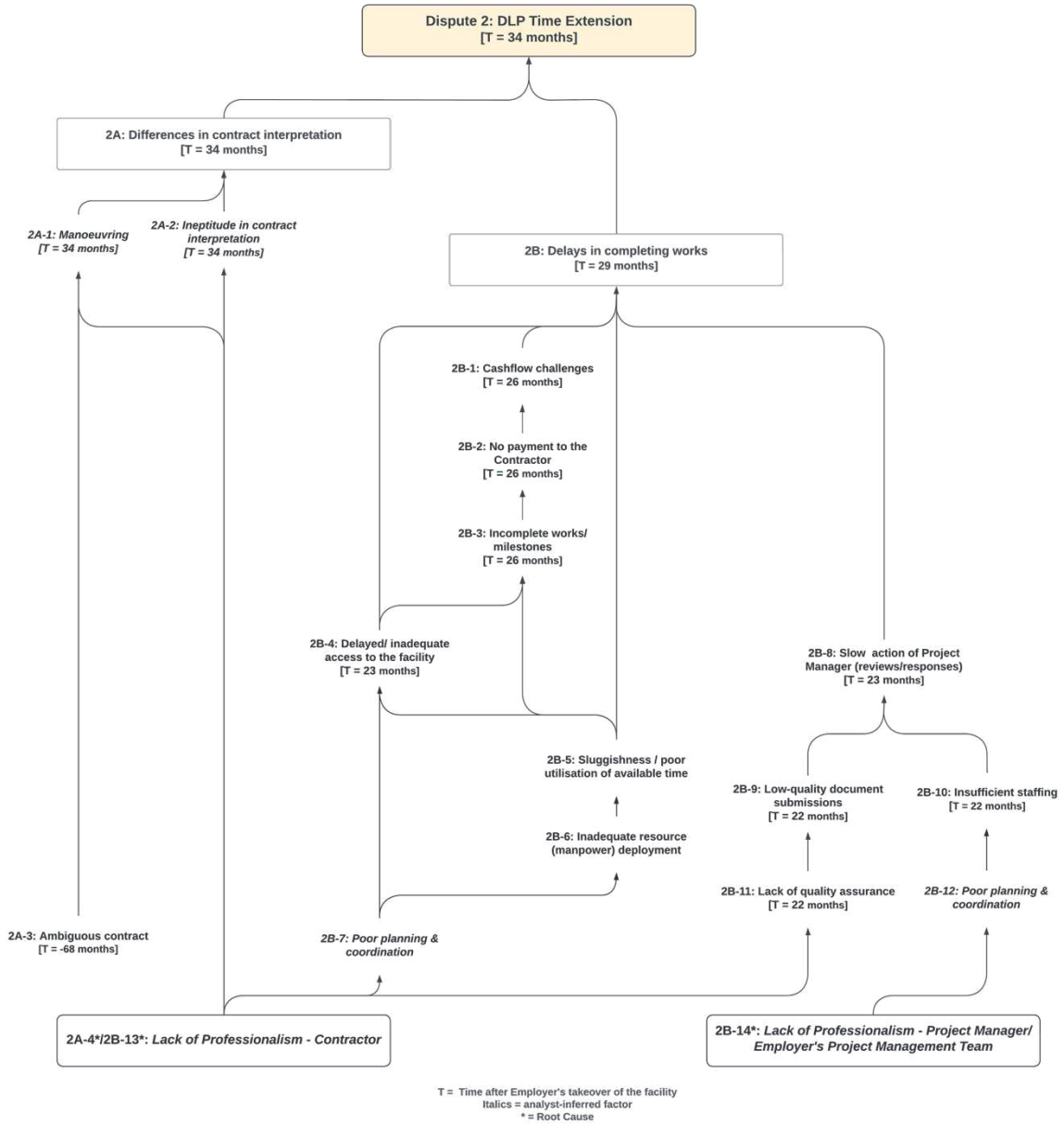

Fig. 2. Mechanism of DLP Time Extension Dispute

Table 2. Typical Evidence of Dispute #2 Causal Factors (listed in reverse chronological order)

Causal Factor	Typical Evidence from Data
2A	Project Manager's report: "EPC Contractor has disputed the proposed further extension of DLP as having no contractual basis." [T=34 Months]

2A-1	Contractor's letter to the Project Manager: "… completion of snags was a conditional commitment subject to the payment of USD 15 million by the Employer, hence the target date is no longer valid …" [T=31 months]
2A-2	Contractor's letter to the Project Manager: "… the Project Manager's interpretation … is biased, unfair and prejudiced, which cannot be accepted." [T=31 months]
2A-3	Inferred from the differences in contract interpretation as presented for 2A and 2A-1
2B	Employer's letter to the Contractor: "… snags documented at the time of issuance of the taking over certificate have not been fully addressed to date…it is evident that these cannot be completed by the expiry of the current DLP" [T=31 Months]
2B-1	Contractor's letter to the Project Manager: "… the resulting lack of Contractor's cash flow … has caused and worsened delays on all outstanding works." [T=31 months]
2B-2	Contractor's letter to the Project Manager: "… the Employer has failed to honor his commitment and pay the certified amount ... the delayed payment was supposed to be utilized towards the outstanding works …" [T=31 months]
2B-3	Owner's statement in DLP extension negotiation meeting: Whereas the Contractor stated that payment was not certified, payments were certified for the completed milestones, in accordance with the contract. "No further payments will be certified" [T=32 months]
2B-4	Contractor's letter to the Project Manager: "… delay in issuance of work permits … directly affected the planned activities." [T=31 months]
2B-5	Project Manager's letter to the Contractor: "... it has been observed that the Contractor's workforce is lax, and the working hours do not optimize the outages/access." [T=31 months]

2B-6	Project Manager's letter to the Contractor: "… In some cases, the workforce is not optimal. ... the teams are clearly inadequate to complete the works by the scheduled date…" [T=31 months]
2B-7	Project Manager's presentation: "The Contractor previously submitted Implementation Schedules which have not been followed." [T=23 months]
2B-8	Contractor's letter to the Project Manager: "… the Project Manager's failure in timely discharging the responsibilities … caused delays ..." [T=30 months]
2B-9	Project Manager's letter to the Contractor: " The long reviews of these documents have been necessitated by their poor quality at submission." [T=31 months]
2B-10	Contractor's letter to the Project Manager: "… the Project Manager's failure in timely discharging the responsibilities due to insufficient staff for granting approvals, site inspections … caused delays." [T=30 months]
2B-11	Project Manager's letter to the Contractor: " Our detailed comments on each document … demonstrate a lack of quality assurance by the Contractor in preparing these documents." [T=31 months]
2B-12	Inferred from the insufficient staffing in 2B-10
2A-4*/ 2B-13*	Basic tenets of professionalism were breached in 2A-1, 2A-2, 2B-7 and 2B-13
2B-14*	Basic tenets of professionalism were breached in 2B-14

Professionalism (or a lack thereof)

While professionalism is commonly perceived as a straightforward concept with well-known benefits, our analysis of the two disputes reveals that its tenets and values were not consistently upheld in the case study. This challenges the assumption that professionalism is a given, highlighting the need for deliberate measures to establish and institutionalise its principles in the construction industry. Ensuring adherence to professionalism can serve as a remedy for disputes arising from its absence. To foster professionalism in construction projects, it is crucial to recognise and reward professional behaviour,

implement consistent punitive measures for unprofessional conduct, and mandate the affiliation of key project roles with recognised professional bodies. These bodies can oversee and vouch for the knowledge, skills, and conduct of professionals, which is especially important in projects involving international participants whose competencies may be challenging to verify. They can also call out any unprofessional conduct of their members and/or sanction them. This could ultimately act as a deterrent to the contravention of the tenets of professionalism.

Furthermore, our analysis shows that a lack of professionalism in the case study manifests in three broad areas/categories: (1) poor contracts—primarily due to ambiguity in the contract documents, (2) poor contract administration—mainly due to complacency or incompetence, and (3) poor quality of contractors—resulting in non-conforming or defective works. Addressing these areas may provide short- to medium-term interventions against dispute emergence, alongside the longer-term goal of institutionalising professionalism in project delivery. As such, several recommendations can be made to enhance contract clarity and administration. First, to improve contract quality and reduce ambiguity, it is critical to allocate adequate time during early project phases for detailed scope planning and contract clarification to ensure alignment of expectations (Maemura et al., 2018). Second, building capacity in contract administration is equally important, as it has been identified as one of the most critical factors in dispute avoidance (Arcadis, 2018; Zhu and Cheung, 2020). Third, since recurring contractual conflicts have been linked to inadequate contractor competence (Maemura et al., 2018), contractors' technical capabilities should be carefully evaluated during the early stages—particularly at the bidding or prequalification stage—to reduce performance-related and dispute risks (Abdul-Nabi & El-Adaway, 2021). Appropriate prequalification criteria are necessary to ensure that only competent, trustworthy and experienced contractors are selected. This responsibility falls within the scope of procurement strategy, which Hasanzadeh et al. (2018) identify as one of the early owner decisions most influential in dispute prevention. Finally, proactive risk management and formal dispute resolution mechanisms are essential. Integrating ADR methods—such as mediation, arbitration, or adjudication—early in the contract structure is encouraged (Kisi et al., 2020), as doing so helps address emerging disputes before they escalate.

CONCLUSIONS

This paper set out to examine the mechanisms through which disputes emerge in complex infrastructure projects by applying inductive thematic analysis to a document-based case study. Through a layered, chronological causal reconstruction of two major disputes in the case study project, the analysis revealed that the proximate and intermediate factors, which manifested in three broad areas: poor contracts, poor contract administration and poor quality of contractors, were linked to breaches of the basic tenets of professionalism: competence, responsibility and integrity. These findings suggest that dispute emergence should not be understood simply as a result of contractual violations or isolated project failures, as they may be the cumulative outcome of professionalism lapses across multiple actors and decision points. This supports a more behavioural and systemic interpretation of causation in construction disputes. The study also illustrates the value of inductive thematic analysis and chronological mapping in revealing interrelated, layered causes of disputes.

While the primary aim of the paper is explanatory, the findings offer practical implications. First, to improve contract quality and reduce ambiguity, it is essential to allocate adequate time during early project phases for detailed scope planning and contract clarification to ensure alignment of expectations. Second, strengthening contract administration is equally important, as it has been identified as one of the most critical factors in dispute avoidance. Third, contractors' technical capabilities should be carefully evaluated during prequalification or bidding to reduce the risk of disputes stemming from performance failures. Finally, proactive risk management and structured dispute resolution mechanisms are essential, and integrating ADR processes early in the contract framework can help address emerging disputes before they escalate.

However, this study is subject to some limitations. First, it is based on a single-case analysis, which limits the generalisability of the findings. However, the intention of the study was not statistical generalisation, but analytical insight transferable to similar project contexts. Second, the interpretivist and qualitative nature of the study means that the analysis is shaped by the researchers' interpretive lens, i.e. how the researchers frame, code and thematise the data. While trustworthiness was enhanced through data triangulation, reflexive journaling and internal peer review, the findings remain context-

specific. Future studies could apply the framework across multiple cases or combine it with interview-based data to build a broader theory or explore sectoral variation in dispute emergence.

Ultimately, this study responds to a gap in the construction disputes literature: while layered causation models have gained attention, few studies have traced how proximate, intermediate and root causes unfold and interact over time to produce formal disputes in complex infrastructure projects. By using inductive thematic analysis to reconstruct these chronological and relational dynamics, the paper shows how disputes emerge from accumulations of professionalism-related lapses. This can help project stakeholders recognise and respond to early warning signs, such as contract ambiguity, procedural drift or competence gaps, before these issues escalate into disputes. The findings, therefore, contribute to both scholarly discourse on dispute causation and to ongoing efforts to promote more proactive dispute avoidance in project delivery.

DATA AVAILABILITY STATEMENT

Some or all data, models, or code generated or used during the study are proprietary or confidential in nature and may only be provided with restrictions.

REFERENCES

Abdul Nabi, M. and El-adaway, I.H. 2021. Understanding Disputes in Modular Construction Projects: Key Common Causes and Their Associations. *Journal of Construction Engineering and Management*. **148**(1).

Ahmed, M.O. and El-adaway, I.H. 2023. Data-Driven Analysis of Construction Bidding Stage–Related Causes of Disputes. *Journal of Management in Engineering*. **39**(5).

Ahmed, S. K. (2024). The pillars of trustworthiness in qualitative research. *Journal of Medicine, Surgery, and Public Health*. 2 (2024) 100051

Alrasheed, K.A., Soliman, E. and AlMesbah, F.E. 2023. Dispute Classification in Construction Projects Based on Litigation Cases. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*. **15**(3).

APM 2019. *APM Body of Knowledge* 7th ed. Princes Risborough: Association for Project Management.

Arcadis 2018. *2018 Global Construction Disputes Report*.

Arcadis 2021. *2021 Global Construction Disputes Report*.

Arcadis 2022. *2022 Global Construction Disputes Report*.

Bega, F. and Lin, B. 2024. China's Belt & Road Initiative Hydropower Cooperation: What can be improved?" *Renewable Energy*. 221 (2024), 119789.

Braun, V. and Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.

Cheung, S.O. and Pang, K.H.Y. 2013. Anatomy of Construction Disputes. *Journal of Construction Engineering and Management*. **139**(1).

Clegg, S.R. 1992. Contracts cause conflicts *In*: P. Fenn and R. Gameson, eds. *Construction Conflict Management and Resolution*. London: E & F N Spon, pp.127–144.

El-Sayegh, S., Ahmad, I., Aljanabi, M., Herzallah, R., Metry, S. and El-Ashwal, O. 2020. Construction Disputes in the UAE: Causes and Resolution Methods. *Buildings*. **10**(10), p.171.

FIDIC. 2017. *Conditions of Contract for EPC/Turnkey Projects* 2nd ed. Geneva: FIDIC

Franz, B. and Roberts, B. A. M. 2022. Thematic analysis of successful and unsuccessful project delivery teams in the building construction industry. *Journal of Construction Engineering and Management*. 148(3)

Guba, E. G., and Lincoln, Y. 1989. *Fourth generation evaluation*. Newbury Park, CA: Sage.

Hallebone, E. and Priest, P. 2009. *Business and Management Research : Paradigms & Practices* . Basingstoke: Palgrave Macmillan.

Han, X. and Webber, M. 2020. From Chinese Dam Building in Africa to the Belt and Road Initiative: Assembling Infrastructure Projects and their Linkages. *Political Geography*, 77 (2020), 102102.

Hardjomuljadi, S. 2020. Use of Dispute Avoidance and Adjudication Boards. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*. **12**(4).

Hasanzadeh, S., Esmaeili, B., Nasrollahi, S., Gad, G.M. and Gransberg, D.D. 2018. Impact of Owners' Early Decisions on Project Performance and Dispute Occurrence in Public Highway Projects. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*. **10**(2).

Hill, S., Lorenz, D., Dent, P. and Lützkendorf, T. 2013. Professionalism and ethics in a changing economy. *Building Research & Information*. **41**(1), pp.8–27.

ICED 2018. *Construction Capacity Framework* [Online]. Available from: http://icedfacility.org/wp-content/uploads/2019/07/Framework_Construction-Capacity_Final.pdf.

Kisi, K.P., Lee, N., Kayastha, R. and Kovel, J. 2020. Alternative Dispute Resolution Practices in International Road Construction Contracts. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*. **12**(2).

Korstjens, I., and Moser, A. 2018. Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing. *European Journal of General Practice*, 24(1), 120–124.

Kyalisiima, C., Tutesigensi, A., Kayondo, M. and Mutikanga, H. E. (2024). *Competence as a Key Factor in Causal Mechanisms of Construction Disputes*. J. Leg. Aff. Dispute Resolut. Eng. Constr., 16(4).

Love, P.E.D., Davis, P.R., Ellis, J.M. and Cheung, S.O. 2010. A systemic view of dispute causation. *International Journal of Managing Projects in Business*. **3**(4), pp.661–680.

Maemura, Y., Kim, E. and Ozawa, K. (2018). *Root Causes of Recurring Contractual Conflicts in International Construction Projects: Five Case Studies from Vietnam*. *Journal of Construction Engineering and Management.* 144(8).

Nowell, L.S., Norris, J.M., White, D.E. and Moules, N.J. 2017. Thematic Analysis. *International Journal of Qualitative Methods*. **16**(1), p.160940691773384.

Othman, A.A.E. 2013. Challenges of mega construction projects in developing countries. *Organization, Technology & Management in Construction: An International Journal*. **5**(1), pp.730–746.

Otim, M.A., Tutesigensi, A. and Mutikanga, H.E. 2022. Can Professionalism Make Contract Disputes in Infrastructure Projects Disappear? *In*: A. Tutesigensi and C. J. Neilson, eds. *38th Annual ARCOM Conference*. Glasgow: Association of Researchers in Construction Management, pp.134–143.

Reid, A. and Ellis, R.C.T. 2007. Common sense applied to the definition of a dispute P. Chynoweth, ed. *Structural Survey*. **25**(3/4), pp.239–252.

Rowlinson, M. 2019. *A Practical Guide to the NEC4 Engineering and Construction Contract.* 1st ed. John Wiley & Sons, Incorporated.

Saseendran, A., Bigelow, B. F., Rybkowski, Z. K. and Jourdan, D. E. (2020). *Disputes in Construction: Evaluation of Contractual Effects of Consensus*. J. Leg. Aff. Dispute Resolut. Eng. Constr., 12(2)

Saunders, M.N.K., Lewis, P. and Thornhill, A. 2016. *Research Methods for Business Students* 7th ed. Edinburgh: Pearson Education Limited.

Sheng, Z. 2018. *Fundamental Theories of Mega Infrastructure Construction Management*. Cham: Springer International Publishing AG.

Stahl, N.A. and King, J.R. 2020. Expanding Approaches for Research: Understanding and Using Trustworthiness in Qualitative Research . *Journal of Developmental Education*. **44**(1), pp.26–28.

Tanriverdi, C., Atasoy, G., Dikmen, I. and Birgonul, M.T. 2021. Causal Mapping to Explore Emergence of Construction Disputes. *Journal of Civil Engineering and Management*. **27**(5), pp.288–302.

Viswanathan, S.K., Panwar, A., Kar, S., Lavingiya, R. and Jha, K.N. 2020. Causal Modeling of Disputes in Construction Projects. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*. **12**(4), p.04520035.

Wang, J., Zhang, S., Jin, R., Fenn, P., Yu, D. and Zhao, L. 2023. Identifying Critical Dispute Causes in the Construction Industry: A Cross-Regional Comparative Study between China and the UK. *Journal of Management in Engineering*. **39**(2).

Yin, R.K. 2014. *Case study research: Design and methods* 5th ed. Sage, Thousand Oaks, CA.

Zhu, L., and Cheung, S. O. (2020). Power of Incentivization in Construction Dispute Avoidance. *J. Leg. Aff. Dispute Resolut. Eng. Constr.*, 12(2)