

**Dispute Avoidance in New Zealand Construction Projects
during Pre-Contract Stage**

A thesis presented in partial fulfilment of
the requirements for the degree of

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in
Construction

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Statement of Originality

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Weerasinghage Pramod Malaka Silva

ABSTRACT

The construction industry is prone to disputes due to its complex, time-spanning and risky nature. Anywhere in the world where the construction industry is active, disputes are also prevalent, which costs the project's objectives and good relationships among parties. New Zealand (NZ) construction industry also significantly contributes to the country's economy and experiences disputes similar to any other country. The importance of researching the construction industry disputes has been identified, and dispute resolution, dispute avoidance and causes of disputes were highly focused. However, in the area of dispute avoidance, there has been minimal research on the possibilities during the pre-contract stage to avoid future disputes; therefore, this study has aimed at developing a pre-contract dispute avoidance toolkit for the NZ construction industry. To achieve this aim, four objectives were established namely; identification of causes of disputes, investigation of the dynamics of causes of disputes in NZ, identification of pre-contract measures to avoid potential disputes in NZ and development & validation of a pre-contract dispute avoidance toolkit for the NZ construction industry.

After the background study of previous studies in the area of construction-related disputes in international and NZ contexts, a systematic literature review on causes of disputes was carried out to identify an all-inclusive and objective list of causes of disputes. The systematic literature review identified 29 core causes of disputes, and amongst them, poor contractual arrangements, employer-initiated scope changes, and unforeseen site changes were found in most of the previous studies of causes of disputes. Then court case study on actual court cases of NZ was carried out. Based on the court case analysis, it has been concluded that the majority of disputes arose out of traditionally procured contracts, and disputant parties were mostly the principal and the contractor. Further, characteristics of causes/attributes of disputes such as significance (after considering both frequency of occurrences and level of centrality), dependencies and underlying themes were investigated. The lack of understanding of the purpose of the

Construction Contracts Act was identified as the cause/attribute with the highest overall significance as well as highest centrality (a cause with the highest number of dependant causes). Considering the commonalities of the causes of disputes, five themes of causes were identified as, poor contract understanding, poor contract practices, poor contractual formation, over expectations of contractor and over expectations of principal. An attribute map illustrating the overall significances of causes/attributes linkages among attributes and themes (including attributes under themes) was also created, which provided a more organized direction and structure for the remainder of the study.

Fourteen expert interviews were carried out searching for pre-contract dispute avoidance measures. 84 pre-contract measures to prevent construction-related disputes were identified under five themes. Each avoidance measure is recorded with the most responsible parties and relevant pre-contract stages. The key characteristics of these measures are clarity and communication, risk management, proper documentation and standardization, review and continuous improvements, and collaboration. Clear scope documentation and expectation management meetings were emphasized as the most important steps by respondents. Based on the gathered data from various research stages, an interactive toolkit was developed using Microsoft Power BI. The toolkit generates three outputs: dispute avoidance steps, causes/concerns of disputes, and relationships between them, based on user inputs regarding the pre-contract stage, party, and theme. Users can multi-select these inputs and explore specific dispute avoidance steps in detail, while visualizing linked causes. It underwent a two-stage validation process, including interviews and a focus group with New Zealand construction experts, leading to improvements in its functionalities and content.

In general, this study has contributed to both industry practitioners and researchers by providing an innovative and interactive solution to use during the pre-contract stage of traditionally procured construction projects in NZ which is capable of avoiding potential

disputes. This study recommends further exploration of the purposes of the New Zealand Construction Contracts Act's clauses. Since the study focuses on traditionally procured projects, future research could evaluate the applicability of the dispute avoidance steps to other procurement methods. It also proposes evaluating or expanding the pre-contract dispute avoidance toolkit for use in other procurement methods, with the potential to enhance it using broader data or language models to generate more accurate discussions on pre-contract dispute avoidance.

Ethics Approval

Massey University Human Ethics Committee granted ‘Low-Risk Notification’ to this research project. Such approval was granted on 10th August 2022, under Ethics Notification Number 4000025271, for the study. The Approval letter is attached under Appendix A.

Dedication

This thesis is dedicated to

My wife, Tharaki Pamoda

And my parents, Pushparani De Silva and Gamini Silva

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This study has been a significant milestone in my life and would not have been possible without many individuals and organisations' guidance, support, and encouragement. Firstly, I express my heartfelt gratitude to my main supervisor, Associate Professor Niluka Domingo for the continuous guidance, support and patience throughout the entire period of this study. Her supportive and constructive feedback was invaluable in shaping the research in a more productive and effective manner. In addition, I would also like to thank my co-supervisor, Associate Professor Naseem Ameer Ali, for the support and expertise knowledge provided for this study. I sincerely appreciate all the lecturers technical and administrative staff of the School of the Built Environment, Massey University for their kind support and assistance throughout my PhD. I am also thankful to McKay Limited, where I was employed, especially for their understanding, flexibility, and valuable input to this study. Furthermore, I acknowledge the inputs provided by industry practitioners from various construction companies in New Zealand, whose contributions were instrumental in enriching this research.

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Abbreviations and Acronyms

BOT	- Build-Operate-Transfer
CCA	- Construction Contracts Act
CCAA	- Construction Contracts Amendment Act
CDSC	- Concept Design and Spatial Coordination Stage
ECI	- Early Contractor Involvement
FIDIC	- The International Federation of Consulting Engineers
GDP	- Gross Domestic Product
ISM	- Interpretative Structural Modelling
MBIE	- Ministry of Business Innovation and Employment
MICMAC	- Matrix Cross-Reference Multiplication Applied to a classification
ML	- Machine Learning
NZ	- New Zealand
NZDRC	- New Zealand Dispute Resolution Centre
OEC	- Over-expectation of Contractor
OEP	- Over-expectation of Principal
PB	- Preparation and Briefing
PCF	- Poor Contract Formation
PCMP	- Poor Contract Management Practices
PCSA	- Pre-Construction Services Agreements
PCU	- Poor Contract Understanding
RIBA	- Royal Institute of British Architects
SEM	- Structural Equation Modelling
SLR	- Systematic Literature Review
SNZ	- Standards New Zealand
TDA	- Technical Design – A Stage
TDB	- Technical Design – B Stage
UAE	- United Arab Emirates
UK	- United Kingdom
USA	- United States of America
USD	- United States Dollars

List of Peer-reviewed Publications

Chapter No	Publication Reference	Publication Type	Publication Status
3	Pramod Malaka Silva, Niluka Domingo, Noushad Ali Naseem Ameer Ali; Current knowledge on construction dispute management in New Zealand. AIP Conf. Proc. 5 October 2023; 2881 (1): 050023. https://doi.org/10.1063/5.0167894	Conference paper	Published
4	Silva, P.M., Domingo, N. and Ameer Ali, N.A.N. (2024), "Causes of disputes in the construction industry – a systematic literature review", Journal of Financial Management of Property and Construction, Vol. 29 No. 2, pp. 193-210. https://doi.org/10.1108/JFMPC-03-2023-0012	Journal paper	Published
5	Silva, P.M., Domingo, N. and Ali, N.A.N.A., 2023. Quantitative analysis of construction-related legal cases in New Zealand. In: Sandanayake, Y.G., Waidyasekara, K.G.A.S., Ramachandra, T. and Ranadewa, K.A.T.O. (eds). Proceedings of the 11th World Construction Symposium, 21-22 July 2023, Sri Lanka.[Online]. pp. 900-908. DOI: https://doi.org/10.31705/WCS.2023.72 . Available from: https://ciobwcs.com/papers/	Conference paper	Published
6	Silva, P.M., Domingo, N. and Ameer Ali, N.A.N. (2024), "Attribute Analysis of Legal Cases in the Construction Industry ", Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, DOI: 10.1061/JLADAH/LADR-1194	Journal paper	Published
7	Silva P.M., Domingo N, Ali N.A.N. (2025). Pre-Contract Measures to Avoid Potential Disputes in the New Zealand Construction Industry. Construction Economics and Building. 25. 2. (pp. 235-252).	Journal paper	Published
8	Silva, P.M., Domingo, N. and Ameer Ali, N.A.N. (2024), "An Interactive Pre-Contract Dispute Avoidance toolkit for New Zealand Construction Industry", Journal of Construction Innovation: Information, Process, Management, https://doi.org/10.1108/CI-10-2024-0309	Journal paper	Published

1 INTRODUCTION

1.1 Background

A “dispute” is associated with distinct justiciable issues and is caused by a conflict that occurs due to the incompatibility of interests among the parties (Fenn, Lowe & Speck, 1997). With the notion that conflicts and disputes are distinct phenomena, the authors further mentioned that conflicts can be managed, but disputes require resolutions, perhaps from an external party. Kumaraswamy (1997) has defined a dispute as a “situation in which a claim or assertion made by one party is rejected by the other party and the rejection is not accepted in return”.

Internationally, many researchers have focused on identifying causes of disputes and categorising causes of disputes from various perspectives. Kumaraswamy (1997) categorised causes of disputes as root causes (underlying reasons of the problem) and immediate causes (immediate reasons). Cakmak and Cakmak (2003) further developed that categorisation and identified seven dispute-causing categories: owner-related, contractor-related, design-related, contract-related, human behaviour-related, project-related, and external factor-related. Moreover, an Australian study done by Al-Keim (2017) recognised nine key issues in disputes: scope variations, contractual clause interpretation, extension of time claims, site conditions, obtaining approvals, access to the site, design quality, late or incomplete information, and resource availability. In the New Zealand (NZ) context, Ramachandra and Rotimi (2011) observed that a substantial number of disputes were linked to payment issues. Their study revealed that 80% of the 40 High Court cases examined were attributed to disputes over progress and final payments.. A study based on 80 disputes in NZ by Yiu et al. (2021) ascertained that “change of scope” and “unrealistic expectation” were the main reasons for disputes, each accounting for 25% of the 80 disputes. The Ministry of Business Innovation and Employment in New Zealand (MBIE,2016) highlighted that disputes arise due to differing

perspectives on contractual provisions, quality expectations, payment issues, underestimated change impacts, and misunderstandings about project scale, complexity, and timing.

Dispute prediction and construction contract automation were two areas that were focused on by previous scholars who investigated solutions to reduce disputes. Several studies proposed tools and frameworks to predict future disputes considering the attributes of projects during early stages. Naji et al. (2020) presented a model based on fuzzy logic incorporated with SEM (called the hybrid fuzzy logic-SEM model) that can evaluate the likelihood of dispute occurrence in traditional construction projects. Molenaar, Washington and Diekmann (2000) presented a structural equation model (SEM) for describing and quantifying the fundamental factors that affect contract disputes between owners and contractors in the construction industry and the purpose of the specific model was to explain how and why contract related construction problems occur. Diekmann and Girard (1995) developed a logistic regression model based on collected data from 159 construction projects, which could predict disputes regarding a particular construction project by taking into account people, processes, and project aspects. Ayhan et al. (2021) used machine learning techniques to predict the occurrence of disputes in the construction industry and explored that the relationship between parties, communication between parties, and project management and coordination skills have the highest impact on disputes in its order. Smart contracts and blockchain technology have shown potential for automated contract administration, which would assist parties when adhering to the guidelines and standards autonomously and objectively; however, some studies opined that apart from some straightforward issues, an automated contract administrator cannot manage complex issues without human intervention (Mason et al., 2018; Szabo, 1994).

Besides the causes of construction-related disputes and dispute prediction methods, previous studies have also focused on dispute resolution methods. For instance, Xinhua (2010) suggested a dispute resolution mechanism for the Chinese construction industry that integrates

third-party involvement and local authorities to manage project issues. A study in Saudi Arabia by Jannadia et al. (2000) highlighted the importance of drafting effective dispute-resolution clauses as the most suitable method for avoiding and resolving conflicts. In Malaysia, Danuri et al. (2015) proposed a cost-effective solution that engages top management from both parties in discussions and negotiations to resolve disputes, addressing the financial limitations of existing processes. While dispute resolution methods are highly discussed and useful after a dispute occurs, it is also important to focus on avoiding disputes before they actually arise.

Although numerous studies have focused on the causes, prediction, and resolution of disputes, conflicts still arise in both international and NZ construction industries, as previously mentioned. Completion of a project within the expected time and cost is the main objective of any construction project, and disputes over these two factors cause a major hindrance to the success of the project (Naji et al., 2020). Further, disputes cause worries, reflexive responses, deterioration of relationships among parties, and communication failures (Naismith et al., 2016). Similarly, Mashwama et al. (2019) highlighted that reduced productivity, cost and time overruns and harm to both company and professional reputations are negative consequences of disputes in construction projects. Based on a NZ study, Jelodar et al. (2013) emphasised that construction disputes in NZ impact on the sustainability of relationships among the parties which was identified as an asset in the construction industry.

The construction industry in NZ is identified as the fifth largest economy as it contributed 6.3% of the NZ's real Gross Domestic Product (GDP) in 2023 ((MBIE), 2023). In contrast, the construction sector in the United States contributes about 4.3% of GDP, and in the UK, it represents approximately 6% of GDP (The Constructor, 2020; Leading Builders of America, 2020). Also, the construction Industry in NZ is the third largest employer in NZ, making up 10.7% of the country's workforce as of June 2023 , despite the global COVID-19 pandemic and severe weather conditions (MBIE, 2023). According to the NZ Construction Industry

Council (2016), each dollar invested in the construction sector generates around two dollars and eighty cents in total economic activity, making it one of the sectors with the highest economic multiplier effects. Based on the mentioned economic indicators, the construction industry in NZ has a significant impact on three key economic factors: GDP, employment, and returns on investment. Therefore, disputes in the NZ construction projects could negatively impact the overall economy of NZ as its GDP, employment rate and return on investments are somewhat dependent on the construction industry. Additionally, in Australasia, Contractors enter into fixed-price contracts based on incomplete designs and contracts with many particular conditions, which passes major risks to the contractor, resulting in disputes around variation entitlements; due to this “inequitable” level of risk transformation towards contractors, major contractors in Australasia tend to exit from the industry (Harris et al., 2019; Tower & Baccarini, 2008). Hence, it is important to minimise disputes in the NZ construction industry. Government entities and researchers in NZ have attempted to provide solutions to minimise disputes in NZ construction industry. For instance, the Construction Contracts Act (CCA) of NZ, enacted in 2002, aimed at minimising disputes around payment processes by securing withheld retention money, ensuring fair payment management, offering a cost-effective adjudication process, and providing mechanisms for recovering due payments (MBIE, 2017). Moreover, Standards New Zealand (SNZ) introduced three standard contract conditions tailored to different procurement routes—principal-designed projects, design-and-construct projects, and fixed-term projects, enhancing transparency, contract administration, and decision-making accuracy (Finnie, 2021; SNZ, 2013). Additionally, Finnie (2021) proposed a two-stage early contractor involvement (2S-ECI) framework to streamline the early contractor involvement (ECI) process and to minimise disputes. Despite the efforts by the NZ government entities and researchers, disputes occur in NZ construction projects, particularly payment issues are reportedly prevalent in the NZ construction industry due to the inadequacies of the CCA, certain industry practices and

unethical behaviours (Ramachandra & Rotimi, 2011a; P. M. Silva, N. Domingo, & N. A. N. A. Ali, 2023). The disputes in the NZ construction industry hinder the project success and negatively impact on the country's economy and even cause major/well-established contracting organizations to quit the industry, as explained before. Further, a survey based on NZ industry practitioners by McVeagh (2020) found that 61% of the respondents believed that the disputes in the NZ construction industry would continue to increase. In conclusion, despite several efforts and proposed solutions, disputes in NZ's construction industry remain frequent, negatively impacting the country's economy, industry relationships, and builders' confidence. Unfortunately, many industry practitioners anticipate a rise in disputes in the coming years.

1.2 Research Problem

It is paramount to minimise avoidable disputes and to minimise the impact of unavoidable disputes; thus, Kumaraswamy (1997) identified trends in the construction industry towards “dispute avoidance” over “dispute resolution”. Yiu et al. (2021) stated that NZ construction industry has experienced a sustained growth rate of 7% since 2011; however, the NZ construction industry is relatively small compared to other countries. In the NZ construction industry, even though the construction contracts attempt to minimise and protect the contractual parties from disputes, numerous disputes occur due to quality of workmanship, delays, lack of details and incomplete plans, even though the construction contracts attempt to minimise and protect the contractual parties from disputes (MBIE, 2016). Yiu et al. (2021) stressed that lack of large-scale developments and low productivity hinder the growth of the NZ construction industry and highlighted the importance of avoiding and mitigating construction-related disputes aiming at better resource allocation and serving the national economy.

While choosing an appropriate method to resolve unavoidable disputes, it is equally important to minimise and control root causes of avoidable disputes (Kumaraswamy, 2002). Avoidance of disputes during the post-contract stage and avoiding future / potential disputes during the

pre-contract stage could be considered as two discussion areas and were focused on by a few previous studies. Among the mentioned two areas, few studies investigated about avoiding disputes during the post contract stage itself. For instance, by introducing a concept called “scope lock point” Yiu et al. (2021) recommended that the scope of a project should be defined as early as possible with regard to functionality, major deliverables. Moreover, Success factors that would make the stakeholders understand and comply with the contractual obligations of public construction projects and avoid disputes were investigated by Tabish and Jha (2023). The authors identified effective monitoring, top management support, and competence of the contractor’s design consultants as success factors in avoiding disputes, however, the identified success factors were more relevant to the post-contract stage.

Kumaraswamy (1996) stated that many of the root causes of disputes can be mitigated using various project management strategies and associated tools and techniques, particularly during the pre-construction phase. The root causes identified by Kumaraswamy (1996) were the most underlying or fundamental causes of disputes and notably, many of those root causes are originated from the pre-contract stage of construction projects. Further, Gerber (2013) emphasised that the initial investment in setting up a proper dispute avoidance procedure would recover many times the costs that would occur due to disputes (Gerber, 2013). Construction dispute prediction models by Naji et al. (2020), Ayhan et al. (2021) and Diekmann and Girard (1995) were developed to predict future disputes considering the existing variables, namely scope definition, site conditions, financial planning and project complexity. Few of those suggested models could be utilised during the pre-contract stage, and more importantly, variables are mostly related to the pre-contract stage of a project. Hence, it has been concluded from the previous studies that several variables that are prevalent even before signing the contract are also attributable to post-contract stage disputes. Although several studies have recommended mechanisms to predict disputes from the attributes available during the pre-

contract stage, they have not investigated possible measures applicable to the pre-contract stage in order to avoid potential disputes.

In addition to the dispute prediction models, a few other studies emphasised several factors / areas that need to be considered before signing a construction contract in order to expect a dispute-less post-contract stage. For instance, Senarath and Francis (2021) highlighted that fostering team relationships during the briefing stage is a crucial strategy for avoiding disputes. Ekhtor (2016) underscored the value of adequate contract documentation, hiring experienced contractors and consultants, and avoiding ambiguity in bills of quantities to prevent disputes. Both these studies have generally suggested or pointed out the importance of focusing on certain areas but have neither provided a more methodical and/or holistic mechanism nor a specific method applicable for traditionally procured construction projects. In the NZ context, Ramachandra and Rotimi (2011) recommended strengthening the financial guarantees and including mandatory prequalification of funding parties' financial status before signing the contracts. Although unrelated to the projects that followed the traditional procurement path, Finnie (2021) developed a framework for two-stage ECI processes in NZ which aimed at a less-conflicting project environment.

Many studies have considered causes for construction disputes, and researchers have been able to categorise those causes in various ways. Further, existing literature shows methods to predict disputes in construction projects and to foresee the frequency of disputes before the construction begins. Despite the fact that, the importance of avoiding disputes is highly emphasised in the existing literature, very few studies have focused on identifying pre-contract dispute avoidance measures. . Although there were few studies (1) that proposed collaborative procurement methods (i.e, 2-staged early contractor involvement) by Finnie (2021) and Senarath & Francis (2021) and (2) that proposed or highlighted individual/few considerations in isolation as dispute avoidance strategies by Ekhtor (2016), Yiu et al. (2021) and

Ramachandra & Rotimi (2011), there have not been comprehensive and wholistic solutions that configure pre-contract dispute avoidance steps for the traditionally procured construction projects in NZ. Therefore, this study attempted to fulfil the mentioned research gap by investigating the possible pre-contract measures to avoid potential post-contract disputes in the NZ construction industry.

1.3 How Aim and Objectives

The aim of the research is to develop a pre-contract dispute avoidance toolkit to minimise potential disputes in NZ construction industry. The following objectives have assisted in achieving this aim;

- Review causes of disputes in NZ and international construction industries
- Explore the dynamics of causes (significances, relationships and underlying themes) of disputes in the NZ construction industry
- Identify pre-contract measures to avoid potential disputes in the NZ construction industry
- Develop and validate a pre-contract dispute avoidance toolkit for the NZ construction industry

1.4 Research Methodology

This research is not guided by a pre-determined theories or knowledge but rather directed towards the research questions identified from the literature review, therefore this research is more towards the pragmatic philosophical stance. When fulfilling the aim and objectives researcher progressively worked on generating the knowledge inductively. Moreover, the nature of the research questions were “why” and “how” type and the those questions were answered throughout the research process inductively by following a qualitative method. The research process started from the background study followed by a systematic literature review (SLR), court case analysis, expert interviews, toolkit development and validation as illustrated

in the figure 1. The figure 1 elaborates the research process against objectives alongside the publications. The format of the research was “thesis by publications”.

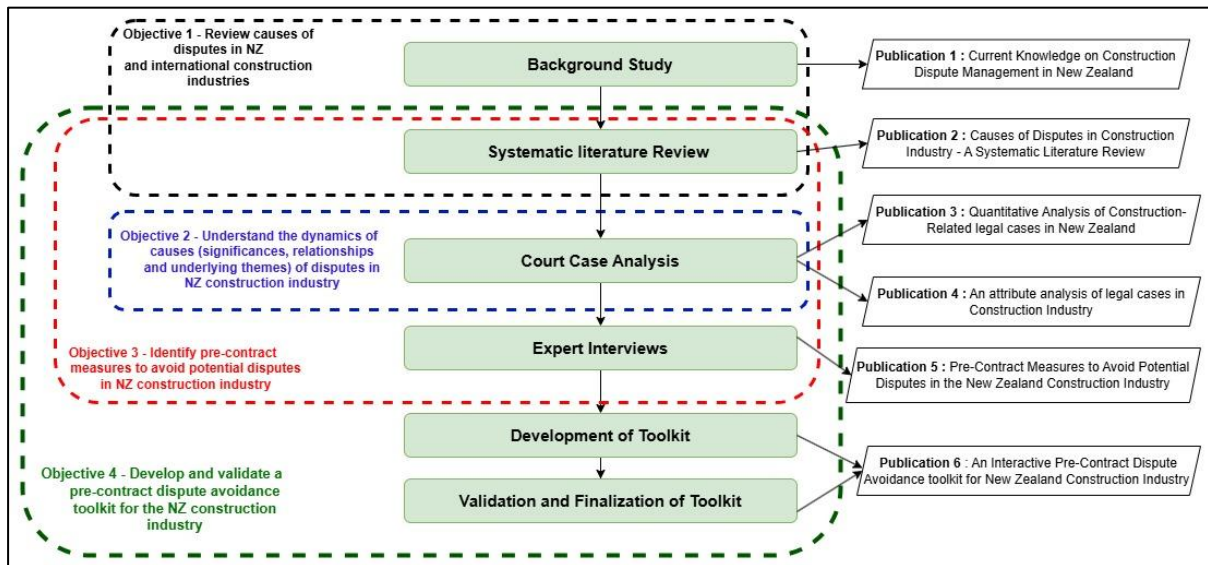


Figure 1 : Research Process and research objectives

1.5 Scope of the Research and Limitations

The aim of the research is to develop a toolkit to avoid disputes in construction projects in NZ, and the data on causes of disputes, dispute avoidance steps and opinions on the developed toolkit (during the validation stage) were collected within the NZ construction industry. Hence, the main findings are more applicable to the disputes in the NZ construction sector. As a part of this study, an analysis of the legal cases in NZ was carried out, and it concluded that most cases arose out of traditionally procured projects; therefore, the remainder of the study was limited to the traditionally procured construction projects. . Hence, the developed “toolkit to avoid potential disputes in NZ construction industry” is limited to the projects which follow the traditional procurement path. Given the nature of this study, its scope has been narrowed down to the NZ construction industry, which followed the traditional procurement path.

In addition to the explained research scope, there are a few research limitations that are beyond the researcher’s control and can influence the generalizability and the quality of the findings.

Even though a considerable number of court cases (35 court cases) and expert interviews (14 expert interviews) were carried out, the validity of the research findings is based on the contexts of the court cases and the opinions of the participants. Moreover, the effectiveness of the developed toolkit in avoiding disputes is dependent upon the project-specific constraints and competencies of its users.

1.6 Flow of remaining chapters and publications

The chapters in this thesis are predominantly presented by the publications throughout the research process. However, this chapter (introduction), research methodology, discussion and conclusions & recommendations for further research were added in addition to the chapters by publications to maintain the flow of the thesis and to provide more meaningful understanding to the reader. The table 1 shows the purposes of chapters and related publications.

Table 1 : Thesis chapters and related publications

Chapter No	Chapter title	Chapter description	Chapter by publication?	Journal / Conference
1	Introduction	Introduction to the research, research area, research gap, aim and objectives are presented	No	N/A
2	Research Methodology	Research process is explained in detailed manner	No	N/A
3	Current Knowledge on Construction Dispute Management in New Zealand	Previous studies related to the same research area were summarised, establishing the research gap	Yes	3rd International Conference On The Built Environment And Engineering (ICONBEE)
4	Causes of Disputes in Construction Industry - A Systematic Literature Review	The identified causes of disputes in the international context were reviewed	Yes	Journal of Financial Management of Property and Construction

5	Quantitative Analysis of Construction-Related legal cases in New Zealand	Common types, causes, procurement types of the court cases were analysed quantitatively and defined the research limitation	Yes	The 11th World Construction Symposium 2023 (CIOB)
6	An attribute analysis of legal cases in Construction Industry	The dynamics of the causes of disputes in NZ context were critically analysed	Yes	Journal of Legal Affairs and Dispute Resolution in Engineering and Construction
7	Can the post contract disputes in the NZ construction sector be avoided by pre-contract measures?	Dispute avoidance measures identified in the expert interviews were presented	Yes	Journal of Construction Economics and Building
8	Avoidance of potential disputes in traditionally procured construction projects in NZ	The developed and validated toolkit is presented	Yes	Journal of Construction Innovation: Information, Process, Management
9	Discussion	The findings of this research were compared and contrasted with previous studies	No	N/A
10	Conclusions & recommendations for further research	The essence of this study and potential research avenues created by this study are presented.	No	N/A

2 RESEARCH METHODOLOGY

2.1 Introduction

The main aim of any research is to establish facts (unclear, philosophically speaking and commonly assumed) and to arrive at new conclusions via a systematic investigation of study materials, sources and so on (Oxford Dictionary, 1995). Fellows and Liu (2015) have emphasised that even if anything is discovered or not a, research can be considered as a “voyage of discovery” and that discovery depends on the queries that the study addresses, way of searching, location, investigated subject matter, analysis and the reflection by the researcher on the results of the analyses. Therefore, it is vital to follow an appropriate research methodology, and it should be selected based on what knowledge claims are made by the researcher, what strategies of inquiry are used, and what methods are used to collect and analyse the data (Creswell, 2003). By introducing a “research onion” concept, Saunders et al. (2007) have mentioned that research methodology includes philosophy, approaches, strategies, methods, choices, time horizons, data collection and analysis techniques are discussed in the following sections.

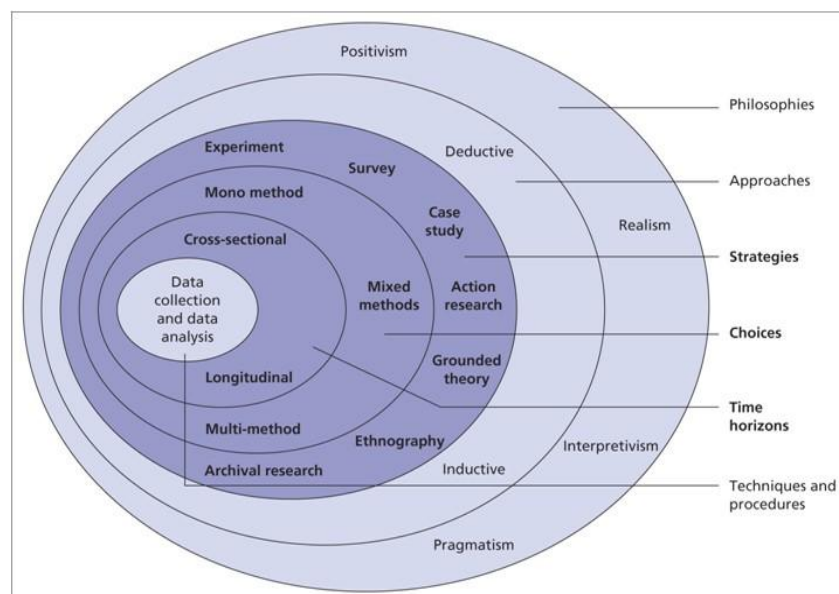


Figure 2 : Research Onion (Source: Saunders et al., 2007)

2.2 Philosophical Stance

Research philosophy is the outermost or the umbrella concept of the research onion developed by Saunders et al (2007). Research philosophy relates to the nature of the knowledge and how the knowledge is developed (Saunders et al., 2007). In order to identify the most suitable research design and to create an appropriate design, a comprehensive perception of the philosophical position is necessary (Easterby-Smith et al., 1991). Research philosophy is comprised of Ontology, Epistemology and Axiology, and each of these three branches span over two extremes called objectivism and subjectivism.

The nature of reality is considered under **ontology**, and one extreme ontological philosophy is “ontological objectivism” or “materialism”, in which believes that there is only one reality experienced by all and considers that reality (objects, procedures, and social phenomena) exist independent to the people who interact with them (Bhattacharjee, 2012; Saunders et al., 2016). The other extreme of ontological assumptions is “interpretivism” which is about believing that reality is relative and accept that there can be many different valid realities therefore, realities are determined by observation and scientific study (Fellows & Liu, 2015; Bryman & Bell, 2015).

Epistemology is simply about how does the researcher know about the reality and it concerns the origins, nature, methods and limits of human knowledge (Fellows & Liu, 2015; Creswell, 2007). Similar to ontology, epistemology also comprised with two extremes namely positivism and interpretivism. Positivism tries to generate universally generalised social realities with the use of observable and measurable facts, experiences that are confirmed by our senses (Saunders et al., 2016). The other epistemological stance; interpretivism uses reasoning and logical arguments to ascertain reality and also focuses on different opinions and narratives to understand diverse realities (Bryman & Bell, 2015).

The researchers view on values, ethics and scope of the study is related to the **axiology** and it is again comprised of two extremes as axiological objectivism and axiological subjectivism. In axiological objectivism, researchers keep the participants detached from their values and beliefs, to make the outcomes unbiased and value-free while in axiological subjectivism researcher deals with both participant's and researcher's values (Saunders et al., 2016).

Most of the research paradigms stands between the two mentioned extremes and those can be recognised as positivism, critical realism, interpretivism, postmodernism and pragmatism (Saunders et al., 2016). Obtaining views on either subjectivism or objectivism alone has raised many questions, therefore possibilities of combining them have emerged among the researchers which provide multiple views of reality on a particular phenomenon and it is identified as “pragmatism” (Mingers, 1997; Creswell, 2007). Data collection and data analysis can be done either in qualitative or in a quantitative manner if the research is located in the pragmatic philosophical stance and it avails more liberty on focusing on the practical context of the research area (Creswell, 2007).

This particular research is not guided by a pre-determined theory or knowledge but rather directed towards the research questions that emerge from the literature review. Additionally, this research is designed to achieve the objectives, aim and ultimately to address the research question rather than considering certain methods and procedures as more important. The research is focused on the causes of disputes and pre-contract dispute avoidance steps, and the nature of reality is constantly being constructed based on case studies and industry practitioners' opinions. Given these reasons, this particular study does not fit either to objectivism or subjectivism but it is more towards a moderate position or in other words in a “pragmatic” knowledge claim position.

2.3 Research Approach

After identifying the research philosophy, the next step is to select a proper research approach in order to design the research. Based on the understanding of theory at the initial stages of research, there are two approaches to research design, namely deductive approach and the inductive approach. In the deductive approach, the researcher first develops a theory or a hypothesis, which is then tested using the collected data/facts. Unlike deductive research, the inductive approach generalises data or facts gathered through observations and empirical reality to formulate a theory. In other words, the researcher collects data and subsequently develops a theory based on the collected information (Saunders et al., 2007; Tan, 2002). Some key characteristics of the inductive approach include gathering qualitative data, allowing for flexibility as the research evolves, moving from data to theory and involving the researcher in the research process (Saunders et al., 2007).

One of the critical objectives of this particular research is to ascertain the cause of disputes in the NZ context. Based on the literature, the causes of disputes were identified, and the court case analysis further investigated the causes of disputes and trends of construction-related disputes in NZ. Subsequently, the inputs from expert interviews were considered to develop and validate the framework. Hence, the researcher progressively worked on the findings rather than attempting to verify an initially established theory/basis; therefore, the suitable approach for the whole research process was inductive.

2.4 Research Method

Based on the data collection and analysis techniques, research methods are categorised into quantitative, qualitative, and mixed methods (Tashakkori & Creswell, 2008). Qualitative research methods involve subjective interpretation of social phenomena through various strategies, including case studies, action research, ethnography, narrative, and grounded theory

(Saunders, 2016). Qualitative methods expect to explore a phenomenon in more in-depth manner by using more flexible and semi-structured methods such as in-depth interviews, focus groups and participant observation (Mack, 2005). On the other hand, by following a deductive approach, quantitative research allows measuring relationships between variable mostly utilising statistical methods. Surveys and experiments can be categorised using this method, which verifies a pre-established hypothesis (Saunders, 2016). The combination of both qualitative and quantitative methods (mixed methods) are required particularly when the findings of a qualitative study is required to be further confirmed or verified by a quantitative study (Greene & Caracelli, 1997).

The focused area of this study is disputes in the construction industry which is very subjective and a socially constructed phenomenon. The research questions were developed mainly on “what” and “how”. For instance, “what” are the causes of disputes and “how” to avoid potential disputes during the pre-contract stage are two main research questions in this study. In other words, this study attempted to develop knowledge from the inputs from the society in an inductive manner. The causes of disputes in the NZ construction context were identified using case studies of actual court cases in NZ and the pre-contract avoidance strategies were identified from semi-structured interviews. Based on the gathered information, a toolkit was developed and further validated by another round of semi-structured interviews and focus group. Due to the inductive research method and the nature of the research questions as explained, this research led towards a qualitative research method.

2.5 Research Process

Following to the identification of philosophical stance, research approach and suitable research design types the next step is to properly plan the research process. Saunders et al. (2007) have mentioned a six staged research process which is comprised of the stages namely; clarifying a topic, reviewing the literature, designing the research, collecting the data, analysing the data

and writing up. Following sub-sections will discuss on important stages of this research in a more detailed manner. Figure 3 shows the research process and the outcomes throughout the entire research process.

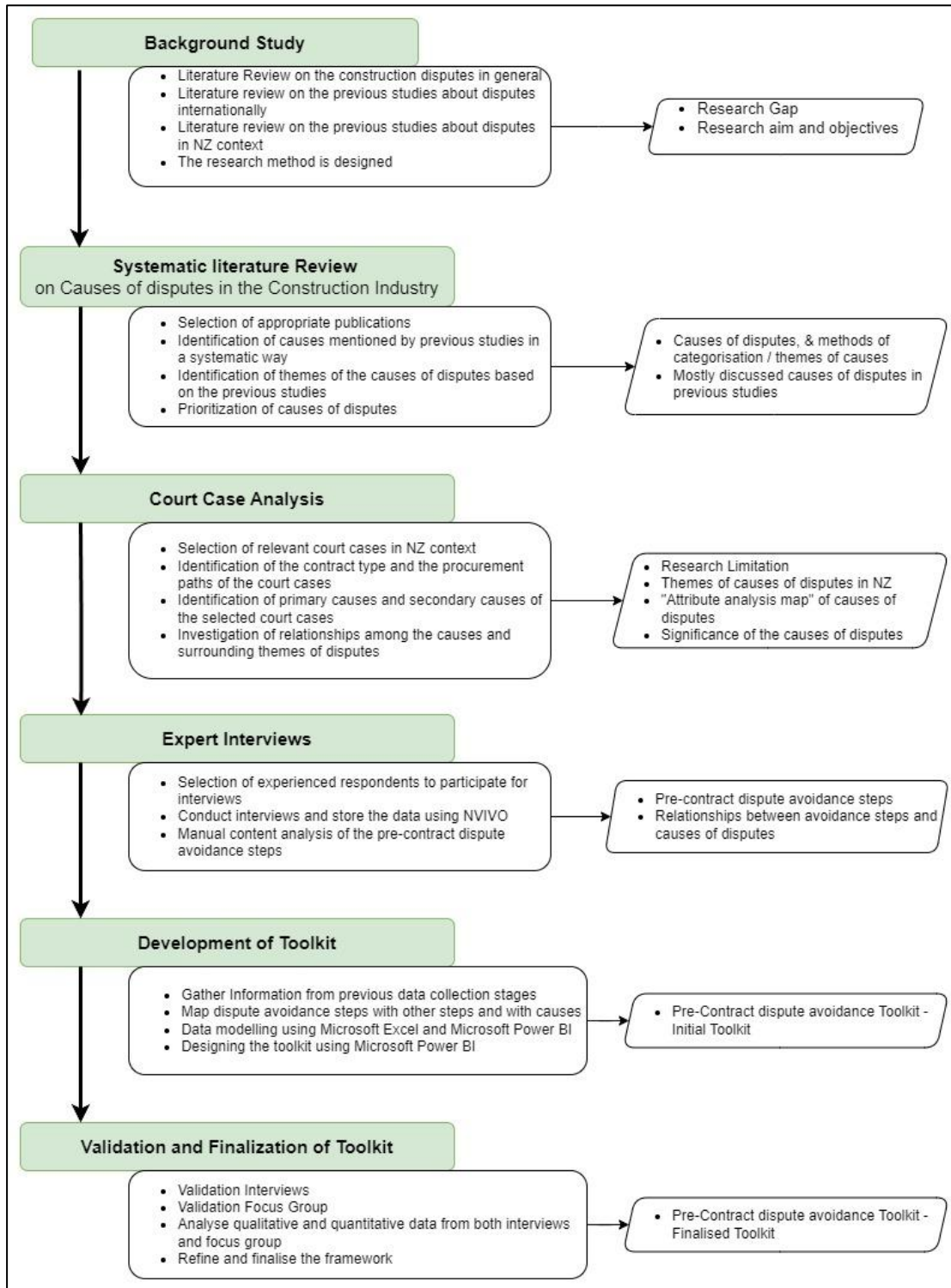


Figure 3: Research process and outcomes

2.5.1 Literature Review

A literature review can be defined as an effective evaluation of documents that contain information, ideas, data and evidence that are written to fulfil a certain aim from a particular perspective (Hart, 2018). Particular to construction industry-related researches, Kibwami and Tutesigensi (2014) have provided a six-stage process for a comprehensive literature review as data retrieval, term extraction, lexical statistics, develop categories, semantic similarity and development of hypothesis. Another process for literature reviews was specified by Remenyi et al. (1998) which is named as “funnel concept” as it starts from a wide end with initial broad studies on the research area and progressively narrow it down towards the other end of the funnel which denotes the identification of research problem.

This particular research followed both the above-mentioned concepts on the research process that were pointed out by Kibwami and Tutesigensi (2014) and Remenyi et al. (1998). The literature review was started by a background study of the research area and investigations made on disputes, causes of disputes and models to predict disputes in a broad manner. The above aspects of -related disputes were first studied in the international context and then narrowed down to NZ-specific materials mainly to recognise the knowledge gaps.

2.5.2 Systematic Literature Review

The background study recognised that there were a significant number of previous studies carried out regarding the causes of construction related disputes and a need of a conclusive set of causes of disputes was highlighted. A systematic literature review (SLR) was carried out to address this need and it also fulfilled the first objective (identification of causes of disputes) and part of the second objective (identification of themes of causes of disputes). The main reason for opting for a SLR was its capability to encompass nearly all previous studies and to study the previous materials systematically, aiming at an all-inclusive and unbiased list of

causes of disputes. Czakon (2011) proposed four main steps of a SLR, namely identifying the purpose of the study, identifying the literature sample, analytical activities (frequency analysis and content analysis) and development of the research report.

The SLR in this study started with an initial search for publications, and then the results were screened, and duplicate and irrelevant materials were excluded. Then a in detailed review/analysis on the selected publications was done in search of the causes of disputes and surrounding themes of causes of disputes. The analysis was carefully done to consolidate similar core causes of disputes and disregard causes that were minimally discussed in previous studies. The frequency of occurrences of core causes in previous studies was considered when prioritising and identifying the most common or mostly discussed causes of disputes.

2.5.3 Case Studies

In a “case study”, a particular phenomenon is studied based on what is experienced or seen in that case/s rather than a theory (Yin, 2014). Moreover, Yin (2014) stated that a case-study design is unique as compared to other qualitative research designs as they allow theories to be developed prior to preliminary data collection. A person, a group, an organisation, a change process or an event can be the “case” in a case study (Saunders, 2016). The data for case studies could be gathered from a variety of sources, including observation, interviews, questionnaires, reports, and archival records (Fellow & Liu, 2015). Yin (2014) mentioned two dimensions of case studies namely the number of cases of the study (single case design and multiple case designs) and the number of “unit of analysis” per case (single unit of analysis: holistic and multiple units of analysis: embedded), and these two dimensions created four types of case studies namely single holistic, multiple holistic, single embedded and multiple embedded case studies.

Researchers required to investigate court cases which were heard before NZ courts to mainly understand the actual dynamics of disputes in NZ construction industry. Identification of causes of disputes in NZ context and identification of themes surrounding the causes were the expected main objectives of this case study. Additionally, the review of court cases provided a more realistic insight as to what type of disputes, procurement methods and payment mechanisms had predominantly contributed to disputes in NZ construction industry. And it also assisted to establish the limitation for the rest of the research; projects that followed traditional procurement type.

To address the issues identified by previous authors regarding the generalizability of findings in case studies, this study has selected a substantial number of actual court cases (34 court cases). Therefore, the "multiple holistic" type was adopted for the case study because multiple distinct cases were studied, with each case having a single unit of analysis. "Lexis Nexis – NZ", a user-friendly and reliable database of case reports, was utilised as the source for this case study.

After selecting "Lexis Nexis – NZ" as the suitable source for the case study, a background study was conducted for 71 court cases and then excluded irrelevant cases such as the ones that were not triggered during the construction period and property-related disputes. The background study recognised 35 relevant cases, and the gathered data from the court cases were analysed by manually. The background of the case, judgement, and causes of the case were analysed and recorded methodically with the assistance of NVIVO software. High attention was paid to the causes of those court cases to identify primary and secondary causes. Subsequent to an in-depth review of each selected case, a cross-case analysis was done amongst those cases to discern themes of causes of dispute, relationships amongst the causes and the significance of each cause. The significance of each cause was determined by considering two parameters namely the degree of centrality of causes in comparison to other causes and the

frequency of occurrences of causes in the selected 35 cases. A detailed explanation of the case study process, including the method of determining the significance of causes, could be found in section 5.3

2.5.4 Expert Interviews

By providing a high response rate as compared to questionnaires, interviews provide a way to collect in-depth opinions of a particular subject matter in a qualitative manner (Kumar, 2005; Seidman, 2013). Easterby-Simth et al. (2012) mentioned that surveys are suitable for gathering opinion-based or behaviour-based data from a large population, and there are mainly two types under survey, namely, (1) “self-completion questionnaires” in which the respondents receive the questionnaire and fill it by themselves and (2) “interviews” in which researcher/s conduct it in a face-to-face manner or over an electronic mode. Interviews can be categorised into unstructured, semi-structured and structured (Saunders et al., 2016). Pre-prepared questions are presented in structured interviews, while general discussions are carried out in an unstructured interview, allowing discussion points to be evolved as the interview continues (Collis & Hussey, 2021). In semi-structured interviews, questions are developed only to a certain extent, and this allows more freedom and flexibility for both the interviewer and interviewee (Fellows & Liu, 2015).

The third objective of this study, which is to investigate dispute avoidance steps applicable pre-contract steps to avoid potential disputes, was fulfilled from these expert interviews. In other words, the avoidance steps to avoid the identified causes and themes of disputes in the NZ construction industry were questioned during the expert interviews. A series of semi-structured interviews were carried out to obtain more elaborative dispute avoidance steps from the industry experts.

2.5.4.1 Sampling method

The primary goal of sampling is to accurately represent the entire population with the chosen sample, offering a practical approach to data collection and processing (Fellows & Liu, 2015). Basically, there are two types of sampling, namely (1) random sampling, which is suitable when the population is large and the structure of the population does not show any variations and (2) non-random sampling, when there are structural variations in the population. Unlike in random sampling, non-random sampling does not enable equal chances of being selected, and there are few sub-types of non-random sampling methods as described in the below table 2 (Fellows & Liu, 2015).

Table 2: Non-Random Sampling types

Non-random sampling type	Description Source : (David & Sutton, 2003; Fellows & Liu, 2015)
Systematic sampling	<ul style="list-style-type: none"> • Has an element of randomness • Every x^{th} member of the population is sampled (where x is a constant interval between two selected ones)
Cluster sampling	<ul style="list-style-type: none"> • Appropriate where a population is divided into groups called clusters • Differences among the groups are small, whilst differences within a group are believed to be large. • Clusters are selected randomly, total members in that cluster become the sample, which represents the entire population
Convenience sampling	<ul style="list-style-type: none"> • Appropriate when the research question does not indicate any form of sample then the researcher can select a sample as per his/her convenience.
Snowball sampling	<ul style="list-style-type: none"> • Used when the population is difficult or hidden to reach.
Purposive sampling	<ul style="list-style-type: none"> • Purposive sampling is more suitable when a database or a defined population to select participants is not available and the researcher relies on his own opinions in selecting the appropriate participants.

The expert interview series was conducted to obtain expert knowledge about the pre-contract dispute avoidance steps relevant to NZ construction industry. The interviewees were required to have comprehensive experience in disputes in the NZ construction industry. Considering the expected depth of the inputs, respondents could not be selected randomly; therefore, all the “random sampling” methods and even “non-random sampling” methods that have elements of randomness (systematic sampling and cluster sampling) were not suitable. On the other hand convenience sampling and snowball sampling were also not suitable as the researcher was aware about a criteria to select a participant and participants were not that “difficult” or “hidden” to reach. Hence, considering the depth of the required information, the suitability of the interviewees and the distribution of those interviewees in the society, the more relevant sampling method for this study was “purposive sampling”. Moreover, industry experts with more than ten years of NZ construction industry experience (with experience in dispute management and/or contract management) and more than fifteen years of overall construction industry experience were selected.

2.5.4.2 Analysis of expert interview data

All the interview sessions were recorded electronically after the consent of the respondents was obtained. The dispute avoidance steps and the most responsible party of actioning the avoidance steps were explained under the five themes of dispute causes. Basically, manual content analysis was carried out to understand and analyse the core ideas presented by the respondents. However, NVIVO software was used as an assisting tool to store, code and analyse the gathered data.

The recorded transcripts were reviewed in detail, searching for core ideas of dispute avoidance steps and highlighted with a code. The codes were defined to give an idea about the theme as well; for example, PCU-2 stood for the second dispute avoidance step under the “Poor Contract Understanding” (PCU) theme. During the detailed review process of the gathered data, two key

aspects were also investigated, namely the most appropriate pre-contract stage and the most suitable/responsible party to take action on the avoidance steps.

2.5.5 Development and validation of toolkit

Based on the researcher's observations of the respondents' perception, behaviour, and feelings in an organised manner, it is important to make inferences between people, events, and parameters studied throughout the study (Tashakkori, & Teddlie, 2010). The inferences from all the data collection stages, namely literature review, case studies and expert interviews, were gathered and presented well methodically in a toolkit. "Toolkit" is defined as a "set of strategies or resources available for achieving a particular objective" (Oxford Dictionary, 2024). Moreover, this step fulfilled this study's fourth objective, which is to develop a toolkit to avoid disputes in the NZ context. The development and validation steps of the toolkit are explained in the following two sub-sections.

2.5.5.1 Development of "Pre-Contract Dispute Avoidance Toolkit"

The causes of disputes in the NZ construction industry and its surrounding themes were identified in the court case analysis. Then, the dispute avoidance steps were identified from the expert interviews. Based on the inputs from the expert interviewees, pre-contract dispute avoidance steps and related avoidable causes of disputes were mapped. Further, the applicable pre-contract stage and the most responsible party to action the avoidance step were also identified.

All the mentioned information was stored in several tables in an excel spreadsheet, and those tables were linked to a data model in Microsoft Power BI. Microsoft Power BI is a user-friendly platform that allows users to combine, analyse, visualise, and share data from a wide variety of data sources (Becker & Gould, 2019). Hence, it has been used as the platform for developing the toolkit, particularly due to its ability to develop user interactive reports and visualise

complex data in meaningful, user-friendly visualisations. The toolkit was published to the internet as an “embed report to the web, ” allowing users to access the toolkit interactively without accessing its data model. The detailed toolkit development process is presented in chapter 8.

2.5.5.2 Validation of “Pre-Contract Dispute Avoidance Toolkit”

The validation of the developed toolkit aimed at verifying the content (dispute avoidance steps, identified themes of causes of disputes), checking the overall understandability and appropriateness of the toolkit and further developing the toolkit. Two-stage validation process was conducted consisted of eight interviews and a focus group session. The first stage of validation or the interviews were carried out with both industry practitioners and with several respondents with academic backgrounds. The selected eleven respondents possessed at least 10 years of industry or research experience (including at least 5 years in New Zealand) in construction contract management or disputes. The inputs from the first stage of validation were taken into consideration, and the toolkit was refined. Then, the refined toolkit was further tested in a focus group session. The participants for the focus group session were selected based on having at least 8 years of experience, including a minimum of 4 years in New Zealand, in construction contract management and/or construction disputes.

Both the interview and focus group stages have gathered the interviewees' opinion (qualitative feedback), and also a follow-up questionnaire was sent to the respondents of the interviews and the participants of the focus group session to provide structured feedback (quantitative feedback) regarding the toolkit. The qualitative data from both validation stages were stored as a NVIVO file and carried out content analysis to identify the respondents' opinions to validate and refine the toolkit. Further, the answers received for the follow-up questionnaires in both validation stages were stored in an Excel spreadsheet, and descriptive statistics were used to

analyse data related to the different questions. Finally, considering all the feedback from both the validation interviews and focus group sessions the toolkit was further developed.

2.6 Quality of the Research

A deviation from the true findings of the research is a key concern in both qualitative and quantitative studies as it affects the validity and reliability of the research findings. Hence, the following two sub-sections will discuss the two attributes that underpin the quality of the research, namely validity and reliability.

2.6.1 Validity of the research

Validity or the possibility of being able to be accepted is paramount in terms of the research findings and words, namely trustworthiness, authenticity, and credibility carry the same meaning (Cambridge Dictionary, 2005; Creswell, 2009). A research validation process is about checking the correctness of the research by verifying the collected data, data analysis and interpretation of the data (Creswell, 2009; Saunders et al., 2016) A highly validated research findings can be determined by considering that these findings are accurate from multiple perspectives, including those of the researcher, participant, and reader. (Creswell & Miller, 2000).

In a quantitative study, there are many statistical measures to verify the validity, whereas in a qualitative study, it is comparatively challenging to validate; hence, the validity of a qualitative study is dependent upon the validity of the data (Creswell, 2009). Several qualitative strategies that are widely being used among the researchers to validate the studies, as mentioned by Creswell (2009) and their suitability for this study are outlined below;

- **Split different data sources of information** by examining evidence from the sources in order to develop comprehensive and interconnected themes. If the ideas are being generated by adjoining distinct of data or from diverse standpoints of the respondents,

then it is regarded as a high level of validity:- This study has analysed a considerable number of (35 court cases) cases to identify causes of disputes and considered the opinions from 14 industry experts to recognise the dispute avoidance steps. The causes of disputes and avoidance steps were discerned considering diverse sources of input; hence, the validity of the findings can be considered high.

- **Check the accuracy of the findings from the participants** is another validation strategy that enables the respondents to give their comments on the final outcome of the study:- This study has utilised this strategy as the developed toolkit was presented to industry professionals (in the two-stage validation process comprised of a series of interviews and a focus group session) to refine and validate.
- **Providing rich, thick descriptions to convey the findings** increases the validity of the research as it will give the audience a comprehensive idea on the core inferences with the use of different perspectives, gained experiences and examples:- This research has provided in detailed descriptions to convey findings. Chapter 5 explains the causes of disputes, which were derived from actual cases, in a comprehensive manner, and the toolkit provides an option to configure more details about the dispute avoidance steps, as explained in Chapter 7.
- **Peer debriefing** is also a suitable data validation strategy for this study, which enables the researcher to answer the questions raised by the peers of the researcher on the research outcomes:- Prior to the formal validation stage, the toolkit was presented to a few of the peer researchers and obtained their opinions.

By following above strategies, researchers have attempted to enhance the validity of the study. Saunders et al. (2016) indicated three aspects of assessing the validity of a research study: content validity, criterion-related validity, and construct validity. “Content validity” ensures

that the data collection methods and questions fully capture all relevant aspects of the phenomenon being studied. The SLR, which investigated almost all the previous studies regarding the causes of disputes and the court case analysis, which investigated a considerable number of court cases, have provided a sound basis to capture almost all the aspects of the causes of disputes and to develop the questionnaires capturing all the discussion points (on pre-contract dispute avoidance steps). The “construct validity” examines whether the collected data accurately reflect the phenomenon being studied or the research questions. The two-stage validation process, as explained, contributed to enhance the “construct validity” as it checked and verified the main outcome (toolkit to avoid disputes during the pre-contract stage) that summarised the essence of this research; causes of disputes, dynamics of the causes and dispute avoidance steps. To sum up, this study has adopted several strategies, such as reliance on distinct sources of inputs, checking the research outcomes with industry practitioners, providing detailed explanations of research findings and peer debriefing, which enhanced several standard measures of research validity as well.

2.6.2 Reliability of the research

Reliability is the extent to which a particular entity can be trusted or believed, similarly, with regard to research, a high level of reliability can be achieved by aiming at low errors and biases in the study (Cambridge Dictionary, 2005; Yin, 2003).

When collecting the qualitative data, Yin (2003) stated that many researchers make a bias as his/her (researcher's) comments, tone and verbal behaviour could affect the independent answer of the respondent during the interviews. In order to overcome it, the researcher has relied on a pre-prepared set of questions and practised mock-up interviews with peer researchers to minimise the researcher's influence on the participant's response during both expert interviews in the data collection stage and interviews during the toolkit validation stage.

Saunders et al. (2016) have stated two types of reliability of research, namely, (1) internal reliability, which uses more than one researcher to collect and analyse data and (2) external reliability, which discusses whether the used data collection and analysis techniques would produce the same results if the research techniques are repeated by the researcher or by someone else. Due to the time limitations, only a single researcher was involved in this study; therefore, internal validity was not a viable option. However, the external reliability of this study is considered as high as a series of expert interviews were carried out in both data collection and toolkit validation stages, enquiring similar points of discussion (pre-contract dispute avoidance steps and the suitability of the developed toolkit) repetitively. By emphasising that both researcher and respondent are responsible for the reliability of the research, Saunders et al. (2016) have identified four kinds of threats to research reliability. The steps taken to overcome those threats are mentioned in table 3.

Table 3: Threats to research reliability

Threat to the Research Reliability	Description	Action to overcome the threat
Participant error	These errors are prone when any factor will adversely alter the normal performance of the respondents. For example, if a questionnaire is given while the respondent is in a hurry.	The respondents were given the interview questions few days before the interview, allowing them to review the researcher's knowledge expectations and to prepare for answers.
Participant bias	This refers to false responses due to any external factor. For example, if the interview is	Prior to the interviews, a convenient time and a mode to hold the interviews were

	conducted in an open place, the respondent may be reluctant to give answers genuinely.	discussed, and the interviews were organized accordingly.
Researcher error	This happens when the researcher is tired, not prepared well or cannot understand what the respondent is saying.	The researcher thoroughly reviewed the subject matter and prepared well before the actual interviews.
Researcher bias	Any factor that induces bias in recording the respondents' responses. For instance, when the researcher mixes his/her opinions to the recordings	Once permission was received to record the session, it was recorded electronically and transcribed using Teams software. The researcher ensured that inferences were made based on the opinions of the respondents.

3 CURRENT KNOWLEDGE ON CONSTRUCTION DISPUTE MANAGEMENT IN NEW ZEALAND

3.1 Chapter Introduction

Disputes in the construction industry are common in both international and NZ contexts. Therefore, a considerable number of studies were conducted in the area of dispute management. This chapter explains what areas of dispute management (causes of disputes, dispute avoidance strategies and dispute resolution mechanisms) were carried out in the NZ construction industry and as well as the key findings from those studies. The chapter concludes with the areas that were more focused in previous studies and the areas which would be worthwhile in further studies. The chapter is based on the following conference paper (published):

Pramod Malaka Silva, Niluka Domingo, Noushad Ali Naseem Ameer Ali; Current knowledge on construction dispute management in NZ. AIP Conf. Proc. 5 October 2023; 2881 (1): 050023. <https://doi.org/10.1063/5.0167894>

3.2 Abstract

Construction disputes distract the construction industry from its core business and instead serves the dispute resolution industry in NZ and globally. It is therefore important to avoid construction-related formal disputes so that construction resources are focused on serving the national economies. Globally, many studies have been done on causes of disputes, dispute resolution and avoidance. These studies have categorised causes of disputes based on the context, proximity of the cause of dispute to the effect, and stakeholders' responsibility. Some have proposed methods to predict disputes and the frequency of disputes using statistical modelling and machine learning techniques. However, studies within the NZ context are much more limited. This paper synthesises the findings from the literature on current level of knowledge on the causes of disputes, dispute avoidance strategies, and dispute resolution methods used in NZ. The categories of dispute causes in NZ studies are generally similar to other international studies. Concepts such as early contractor involvement and strengthening financial guarantees are highlighted as dispute avoidance strategies. However, NZ lacks research on avoiding construction-related disputes during the pre-contract stage.

3.3 Introduction

Globally, construction industry is expected to develop at a noticeable rate between 2018 and 2023 with a value of over USD 10 trillion, though it is being hindered by considerable number of disputes (Ballesteros-Lintao & Ameer Ali, 2022). The construction industry in NZ is a significant contributor to the country's economy. It has been reported that the construction industry contributes 15.82 billion NZ dollars to its GDP (March 2021) and employs more than 170,000 employees in the first quarter of 2021 (Granwal, 2022). Yiu et al. (2021) pointed out that although relatively small in a global context, NZ has been experiencing a sustained growth rate of 7% since 2011. They also noted that lack of large-scale developments and low productivity has hindered the growth of the NZ construction industry. They also highlighted

the importance of avoiding and mitigating construction related disputes so that resources can be better allocated and focused on serving the economy. Construction conflicts are inevitable whether in NZ or elsewhere. But conflicts escalating into disputes referred to formal dispute resolution processes have negative impacts which may be destructive. These include causing worries, reflexive responses, deterioration of relationships among parties, and communication failures (Naismith et al., 2016).

Ramachandra and Rotimi (2011) observed a significant portion of disputes relate to payment issues. Their studies showed 80% of the 40 High Court cases they investigated were attributed to disputes relating to progress and final payments. Among those cases, only in 40% of the cases were the claimants successful in recovering all the money in dispute. Amongst the cases studied, the majority (82%) were between the clients and contractors followed by cases between contractors and sub-contractors (10%) and between clients and sub-contractors (8%).

Some aspects of construction contracts in NZ are regulated by the CCA and other legislation like the Building Act. The Ministry of Business Innovation and Employment in New Zealand (MBIE) reminds construction industry stakeholders that any residential construction in NZ that costs \$30,000 or more must be in a written contract and that business entities who do not have a written contract can be fined. The CCA came into effect in 2003. In 2015, Construction Contracts Amendment Act (CCAA) was established. Among the new requirements was for retention money to be held on trust in the form of cash or other liquid assets readily converted into cash, or in a form of a financial instruments (insurance or a payment bond) which is purchased from a registered banks or a licenced insurer (MBIE, 2017).

Based on literature review and a review of court cases over five years in NZ there are three main categories of construction related disputes namely (1) project uncertainty, (2) contract and process issues, and (3) people and behaviour issues. However, it has been further identified

that ultimate triggering causes of disputes (which are different from the main categories above) are the taking advantage of the conflict situation and the way the situation is handled at the early stages of conflict (Jelodar et al., 2016). Further, the party's inability to manage those triggering causes of disputes escalates the dispute situation and impedes sustainable relationship among the parties. Another NZ study suggests that power, personality, group dynamics, and organisation culture act as key factors in causing and resolving construction disputes (Naismith et al., 2016)

Construction disputes are discussed by many studies in NZ and globally. In NZ, there is legislation and standard forms of contracts are commonly used in construction projects. Several studies have been carried out on construction related dispute management in NZ. This paper aims to analyse existing knowledge on how construction disputes are managed in NZ. It also considers causes of disputes, dispute avoidance strategies, and dispute resolution methods.

3.4 Research Methodology

Literature review and court case review are the main methods adopted in this study. Literature review initially focused on findings in a global context in a broad manner followed by more in-depth review on the materials related specifically to NZ. Causes of construction related disputes, dispute avoidance strategies, and dispute resolution methods were the focus of the literature review. "Google Scholar" database was used to do the literature review by searching applicable key words. Only the "abstracts" of the searched materials were initially reviewed, and applicable ones were reviewed in more detail while highlighting and recording important issues in a spreadsheet. Findings from similar themes were analysed manually based on the core concepts and reported systematically.

3.5 Literature Review

3.5.1 Causes of Disputes in NZ

Globally many studies have suggested several ways of categorising the causes of construction related disputes. For example Kumaraswamy (1997) identified two main types of causes: (1) root causes (underlying reasons of the dispute) such as unfair risk allocation, unclear risk allocation, client lack of information and decisiveness, inappropriate contract type, unrealistic tender pricing, and unrealistic information expectations (2) proximate causes (immediately produces the effect) such as weak communication, inadequate briefs, and vague or slow client responses. Further, Diekmann and Girard (1995) developed another categorisation of causes of disputes with three main dispute attributes as people related (owner, contractor, and business relationship), project related (external and internal), and process related (pre-construction planning and construction contract).

In NZ, based on 40 NZ engineering and construction professionals involved in 80 cases, Yiu et al. (2021) summarised that the most common causes of disputes is change of scope (25%) and unrealistic expectations (25%) followed by quality and performance issues. However, an in-depth discussion with the same professionals shows the most common root cause or the essence of the causes of disputes is directly related to human factors such as performance, behaviour, and perception. A study based on NZ liquidators' reports and high court cases related to payment issues of construction industry (from 2008 – 2010) revealed that payment related disputes were commonly raised under provisions of the CCA following contractual breaches of standard conditions of contracts. This is despite the fact that these contracts provide remedies for delays and losses in NZ (Ramachandra & Rotimi, 2011b). Similarly, Ministry of Business Innovation and Employment in New Zealand (MBIE) emphasises that even though a construction contract attempts to prevent disputes, there are considerable number of disputes

in NZ due to causes such as (a) different perspectives of contractual provisions, (b) different levels of expectations on the quality of works, (c) late payments or payments that are not line with contract schedule, (d) underestimating the impact of making changes after accepting the initial bid, and (e) misunderstanding on the scale, complexity and time of the project ((MBIENZ), 2016). In NZ, payment related disputes is common and it is often caused by cash flow problems due to lack of financing from other concurrent projects, difficulties faced due to low initial capital, the way of thinking of the payers, easy exit of players, and the culture of poor payment in the construction industry (Ramachandra & Rotimi, 2015)

A dispute may be a mixture of three sources namely (i) project uncertainty, (ii) contract and process, and (iii) people and behaviour issues. It is important to ascertain where a dispute originated from (Jelodar et al., 2013). Moreover, during the development of a conflict to a dispute, the relationship among the parties deteriorates. This is illustrated in figure 4.

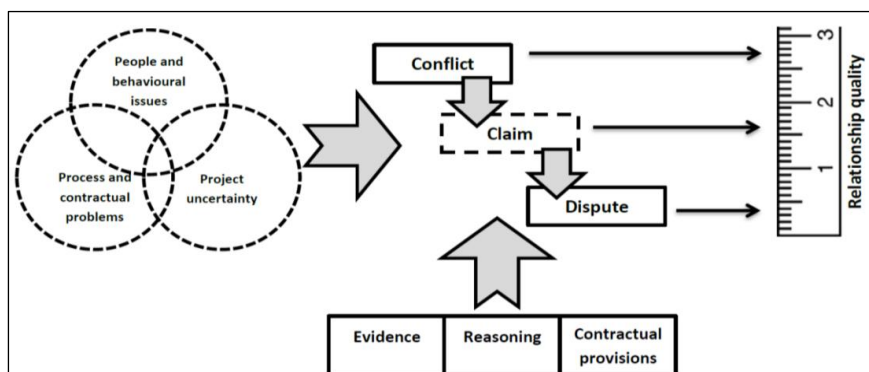


Figure 4: Relationship quality status in a conflict situation (Jelodar et al., 2013)

3.5.2 Dispute avoidance strategies in New Zealand

The existing literature in international contexts have suggested several models, approaches, and strategies to avoid disputes. Internationally, Naji et al. (2020) have presented a model based on fuzzy logic incorporated with Structural Equation Modelling (SEM) to evaluate the likelihood of dispute occurrence in traditional construction projects. Ayhan et al. (2021) used ML techniques to predict the occurrence of disputes.

Three recommendations to avoid construction related disputes have emerged from a NZ study by Yiu et al. (2021) namely to (1) define the scope of the project as early as possible and to make no major changes to the original scope after a specific point (defined as Scope Lock Point), (2) provide an opportunity to the parties to review the history of performance (with regards to behaviours, good faith, and business style) of the other party before entering into a contract and to comment on the performance of the other party and (3) encourage the entire NZ industry to behave consciously to avoid disputes in a professional and accountable way.

Finnie (2021) has proposed two-stage early contractor involvement (2S-ECI) in a NZ context in which firstly employ a contractor during the design stage, and then enter into a contract for construction. Even though there have been many benefits, the authors stress that 2S-ECI contractual practices remain generally unfamiliar in NZ. As a contractor is also involved during the design stage, the contractor and client have to draft a bespoke contract as there is no standard form of pre-construction services agreements (PCSAs) in New Zealand for employing contractors during the design stage. Finnie (2021) developed a framework to provide a clearer contractual procedure, identifying contractual ingredients during design stage, and to establish the effect of early involvement on the contractor's obligations during the construction stage. The author considered factors such as (1) when to treat claims for drawing details as variations, (2) the legal implications of a contractor's involvement in design development and (3) the legal implications on construction managers if there are claims from direct trade contractors against the client under a construction management procurement when developing the framework (Finnie, 2021).

It is important to include proper payment provisions in both standard conditions of contract and bespoke contracts to avoid disputes - particularly to avoid liquidation of construction companies (Ramachandra & Rotimi, 2011b). Ramachandra and Rotimi (2015) recommended few measures to mitigate payment related issues in NZ including (1) settling the financial

claims in a timely manner to ensure regular flow of cash during the progress, (2) obtaining financial guarantees at the early stage of a contract and to amend contractual provisions in line with those guaranties, and (3) incorporating mandatory requirements for prequalification of the financial status of funding parties.

The CCA 2002 provided a process to effectively deal with payments and disputes under a construction contracts in New Zealand ((MBIENZ), 2016). The first such Act – the Housing Grants Construction and Regeneration Act 1996 in the UK and Building Industry Security of Payments Act 1999 in New South Wales, Australia were the two initiatives that preceded the CCA (Ramachandra & Rotimi, 2011b). The CCA was developed with several objectives including (1) securing the release of withheld retention money (2) ensuring fair, balanced, and suitable payment provisions (3) providing the cost-effective adjudication process, and (4) providing an enforcement mechanisms to recover any overdue payments ((MBIENZ), 2017). After several years, some changes to the Act were proposed. These included to remove the distinction in treating residential and commercial contracts, the inclusion of professional services within the ambit of the Act, and to make the enforcement process more robust. These proposed changes were scrutinised by the Commerce Committee (David & Naseem Ameer, 2015). Industry practitioners responded somewhat moderately on the effectiveness of the CCA provisions by highlighting that, although the CCA expedites the resolution process of payment related disputes, it does not ensure the payments are made unless the timeframe for objection was shortened and the lack of comprehension of the act by lower-tier parties to construction contracts (Ramachandra & Rotimi, 2016).

As in numerous other countries, NZ has also developed a standard form of contracts for construction projects. This may help reduce disputes. Standard form construction contracts are used repeatedly on projects rather than developing bespoke or one-off contracts which are applicable only for a particular project. This helps ensure clarity, transparency, and consistency

in contracts while providing a known contract administration process and hopeful higher level of accuracy in making decisions (Finnie, 2021). Standards New Zealand (SNZ) (2013) mentioned, initially in 1987, NZS 3910 was published based on the NZS 623P:1984 and subjected to regular revisions over two decades. Subsequently NZS 3910:2003 was reviewed following feedback from the sector and analysis completed by the Engineering Leadership Forum. SNZ published three different standard forms based on the different procurement methods in 2013 as (a) NZS 3910:2013 (Conditions of contract for building and civil engineering construction– Principal design), (b) NZS 3916:2013 - Conditions of contract for building and civil engineering – Design and construct and (c) NZS 3917:2013 (Conditions of contract for building and civil engineering – Fixed term) (Zealand, 2013). All these three standard forms published in 2013 superseded NZS 3910:2003 and provided what is claimed to be a clearer document with reduced need for extensive special conditions. NZS 3910:2013 has a section on disputes and expressly provides for either party to refer a dispute to the Engineer and if that is not satisfactory, to refer it to mediation and subsequently arbitration. Adjudication as a statutory right always remains open to the disputing parties under the contract. In addition to the sections dedicated for general obligations, payments, and variations, NZS 3910:2013 provides a separate section with defaults by principal and contractor and how the affected party may deal with those situations (Zealand, 2013).

3.5.3 Dispute Resolution in New Zealand

Out of the responses received by Yiu et al. (2021), almost two thirds of the disputes were resolved by discussion and negotiation while some cases involved mediation and adjudication. No case was referred to litigation. The authors further mentioned, like dispute avoidance, the dispute resolution process was also impacted by human factors such as the personality or past experience of disputants. In NZ, all types of construction related disputes may be resolved

through statutorily provided adjudication whereas in Australia and Singapore, only payment related disputes may be referred to statutory adjudication (Cheung et al., 2009).

Even though legal issues with the mediation process in NZ were identified relating to confidentiality and the mediator's liability, mediation is a popular method of resolving disputes. Mediation enables the parties to negotiate and resolve disputes in a confidential, inexpensive, and innovative way (Brooker & Wilkinson, 2010; NZDRC, 2018). The New Zealand Dispute Resolution Centre (NZDRC) has developed a Mediation protocol to encourage mediation process in NZ and to provide guidance on the rights and responsibilities of the participants of a mediation process. However Naismith et al. (2016) suggest that mediation and arbitration are not generally used by the practitioners in NZ when resolving disputes and that they preferred collaboration and negotiation for both internal and external disputes.

Expert determination is another dispute resolution method increasingly being used in NZ. Campbell (2020) suggests that NZ courts should manage cases adopting prior expert determinations in a more liberal way by securing the freedom to contract and respecting the contractual intentions of the disputants.

An NZ study by Jelodar et al. (2016) emphasised that the availability of evidence, reasons, and proper implications of contract provisions are vital to manage a dispute effectively without adversely affecting the parties' long term relationship.

3.6 Conclusion and Further Research

Regarding dispute management in the NZ context, current knowledge is more related to causes of disputes, dispute avoidance strategies, and dispute resolution methods. There are several studies internationally which attempted to provide a comprehensive list of causes of construction related disputes. Some have categorised the causes based on the proximity of the

cause and the dispute event (proximate causes and root causes) while other studies focused on the stakeholders' perspectives. Many of the proposed categories of dispute causes in NZ are consistent with the core areas identified in international studies. Most importantly, most disputes in NZ occur as an impact of multiple causes. Based on court cases studied, in a broad sense, poor contract administration and understanding is the most common cause of disputes. Some researchers have suggested dispute avoidance strategies that are more strategic, such as involvement of a contractor during early designing stages and strengthening the bonds and guarantees. The CCA and standard forms of contracts were developed with provisions to avoid disputes and expediting payment processes, even though there were some concerns about its comprehension with some practitioners. In terms of dispute resolution, alternative dispute resolution methods are encouraged. This includes through legislation such as the right to progress payment, the right to refer a construction contract dispute to adjudication, and the mandatory obligation to ensure certain residential construction contracts above a certain value are made in writing. Others are measures that are encouraged – for example the encouragement to use mediation by the NZDRC. Not surprisingly, negotiation is the most used dispute resolution method in NZ.

Further studies may be carried out in NZ to investigate the possibilities of avoiding disputes in early pre-contract stages. Further, a comprehensive qualitative analysis of court cases with the aim of identifying the root causes of disputes in NZ would also be beneficial to both industry and adding to the body of knowledge in this area.

4 CAUSES OF DISPUTES IN THE CONSTRUCTION INDUSTRY – A SYSTEMATIC LITERATURE REVIEW

4.1 Chapter Introduction

From the background study, it has been identified that numerous studies on the causes of construction-related disputes were conducted. Also, most of those studies were limited to a geographic limitation, project type or procurement type, hence, a conclusive list of causes of disputes in the construction industry based on the previous studies was identified as paramount for both industry and researchers. In order to achieve this aim in a more objective and reliable way, a systematic literature review was conducted on the previous studies internationally which had focused on causes of disputes in construction industries. Further, this chapter aimed to identify a better categorisation of causes of disputes. The chapter is based on the following journal paper (published):

Silva, P.M., Domingo, N. and Ameer Ali, N.A.N. (2024), "Causes of disputes in the construction industry – a systematic literature review", Journal of Financial Management of Property and Construction, Vol. 29 No. 2, pp. 193-210. <https://doi.org/10.1108/JFMPC-03-2023-0012>

4.2 Abstract

The construction industry is complex, human-intensive, and driven by monetary values. Hence disputes are widespread. Initial conflicts among parties may develop into a disastrous dispute that costs the project success, good relationships and affects stakeholders' expectations. There has been a focus on causes of construction-related disputes, and studies over the past three decades have attempted to identify a more comprehensive list of reasons for disputes. Some of these studies' limitations were geographical, project delivery methods, and project types. This study attempts to identify the most recent and conclusive list of causes of disputes based on current literature by undertaking a SLR.

Considering the large number of studies that focused on causes of disputes, this study aims to develop a comprehensive list of causes, using a SLR as it ensures that all previous articles in multiple databases are reviewed to produce a comprehensive outcome. A six-stage SLR was followed from background study to analysis & reporting.

Not surprisingly, the number of publications has increased over time; most from the Middle East region. The interconnected nature of the causes was widely emphasised. The SLR has produced eight core causes of disputes. They are; poor contractual arrangements, employer-initiated scope changes, unforeseen site changes, poor contract understanding & administration, contractor's quality of works, the inability of the contractor to achieve time targets, non or delayed payments, and poor quality of design. The majority of previous authors realised that disputes could be avoided by parties' involvement during the early stages, avoiding being opportunistic, and acting collaboratively.

Even though numerous studies have been carried out to identify the causes of disputes in the construction industry, none did a SLR. This study aggregates all the previous studies that focused on construction-related disputes systematically. Categorising causes based on the party

primarily responsible help various stakeholders by providing a distinct list of factors to avoid that contribute to disputes.

Key Words: Causes of Disputes, Construction industry, Disputes, Systematic Literature Review

4.3 Introduction

The construction sector plays a significant role in the economic development of any country. Disputes are inevitable. Disputes occur between parties during the bidding, contract, and implementation stages (Sarı et al., 2021). Disputes are common in construction projects and are more frequent in complex projects. A dispute is associated with distinct justiciable issues and is caused by a conflict due to the incompatibility of interests among the parties (Fenn et al., 1997). With the notion that conflicts, and disputes are distinct phenomena, the authors assert that conflicts could be managed, but disputes require resolution, perhaps from an external party.

Many studies have proposed different categories of disputes or types of disputes. Nine types of disputes were stated by Atkin (2006) namely; variations to scope, contract interpretation, extensions of time claims, site conditions, late & incomplete, substandard information, obtaining approvals, site access, quality of design, and availability of resources. More abstractly, Semple et al. (1994) suggested six common categories of disputes premium time, equipment cost, financial cost, loss of revenue, loss of productivity, and site overhead-related disputes. Another study has grouped types of disputes as owner-related disputes, contractor-related disputes, design-related disputes, project related disputes and so on (Naji et al., 2020). Moreover, an Australian study by Al-Keim (2017) recognised nine key issues in disputes: scope variations, contractual clause interpretation, extension of time claims, site conditions, obtaining approvals, access to the site, design quality, late or incomplete information, and resource availability.

There have been many studies investigating the causes of construction disputes. For example, Kumaraswamy (1997) identified two main types of causes namely: (1) root causes (underlying reasons of the dispute) such as unfair risk allocation, unclear risk allocation, client lack of information and decisiveness, inappropriate contract type, unrealistic tender pricing, and unrealistic information expectations, and (2) proximate causes (immediately produces the effect) such as weak communication, inadequate briefs, or slow client responses. Many authors stated that many of the root causes of disputes could be mitigated using various project management strategies and associated tools and techniques, particularly during the pre-construction phase. With reference to a study by Kumaraswamy (1997), Cakmak and Cakmak (2013) initially categorised disputes into seven as disputes related to owner, contractor, design, contract, human behaviour, project, and external factor. Subsequently, Cakmak and Cakmak (2013) revealed causes for each category totalling 28 causes. Those causes appeared to be inclusive of many of the causes of disputes that had been identified by other studies as well. Based on both studies of Kumaraswamy (1997) and Cakmak and Cakmak (2013) another study was carried out by Cakmak and Cakmak (2014) in order to investigate the relative importance of all the 28 dispute causes using an analytical network process. Taking the 28 dispute causes identified by Kumaraswamy (1997) and Cakmak and Cakmak (2013) into account, Naji, et.al. (2020) did a comprehensive literature review to ascertain how many previous studies considered each of the dispute cause as depicted in Table 5. Moreover, Diekmann and Girard (1995) developed another categorisation of the causes of disputes as people related (owner, contractor, and business relationship), project related (external and internal), and process related (pre-construction planning and construction contract).

Table 4 : Causes of Disputes (Source: Cakmak & Cakmak, 2013; Kumaraswamy, 1997; Naji et al., 2020)

Category of Dispute	Causes of Dispute	Occurrences in Literature (out of 18 studies)
<i>Kumaraswamy, 1997 ; Cakmak & Cakmak, 2013</i>	<i>Kumaraswamy, 1997 ; Cakmak & Cakmak, 2013</i>	<i>Naji. et. al, 2020</i>

Owner Related	Variations initiated by the owner	8
	Change of scope	8
	Late giving of possession	2
	Acceleration	2
	Unrealistic expectations	9
	Payment delays	9
Contractor Related	Delays in work progress	8
	Time extensions	8
	Financial failure of the contractor	8
	Technical inadequacy of the contractor	4
	Tendering	8
	Quality of works	10
Design Related	Design errors	6
	Inadequate / incomplete specifications	4
	Quality of design	7
	Availability of information	5
Contract Related	Ambiguities in contract documents	10
	Different interpretations of the contract provisions	6
	Risk allocation	4
	Other contractual problems	8
Human behaviour Related	Adversarial / controversial culture	4
	Lack of communication	10
	Lack of team spirit	4
Project Related	Site conditions	5
	Unforeseen changes	6
External Factors	Weather	3
	Legal and economic factors	4
	Fragmented structure of the sector	2

Some studies relevant to specific project delivery methods were also available in the literature. For example, an Indian study by Fatima Fatima et al. (2019) identified four main causes of disputes for Indian Build-Operate-Transfer (BOT) projects namely (1) time phasing and requisite contracting legislation, (2) project financials and client contractor partnering, (3) quality and risk management under ambiguity, and (4) non-responsive owner and unrealistic contractor rules.

Several studies focused on disputes over only specific types of projects. For example, Abdul Nabi and El-adaway (2022) studied on modular construction projects and found that (1) payment holds and delays, (2) delay in project completion, (3) poor communication among the project stakeholder, and (4) lack of collaboration between various trades are common causes of disputes. They also found that disputes in modular construction projects are triggered mainly

by the occurrence of multiple causes rather than by just a single cause. Similarly, Tanriverdi et al. (2021) also highlighted that disputes do not occur due to an individual cause, but occur as a result of a combination of causes.

Few studies focused on the causes of disputes within a particular geographic constraint. A Norwegian study which focused on road and tunnel projects identified 16 reasons for disputes. Among them, four significant causes (tender specification and contract understanding, final settlement-payment related, low priced contracts, and changes in projects) were identified as similar to the four “root causes” in an initial study by Kumaraswamy in 1997 (Omar et al., 2019). Further, research on the causes of construction-related disputes by Mahamid (2016), HL and Sutrisna (2010), and Chan et al. (2021) were limited to Saudi Arabia, UK, and Canada respectively.

The causes of disputes in the construction industry have been a highly discussed area for the last three decades across the globe. The causes of disputes suggested by (1) Kumaraswamy (1997) and further developed by Cakmak and Cakmak (2013) and (2) Diekmann and Girard (1995) provides relatively more comprehensive and overall categorisations. Some studies have suggested types of disputes whereas some other studies suggested causes of disputes. However, several dispute-type categorisations are based on the underlying causes of disputes. Many studies were restricted to a particular geographical constraint, project type, or project delivery methods.

Due to the considerable number of causes of disputes suggested by many researchers, it is important to conduct an overall study focusing on the causes of disputes in the construction industry in a systematic method. The ability to identify almost all the previous studies is one of the main reasons for adopting a SLR, as the main objective of this study is to develop a conclusive list of causes of disputes taking into account all the previous related studies. SLR

has a defined and structured process that avoids subjectivity and personal biases when developing the list of causes of disputes. Hence the reliability and validity of the outcome is considered to be high. The SLR process is defined to grasp the previous studies' core ideas rather than separately identifying different words or phrases with the same core idea. In other words, SLR combines ideas from different sources effectively and without unnecessary duplications. Moreover, the SLR process enables analysing and presenting data both qualitatively and quantitatively. Hence this study has adopted the SLR method to identify the latest and most conclusive list of causes of disputes based on current literature, while ensuring that most of the related articles are reviewed from numerous search engines. This study also capitalises on the perspectives of the parties to the contract when analysing and presenting the insights of the causes of disputes.

4.4 Methodology

A SLR consists of four main steps namely (1) identifying the purpose of the study, (2) identifying literature sample (this includes three sub-steps; identifying primary literature, publication selection, and developing a publications database), (3) analytical activities (frequency analysis and content analysis) and (4) development of the research report (Czakoń, 2019 as cited in Michalski et al., 2022).

As the first step of the SLR, a background study on disputes in the construction industry was done. The aim of the study was then determined which is to investigate the status of literature on causes of disputes internationally. During the background study, some words appeared frequently and they were used as “keywords” in the subsequent stages of the SLR as long as those words aligned with the aim of the study. Google Scholar, Science Direct, and Web of Science were the databases selected for the study and all the searches took place in February 2023. Only peer-reviewed articles in English were considered. When searching for publications, main keywords used were “construction”, “dispute” and “cause” along with

comparable words such as “building” and “reasons”. Boolean operators, namely “AND” and “OR” were used for combining the searches. Additionally, asterisk (*) was used for multiple-character wildcard searches, which enables the capture of any forms of words that start with given characters. The search was done to filter the articles that includes (1) either “building (and any of its other comparable form)” or “construction (and any of its other comparable form)”, (2) “cause (and any of its other comparable form)” and (3) “dispute (and any of its other comparable form)”. The boolean formula for the literature search used was “(construction OR building) AND (dispute*) AND (cause* OR reason*)”.

These keywords were searched in the publication’s title, keywords and abstract sections. After filtering the searches as mentioned above, all those documents were exported to an excel file. The initial screening was then started by manually reviewing the entire abstract sections of each document. Although 435 articles were filtered after the search operation based on the above keywords, a significant percentage of those articles were not aligned with the identified aim of the study. Many articles matched the keyword criteria, but did not discuss the causes leading to disputes in the construction industry. For example, (1) Grossmann (2019) discusses the social impacts of energy efficiency policies in the housing sector, (2) Lee et al. (2021) presented an annoyance model for construction site noise and (3) Alpkokin and Capar (2019) discussed about alternative dispute resolution through dispute adjudication boards in Turkey. All these articles fulfilled the keywords criteria but did not align with the study aim. There were also many other articles related to dispute resolution in the construction industry, but which did not align with the aim of this study. From all the three search engines, only 59 articles were finally selected for further investigation.

The process is illustrated in the form of a flow diagram in Figure 5;



Figure 5 : Systematic Literature Review Process

The number of publications along the process of the SLR is summarised in Table 6.

Table 5 : Publication Summary

Search Database	Total Searched Articles	Total after initial screening	Total after excluding duplications	Total after detailed review
Google Scholar	68	11	9	7
Science Direct	105	15	14	7
Web of Science	262	33	33	30
<i>Total</i>	435	59	56	44

Following the initial screening, all duplicated publications were excluded, ensuring that a particular publication is not considered more than once. The “in-detail review” step focused on the entire article and further investigated to establish whether they included discussions on the causes of construction related disputes. The “initial screening” stage only focused on the title, keywords and the abstract sections whereas the “in-detail review” stage focused on the entire article. This resulted in the exclusion of a further 12 articles for the next stages. For instance, a study by Shin et al. (2021) was based on disputes that occur after the completion of the project (property disputes) and was not further considered for the study as it was not related to disputes that take place during a construction project. Further, Shahsavand et al. (2018) were focusing on the causes of delays and determination of the contractual responsibility of delays. The “identification of literature sample” step is followed by the in-detail review of 59 selected articles. It was finally determined that only 44 publications discussed the causes of construction-related disputes.

The third step of the SLR (analysis of data) focused on the 44 selected publications. All the causes of disputes (112 causes in total) highlighted by each publication were listed initially. As a fundamental mechanism to analyse data quantitatively, a “frequency of analysis” method was used to identify the number of times a particular cause of dispute occurred among the 44 selected publications. It was identified that many causes with different wordings have a common core idea and some have interdependencies. Considering the core idea of each of the 112 causes, 29 core causes of disputes were identified. Any cause of dispute with only one occurrence was only considered if it was suitable to be treated under any of the 29 core causes of disputes. The flow chart in Figure 6 illustrates the analysis process.

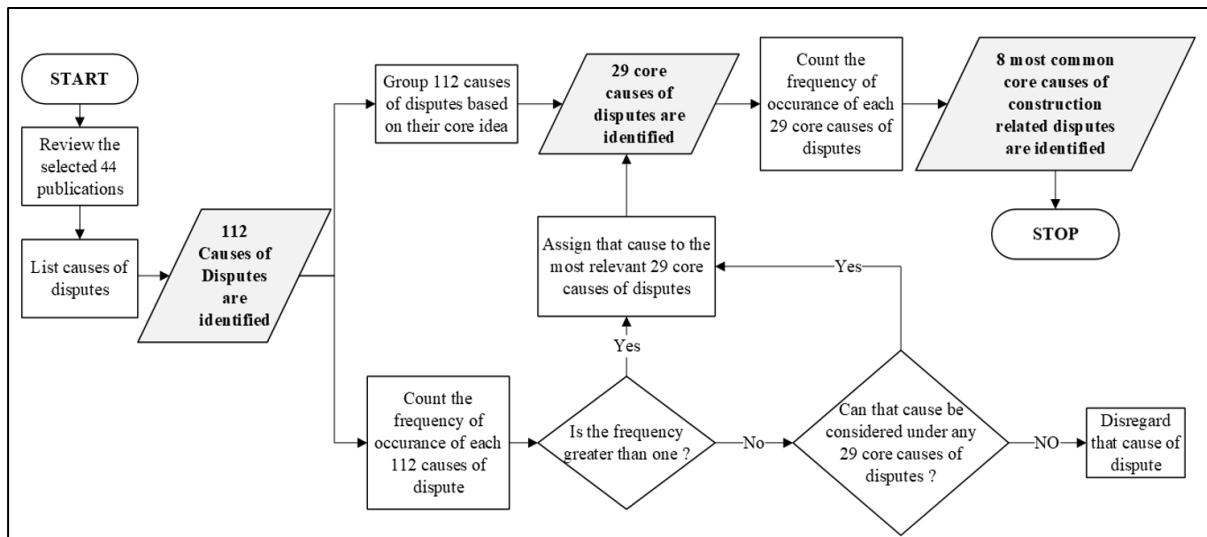


Figure 6 : Flow Chart of SLR Process

4.5 Findings and Analysis

Initial screening, checking on duplications and in-detail review led to a focus on 44 publications. The findings are presented below in quantitative and qualitative forms.

4.5.1 Quantitative Findings and Analysis

The articles that were published between 1997 and early 2023 are shown in Figure 7

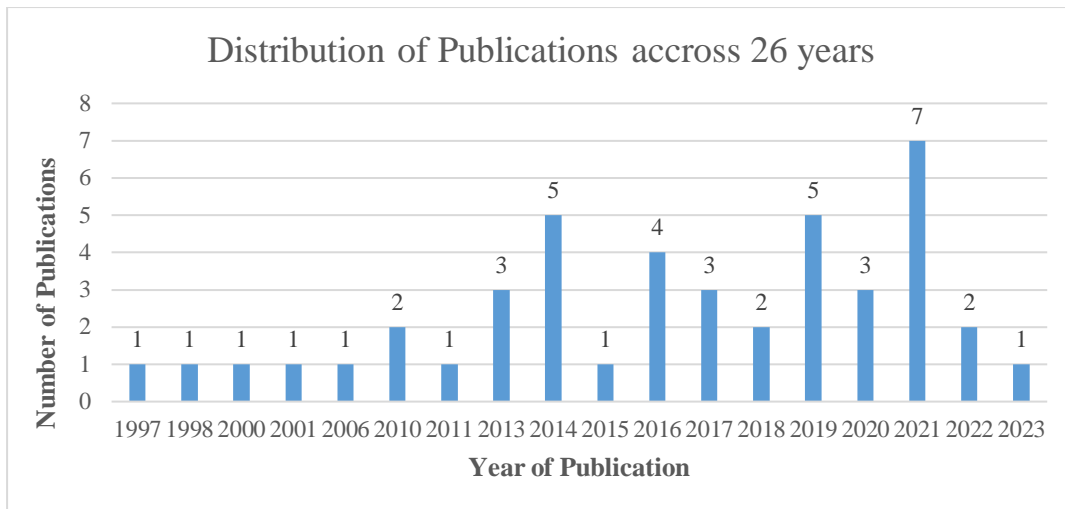


Figure 7 : Distribution of Publications across 26 years

From 1997 to 2010, only a few articles focused on the causes of construction-related disputes. However, from 2010 to 2023, there was an upward trend in the number of publications. The number of published articles in the focused area in 2021 was the highest (seven articles).

The geographical constraint for the selected articles is illustrated in Figure 8, including the number of publications for each country / geographical constraint.

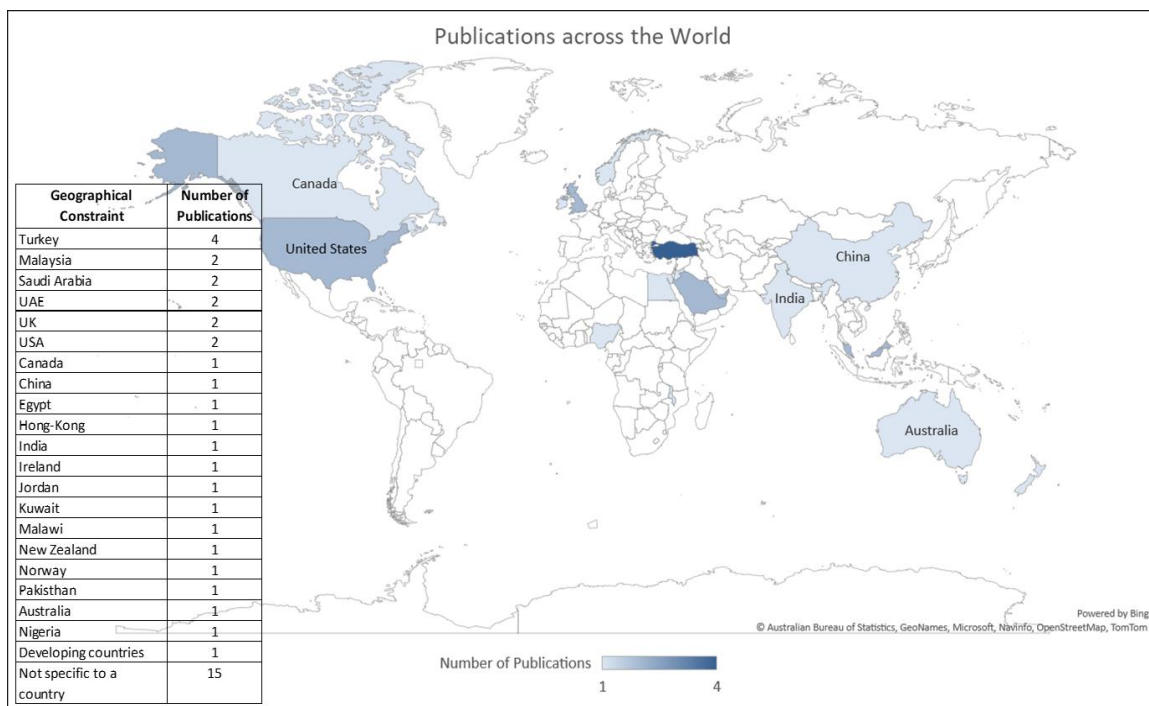


Figure 8 : Distribution of publications across the world

Among the 44 articles, 15 did not specify the geographical constraint their study relates to. However, a majority have clearly stated the applicable location for their study. Studies on the causes of construction disputes were highest in Turkey (four) followed by Malaysia, Saudi Arabia, UAE, UK and USA each with two articles. Apart from South America, all the other continents have published at least one article on the focused area. It is notable that a relatively larger number of studies were from the Middle East.

Almost 75% of the 44 articles neither focused particularly on a sub-sector of the construction industry nor on any other limitation such as procurement method or construction method. However, 4 studies focused on the causes of disputes on transport projects, while another three were limited to public projects. Two studies focused on causes of disputes in residential buildings and modular construction. Besides them, Tanriverdi et al. (2021) studied only on causes of disputes in design and built environment, while an Irish study by David et al. (2016) stressed on disputes of small to medium size businesses amidst a recession.

4.6 Qualitative Findings and Analysis

4.6.1 Summary of causes of disputes

After following the SLR steps as explained in section 2, 112 causes of disputes were identified. Many of those causes have similar core ideas. Twenty nine core causes of disputes were identified along with their frequency of occurrences in the selected 44 publications.

Based on the party who is responsible for the cause of dispute, all the identified 29 core causes of disputes were categorised under (1) employer responsible causes, (2) contractor responsible causes, (3) common causes (either employer or contractor responsible) (4) neither employer nor contractor responsible causes (external causes). Figure 9 illustrates all the identified 29 core causes of disputes along with their frequency of occurrences as appearing in the 44 selected publications.

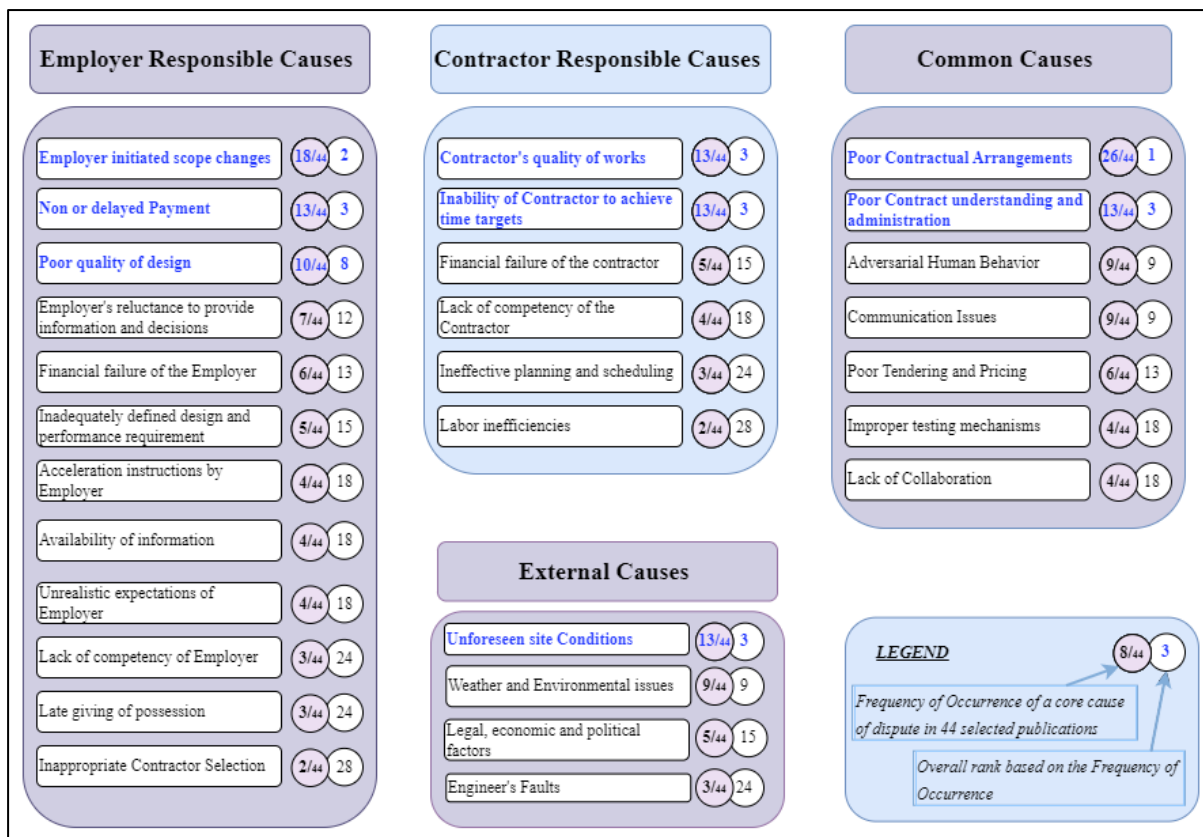


Figure 9 : Core Causes of Disputes

It has been identified that 12 core causes of construction-related disputes are solely attributable to the Employer, while 6 are solely attributable to the Contractor. Further, both or either one of Employer or Contractor is responsible for another 7 core causes of disputes. Figure 9 illustrates 29 core causes of disputes in descending order based on the frequency of occurrence in the selected 44 publications. “Poor contractual arrangements” was stated in more than half (26 out of 44) of the 44 publications and identified as a cause of the construction-related dispute in which most of the publications discussed. Employer-initiated scope changes, unforeseen site conditions, poor contract understanding and administration, contractor’s quality of works, the inability of contractor to achieve time targets, non or delayed payments and poor quality of design were discussed in at least 10 of the selected publications. Hence those eight core causes will be further discussed in the following section.

4.6.2 Core Causes of disputes explained

4.6.2.1 Poor Contractual Arrangements

Poor contractual arrangements are the most discussed core cause of disputes, as highlighted by 26 out of 44 publications. A study in Turkey by Cevikbas and Koksas in 2018 suggests that the construction contract is the most common cause of disputes in the Turkish context and found that 70% of Turkish construction contracts are drafted without considering the appropriateness of the type of contract or considered an analysis of how to resolve disputes when they arise.

The ambiguous nature of the contract is the most commonly cited attribute under this core cause of disputes (12 out of 44 publications). The ambiguous language of a contract document is identified as the main triggering cause to many other factors leading Viswanathan et al. (2020) to position it at the bottom of the Interpretive Structural Modelling (ISM) hierarchy. Ambiguous nature is further sub-divided as ambiguities (1) in the contractual provisions related to changed quantities in the Bill of Quantities, (2) in clauses that do not describe the intended work effectively and (3) in goal and performance requirements (Koc & Gurgun, 2021).

A UAE study reveals that many construction contracts do not distribute the risk among the parties reasonably and the majority of risks is borne by the contractor resulting in claims and disputes at the end (Elhag et al., 2019). “Unfair and unclear risk allocation” has been categorised as a root cause of dispute with a higher potential to avoid during an early stage by a Hong Kong study (Kumaraswamy, 1997).

Inappropriate project delivery method, inappropriate usage of a standard form of contract and inappropriate payment modalities are considered as problems against a better contractual arrangement (Kumaraswamy, 1997; Yildizel et al., 2016). However, Hashem M. Mehany et al. (2018) argue that even having proper project delivery methods and practising suitable contractual methods have no considerable effect on the emergence of disputes but that trust

among the parties and the performance of the contractor have a significant impact on avoiding disputes. Ting et al. (2014) opine that having a standard form of contract causes more disputes and stated that the majority of the construction projects are administered by standard forms of contracts. But this argument has to be considered against the fact that and in the context of many construction contracts being contracted using standard forms of contracts.

Inadequacy of the contract document is another key attribute for poor contractual arrangements as highlighted by 9 publications out of 44. The inadequacy of the contract is the main reason for many ambiguities (Chan et al., 2021). Specifically, the lack of sufficient agreements to govern additional works is the primary contributing factor to trigger disputes in most cases. (Cakmak & Cakmak, 2014; David et al., 2016). Unlike many publications which assert inadequacy of contract documents as a cause of disputes, a Canadian study based on supreme court cases by Chan et al. (2021) argues that, including excessive data (redundant contract documentation) to the contract have also caused many cases that had proceeded even up to the Supreme Court of Canada.

The nature of some contractual clauses contributes to many disputes. For example Hanna (2007) stresses frequent disclaimer clauses which attempt to deny responsibilities of a party, such as specific provisions that tell the contractor not to rely on the information contained in the contract specifications or drawings as they are indicative only or schematic illustrations, can cause many disputes during the post-contract stage.

Some other attributes that are considered poor contractual arrangement are unrealistic contract duration, unrealistic obligations, no contractual relationship to the procurement system, and unclear scope definition (HL & Sutrisna, 2010; Mahamid, 2016; Tanriverdi et al., 2021).

As a measure to overcome contractual issues, Maemura et al. (2018) suggest, based on their case studies in Vietnam, maintaining a transparent practice from the very early pre-contract

stage through negotiations, clarifications, and agreements between the contractor, employer, and their project teams on potential issues that could arise. This Vietnam study emphasises that many possible disputes related to contractual matters can be predicted at pre-contract stages and can even be minimised by effective negotiations and clarifications among parties. A Turkish study emphasises the importance of (1) fair agreement content, (2) compliance to the standard bidding and contracting procedures, and (3) clear and unambiguous language of contracts (Yildizel et al, 2016). An American study by Kilian (2003) identifies a significant drop in the number of cases caused by interpretations of contracts between 1992 and 2002 compared to the preceding decade. The author argues that this is due to the positive impact of the use of partnering and Design-Build practices. To avoid disputes arising out of contract documents, Lee et al. (2019) proposes a model to identify vulnerable clauses that trigger disputes based on Natural Language Processing (NLP).

4.6.2.2 Employer-initiated scope changes

As the second most frequent core cause of disputes, “employer-initiated scope changes” has been identified and mentioned in 18 publications. Change of scope can be additions, deletions, omissions, or changes in the nature of work. Most change orders are initiated and instructed by the client in the form of design changes (Love et al., 2011). Despite the advantages of employer-initiated scope changes for the owner, such as capitalising on the opportunities and allowing the owner to be flexible upon the construction issues, they are the causes of the majority of disputes. Seventy percent of disputes in Kuwait are related to change orders from the employer (Shalaby et al., 2018).

A study on construction-related disputes of public sector projects by Sari et al. (2021) reveals that increased or decreased scope of work contributed as the most significant cause of dispute in their study. Based on an evaluation of 120 contractors’ responses in Saudi Arabia, Mahamid (2016) could ascertain that change orders by the employer is one of the five most severe direct

causes of disputes in residential buildings. Not surprisingly, in a recession, changes to the agreed scope of work are considered one of the seven critical factors that cause disputes in small to medium enterprises in Ireland (David et al., 2016). In UAE, a study based on 150 construction professionals ranked “variations initiated by the owner” (either addition or deduction to the original scope) as the top cause of disputes among the list of 27 causes of disputes (El-Sayegh et al., 2020).

Love et al. (2011) further explain that scope uncertainties arise due to lack of client’s experiences, their unclear requirements, stakeholder needs, physical location, and the prevailing economic environment. Design uncertainties can be minimised, and constructability can be improved by involving the contractor during the early design process (Love et al., 2011).

4.6.2.3 Unforeseen site conditions

Being the third in the list of the frequency analysis “unforeseen site conditions” is emphasised by 13 of the selected publications in the SLR. The difference between the employer’s soil report at the pre-contract stage and the actual soil report by the contractor during the construction period and difference between the underground utility lines as compared to the expected utility line, trigger many disputes in design and build projects (Tanriverdi et al., 2021). Particularly in tunnelling projects, disputes often occur due to the inability to agree on the existing ground level (Abramson, 1998). The effects of sub-surface conditions, namely the water table level and soil condition, are highlighted in terms of their severity and frequency by Marzouk and El-Rasas (2014) in their Egyptian study.

4.6.2.4 Poor contract understanding and administration

While section 3.2.2.1 (poor contractual arrangements) focuses on the context of the contract document and the contractual setting in which the parties are working on, this core cause focuses on the practitioners’ attitude and how they deal with the contractual context. Poor

contract understanding and administration is emphasised by 13 publications (among 44 in total) and is categorised as a core cause which is attributable to either or both parties to the contract. A Norwegian study by Omar et al. (2019) states that “understanding of the contract and the tender specification” is the leading cause of disputes in Norway and further suggests Contractors have exploited the loopholes in contracts and tender specification and benefitted from it. The use of plain language construction contracts enhances the comprehensibility and readability of contracts and could be advantageous in reducing potential disputes (Ballesteros-Lintao & Ameer Ali, 2022).

4.6.2.5 Contractor’s quality of works

Mahamid (2016) categorised contractor’s quality of works as a severe cause (within the top five severe causes in his study) that directly impacts construction-related disputes. Generally, the quality of works falls into four categories: design, material, specification, and workmanship (Barman & Charoenngam, 2017). Works with minimal quality cause defects. Cevikbas and Koksall (2018) analysed 280 Turkish cases and ascertained that among those cases, 63 cases were due to defective works. Twenty five percent of the cases reviewed in the UK were related to non-compliance of the contract with regards to the quality of works - either structural or architectural (HL & Sutrisna, 2010). Another study in the UK reemphasises that defective works are the most common source of disputes, as 17 cases out of 48 cases filed in the technology and construction courts were due to defective works (Barman & Charoenngam, 2017). An Irish study based on case studies, particularly during a recession, also claims that defective work is the most common source of disputes (David et al., 2016).

A Turkish study done by Yildizel et al. in 2016 found “low quality of completed works” as the main cause of construction-related disputes in Turkey. Further, it states that unskilled labour and unsuccessful quality control and assurance systems are the underlying reasons for the low quality of work. Material selection and construction methods are related to quality issues in

construction projects. Poor connection between quality control by contractor and quality assurance by the consultant also leads to disputes (Kilian, 2003). The author further explains that misunderstanding among parties often causes disputes. Further, partnering and design-build practices offer beneficial outcomes due to their collaborative nature. Defects which reduce the quality of work are considered as a significant concern for disputes in China. Hence Cheng and Li (2015) proposed a genetic algorithm-based approach to discover trends of defects based on a study of 100 cases related to construction-related defects in China.

4.6.2.6 Inability of a contractor to achieve time targets

Delays can be either (1) “excusable” if a party cannot foresee the situation such as force majeure situations, labour disputes, unforeseen delays in transportation, or (2) “non-excusable” if a party can foresee the causing factor for a delay such as ordinary and foreseeable weather conditions, poor workmanship, contractor's financing problems (Iyer et al., 2008; Kraiem & Diekmann, 1987). Gardezi et al. (2014) suggests that delays that either party directly causes is considered “non-excusable.” On the contrary, if the cause of the delay is beyond any party’s control, it is considered as “excusable”. Among the various types of delays attributed to different parties, this core cause only focuses on delays attributable to the contractor.

The late delivery of construction projects which causes claims and disputes in Jordan is only identified in 10 projects out of the 130 cases studied (Al-Momani, 2000). Similarly, in the UK, only 5% of the cases studied were due to time extension issues (HL & Sutrisna, 2010). Even though UK studies identified “late delivery of projects” as a non-significant cause of dispute, an Indian study by Iyer et al. (2008) found that delays and related extension of time issues are the second most critical factors for disputes in India. Similarly, a Saudi Arabian study by Sadi et al. (2019) reveals that “delays caused by the contractor” is one of the five most significant contributors to claims and disputes, with a 74% relative significance. Further, many other

studies, including Cakmak and Cakmak (2014), Haron et al. (2020) and Parikh et al. (2019), also highlight the inability of the contractor to achieve time targets as prone to disputes.

4.6.2.7 Non or delayed payments

Non or delayed payment is mentioned as a cause of dispute in 13 out of the 44 articles reviewed. Disputes in modular construction projects in the US are triggered mainly by payment withholds and payment delays, as revealed by Abdul Nabi and El-adaway (2022) in their study of 39 open source legal cases in the US. Delayed payment is ranked as the 8th most critical factor (in a list of 25 factors) in an Irish study limited to small to medium enterprises amidst a recession. An Egyptian study based on a literature review, 33 expert interviews, and a questionnaire survey ranked non-payments for the completed work as the 1st, 3rd and 5th factors against the importance index, severity index and frequency index, respectively.

Non-payment or delayed payments are mainly due to the “cannot” and “would not” pay attitudes of payers. “Cannot pay” refers to payers’ financial difficulties due to failure to seek funding or not having sufficient money or improper cash flow management whereas the “would not pay” attitude lies with the payers’ intention to delay payments in order to manage their cash flow for other projects or reduce their overdraft facilities (Hillebrandt et al., 2002 as cited in Ramachandra and Rotimi, 2011). Poor financial management of the employer, inability to agree on the valuation of work done, delayed certification, use of paid-when-paid clauses with subcontractors, and reluctance to follow the contractual provisions when dealing with payments are mentioned as factors that affect timely payments by the employer (El-Adaway et al., 2017). Several studies have found that issues of payments in construction projects, including late and non-payments, are one of the significant reasons for disputes which subsequently may lead to suspension and even termination of construction contracts (Yates, 2003; Chan and Suen, 2005).

Research carried out in New Zealand by Ramachandra and Rotimi in 2015, ascertained the leading causes of payment-related disputes. These include cash flow problems due to delays and non-payments experienced on other projects, disputes over payment claims and responses, cash flow difficulties due to lack of initial capital, the attitude of payers, the easy exit of players, and the general payment culture of the industry. To avoid payment-related disputes, it is important to provide detailed payment clauses in the agreements and for clients to restraint themselves from carrying issues further to court (Yildizel, 2016).

4.6.2.8 Poor quality of design

Errors in the design, inadequate or incomplete specifications and inconsistencies between drawings and specifications are characteristics of a poor design (Al-Momani, 2000; Haron et al., 2020; Tanriverdi et al., 2021). Designs with errors and inconsistencies with the drawings and specifications were identified as the third and fourth most significant causes of disputes in the Saudi Arabic construction sector (Sadi et al., 2019).

Mistakes in specifications are used opportunistically by Norwegian contractors to benefit themselves unfairly, and it subsequently has led to many conflicts in the Norwegian construction sector (Omar et al., 2019). Specifications providing minimal details on the specific materials to be used cause disputes (Abramson, 1998). Poor information in survey plans, tolerance details, subsurface status, inaccurate dimensioning, and construction methods led to many disputes in tunnelling projects in Northern America (Abramson, 1998).

Several good practices to overcome design-related issues are proposed, aiming to minimise the susceptibility to disputes in the long run. For example, seeking services from industry professionals, collaboratively conducting design sessions, and investigating the construction site in greater detail to clear the unforeseen conditions can help minimise design errors (Yildizel et al., 2016).

4.7 Discussion

The focus by researchers on the causes of construction-related disputes led to this comprehensive study in this area. To enhance the credibility of this study a more methodical and elaborate method was adopted - the Systematic Literature Review (SLR) method. Most of the studies were limited to a particular geography (28 studied out of 44). Among them the studies by Al-Momani (2000), HL and Sutrisna (2010), Omar et al. (2019) and Abdul Nabi and El-adaway (2022) were limited to Saudi Arabia, UK, Norway and the US respectively. Some placed limitations on the type of the project. For example Mahamid (2016) focused only on residential buildings and Parikh et al. (2019) focused only on highway projects and project delivery methods. Tanriverdi et al. (2021) focused only on design and build projects.

The perspectives authors have looked at when categorising the causes of disputes were different. However, Kumaraswamy (1997), Cakmak and Cakmak (2013) and Naji et al. (2020) followed an identical and inherited categorisation of causes of disputes. Their categorisations consisted of main dispute-causing groups: owner related, contractor related, design related, contract related, human behaviour related, project related, and external factor related. Molenaar et al. (2000) and Tanriverdi et al. (2021) followed the same categorisation of dispute causes proposed by Diekmann and Girard (1995) which includes main categories as people related (owner, contractor and business relationship), project related (external and internal), and process related (pre-construction planning and construction contract). This study primarily focused on the contractual parties to a construction contract and categorised causes of disputes into four main groups: employer responsible, contractor responsible, both parties responsible, and external causes. The categorisation considers the party most likely to be responsible for each cause of dispute.

Naji et al. (2020) investigated the frequency of occurrence of 28 causes of disputes (as proposed by Cakmak and Cakmak (2013)) considering 18 previous studies and found that contractor's

quality of works, ambiguities in contract documents, lack of communication, employer's unrealistic expectations, and employer's payment delays are the five most frequently discussed causes. However, this study, which followed a SLR based on 44 previous studies, identified poor contractual arrangements, employer-initiated scope changes, unforeseen site changes, poor contract understanding & administration, and contractors' poor quality of works as the most prevalent causes of disputes in the literature.

4.8 Conclusion

The intricacies of construction projects and the divergent interests among stakeholders contribute to the persistent high rate of dispute occurrence. A conflicting opinion among parties may develop into a formal dispute which ultimately hinders the project's success and expectations of each party. Internationally, disputes in the construction sector have been discussed widely over a few decades and investigating the causes of disputes has been a common interest.

Literature focusing on the causes of construction industry disputes is sometimes limited to a particular criterion, for example, geographical constraint, project delivery method, or a type of project. Some studies may be counted as general studies without such limitation. The causes of disputes were categorised based on the proximity of the disputed event and its cause (proximate causes and root causes) and the stakeholder's perspective. Types of disputes were also identified in some studies, however, amongst them, few have defined "types" of disputes based on the "cause" of dispute. Given the interconnected nature of several distinct causes of disputes, it is extremely difficult to extract a single cause for a particular dispute..

Through a SLR conducted in this study, a comprehensive list of 29 core causes of disputes has been identified. These causes have been categorised into 4 main categories based on the party or factor primarily responsible for each cause. Amongst those 29 core causes, 8 of them, namely

(1) poor contractual arrangements, (2) employer-initiated scope changes, (3) unforeseen site changes, (4) poor contract understanding and administration, (5) contractor's quality of works, (6) inability of the contractor to achieve time targets, (7) non or delayed payments, and (8) poor quality of design, were highlighted by at least one quarter of the 44 publications and therefore considered as the most common 8 core causes of disputes.

Causes of construction-related disputes have been discussed by many authors. Among those authors, many have limited their studies to a particular geographical constraint, project type, or contract type. Even though many studies focused on the causes of construction-related disputes, none did a complete systematic literature review. This study reviewed existing literature methodically by using a systematic literature review and identified 29 core causes of disputes. Those 29 core causes of disputes were then categorised based on the most responsible party for each core cause.

The findings could be helpful for both researchers and industry practitioners. The adoption of Systematic Literature Review has produced an objective, unbiased, and more conclusive list of causes of disputes in the construction industry due to the structured nature of SLR process and the selection of a large sample of articles. Both researchers and industry practitioners can rely on the list of causes of disputes produced with greater confidence. Researchers can use the identified "29 core causes of disputes" or the "8 most frequently discussed core causes" as a basis for an in-depth, qualitative study on those causes. Further, the frequency of occurrences of each cause provides a robust insight into what causes of disputes the past studies were more concerned about. This better informs industry and academia on the primary causes of disputes in industry that is worth paying more attention. Industry practitioners can refer to these findings to become aware of the core causes that lead to disputes and try to avoid them well in advance. The categorization of causes based on the party primarily responsible allows each party to refer to the causes that are specifically classified under their respective responsibility. This facilitates

a more targeted understanding of the causes relevant to each party's role in the construction project.

5 QUANTITATIVE ANALYSIS OF CONSTRUCTION-RELATED LEGAL CASES IN NEW ZEALAND

5.1 Chapter Introduction

As pointed out in chapter three, several studies in the NZ construction industry followed court case analysis to gain more realistic insights into actual disputes. Similarly, this study also conducted a quantitative and qualitative court case analysis to grasp realistic information on the types of disputes and causes of disputes which were heard before NZ courts. This chapter presents the quantitative findings of the court case analysis. The quantitative analysis focused on identifying the most prevalent procurement path leading to disputes and common causes of disputes in NZ. This helped narrow down the scope for the remainder of the research. The chapter is based on the following conference paper (published);

Silva, P.M., Domingo, N. and Ali, N.A.N.A., 2023. Quantitative analysis of construction-related legal cases in New Zealand. In: Sandanayake, Y.G., Waidyasekara, K.G.A.S., Ramachandra, T. and Ranadewa, K.A.T.O. (eds). Proceedings of the 11th World Construction Symposium, 21-22 July 2023, Sri Lanka.[Online]. pp. 900-908. DOI: <https://doi.org/10.31705/WCS.2023.72>. Available from: <https://ciobwcs.com/papers/>

5.2 Abstract

The construction industry in NZ plays a significant role in the country's economy. Similar to many other countries around the world, the construction industry in NZ also prone to many disputes which sometimes ended up in courts. To investigate comprehensively the disputes in the construction industry, several researchers have analysed court cases internationally. There is only a limited number of studies in NZ construction industry that followed court case analysis. This study has been carried out in search of quantitative aspects of 35 construction industry related court cases in NZ. Based on the studied 35 court cases in NZ, most of them have fallen into payment issues, quality of works and variation entitlements. Poor contract understanding and administration, Contractor's quality of work and poor contract arrangement have been identified as the most recurring primary causes of disputes. Further, majority of cases that heard before NZ courts had followed lumpsum contracts and traditional procurement route. The findings of this study is beneficial to the construction industry practitioners to avoid disputes by early identification of common issues in the industry.

Keywords: Causes of disputes; Court case analysis, Disputes in NZ

5.3 Introduction

Kumaraswamy (1997) has defined a dispute as a "situation in which a claim or assertion made by one party is rejected by the other party and the rejection is not accepted in return". Disputes in construction projects hinder the project's success as they largely impact the time , cost and quality objectives of its parties (Naji et al., 2020).

5.3.1 Studies on court cases related to the construction industry

Given the importance of investigating disputes in the construction industry, many researchers have focused on this area. One of the main data collection methods for those studies related to disputes in the construction industry were "court case analysis". Court case analysis provides

an in-depth understanding of how judges make decisions and examines factors such as policy considerations and different viewpoints on past cases (Sunstein, 2005).

Davenport and Brand (2013) investigated how Australian high courts have relied on the effectiveness of the time bar clause in the case *Andrews v. Australia and New Zealand (NZ) Banking Group* case. To investigate the reasons for escalating the disputes from the arbitration and adjudication to litigation in England and Wales, a review of 48 legal cases were conducted by Barman and Charoenngam (2017). Arditi and Pulket (2005) gathered information from 114 construction related court cases in USA to develop a decision making tool based on a boosted decision tree system capable of forecasting the result of construction litigation.

5.3.2 Studies on NZ court cases related to construction industry

Jelodar et al. (2016) reviewed court cases in NZ from 2009 to 2014 and revealed (a) opportunistic behaviour, breach of contract, poor workmanship and contract and documentation problems, are the most common causes of disputes, (b) how relationships among the parties get impacted by a dispute and (c) the importance of proper contractual provisions, evidence and reasoning to manage a dispute smoothly. Amongst the studied cases, 70% of the total court cases were triggered by multiple causes, hence the complexity of the causes was highlighted. Further, their study identified, disputes between client and the Contractor as the most frequent type of dispute to proceed to the courts while disputes between the Contractor and the sub-contractor being the second largest. Similarly, Ramachandra and Rotimi (2011b) also ascertained amongst the cases studied, the majority (82%) were between the clients and contractors followed by cases between contractors and sub-contractors (10%) and between clients and sub-contractors (8%). This study examined the nature of payment problems in NZ by analysing 40 court cases (by identifying the parties, nature of the payment dispute, claimed amount and status of the final judgement) and liquidator's report. Moreover,

80% of the cases which were examined in this study were related to progress and final payment disputes.

5.3.3 NZ Legal System

NZ legal system has diverged from the traditional English legal system in many aspects and it protects the customary or indigenous rights (Penk & Russell, 2018). In 1840, British Crown and Māori chiefs entered into an agreement called, "Treaty of Waitangi" which emphasises the relationship between the Crown in NZ and Māori (Ministry of justice, 2020). Similar to England, NZ's constitution remains unwritten, but the parliament has passed many statues namely Constitution Act 1986, the State Sector Act 1988, the NZ Bill of Rights Act 1990. The sources of NZ law are mainly the parliament, where statues are originated and the courts, where case laws being initiated (Penk & Russell, 2018).

In New Zealand, construction contracts are governed not only by the Construction Contracts Act (CCA) but also by the Building Act. The Ministry of Business, Innovation and Employment (MBIE) stipulates that all residential construction work valued at NZD 30,000 or more must be covered by a written contract, with fines applicable to businesses that fail to comply. The CCA, which came into effect in 2003, was later amended through the Construction Contracts Amendment Act (CCAA) in 2015. The amendment introduced a key requirement for retention money to be held in trust, either as cash or other liquid assets, or as financial instruments such as insurance or payment bonds by enhancing protection and transparency in payment practices.

The court system, which belongs to the government and few private sector entities involve in dispute resolution process in NZ. The hierarchy of court system in NZ follows common law jurisdictions similar to United Kingdom (UK) and Australia which allows to appeal the decisions of lower courts in higher courts. The court hierarchy is basically consisted of three

levels namely higher courts, lower courts and tribunals and authorities as illustrated in the figure 10.

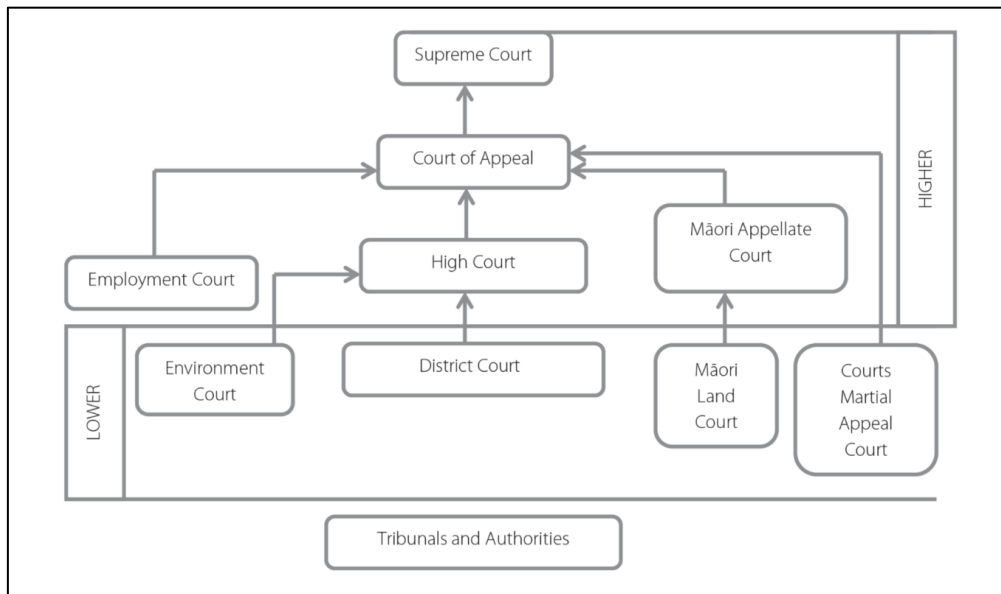


Figure 10 : Hierarchy of court system in NZ (Source: Penk and Russell, 2018)

In summary, several studies around the world preferred court case analysis as their data collection method to achieve various research objectives such as investigating the usage of contractual provisions and developing decision-making tools to predict judges' decisions. However, in NZ, there are very limited number of studies regarding the construction related disputes such as the (a) study by Jelodar et al. (2016) which focused on how the relationship among parties gets impacted by a disputed environment and (b) study by Ramachandra and Rotimi (2011b) which focused on the payment related dispute. This study mainly aims to identify frequent causes of disputes and common types of disputes in the NZ construction industry. Additionally, it attempts to recognise what procurement and contract types have mainly contributed to disputes. The said aims were expected to be achieved using quantitative analysis of court cases in NZ construction industry.

5.4 Research Methodology

This paper presents the findings of only a part of a more extensive study. Researchers have already identified 28 causes of construction-related disputes under four main categories by conducting a systematic literature review. An in-detail court case analysis on the cases which were heard before the courts in NZ was carried out to study their causes more comprehensively. A simple methodology from the selection of cases step to the reporting step was followed as depicted in the figure 11.

"Lexis Nexis - NZ" is a powerful and user-friendly online database that has the ability to search cases and legal information effectively and accurately. Therefore, it has been used as the database to review the cases. "Lexis Nexis - NZ" contains number of varieties of cases and does not limit to construction cases. Users of Lexis Nexis have the ability to filter cases which were categorised based on "catchwords". Hence firstly the main category, "Building and construction" was selected, secondly under that main category, only three sub-categories namely "Building Contracts", "Construction" and "Subcontractors" were selected leaving four other sub-categories unselected as they were irrelevant to the focus of this study. Seventy cases were reviewed initially and almost half of them were not further considered as they were related to condominium property, building consent or litigation procedure-related disputes.

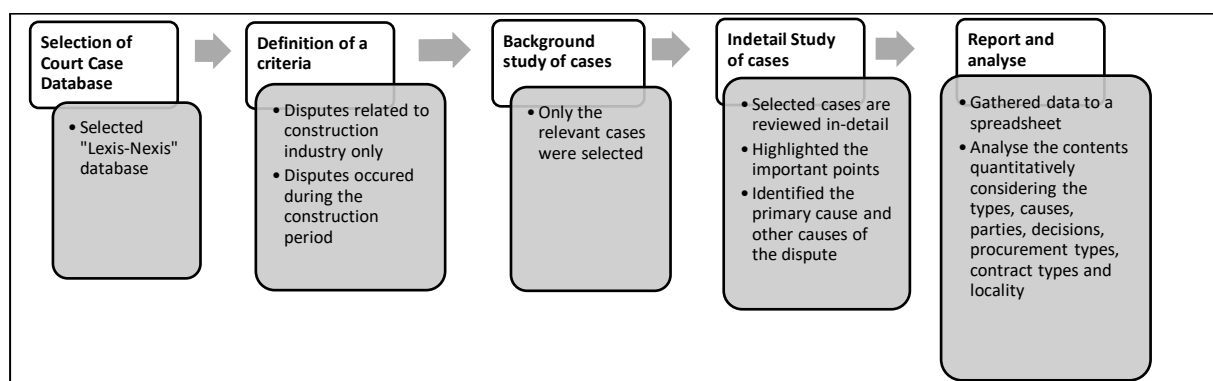


Figure 11 : Research Methodology

The detailed study on the cases were carried for the selected 35 court cases. In each selected case, background information, location, year, primary cause of dispute, other causes and type of dispute were the main aspects recorded in the spreadsheet database. The cases were categorised mainly under eleven causes and analysed qualitatively and quantitatively. However, this paper only presents the quantitative findings. It is possible to bring quantitative aspects even for qualitative data by employing approaches such as frequency counts (by summarising the occurrence of different themes) and descriptive statistics (by calculating measures such as mean, mode and median) (Bryman, 2016; Saldaña, 2015). The reviewed cases were categorised and coded into eleven causes of disputes and 16 types/areas of disputes. Further, those cases were also categorised considering their procurement methods, contract types and locations. Under each category, the frequencies of occurrences of the selected cases were calculated to determine the most common/significant causes, types, procurement types, contract types and locations of construction-related disputes in NZ.

5.5 Findings and Analysis

Within the selected 35 court cases, eleven "primary causes" of disputes have been identified. The number of cases identified against each of the primary causes is listed in the table below.

Table 6 : Primary Causes of Court Cases

Primary Cause	Total
Poor contract understanding and administration	10
Poor contractual arrangements	7
Contractor's quality of works	5
Unrealistic Expectations of Employer	4
Non or delayed payments	3
Unrealistic Expectations of Contractor	1
Employer-initiated scope changes	1
Weather and Environmental Issues	1
Engineer's faults	1
Financial Failure of Contractor	1
Other sub-contractors' conducts	1

Most cases (10 out of 35) were related to "poor contract understanding and administration" which can be considered as a broad "primary cause" with several sub causes such as the party's unilateral decisions, poor instructions, improper reasoning and non-compliance to the contract document. Poor contractual arrangements and quality of the Contractor's work have also caused many construction disputes that have gone up to NZ courts.

Several uncommon causes were also identified namely the Engineer's faults, the financial failure of the Contractor, and other sub-contractors' conducts. Even though a primary cause of each case was identified, several cases were triggered due to multiple reasons; for instance, in "Andrews Property Services Ltd v Body Corporate" (2017), the defendant decided to depart from one of its liabilities unilaterally and on the other hand appellant had not clarified design details during pre-contract stage, therefore this particular case was triggered by multiple causes. Moreover, in a case heard before the High Courts, NZ; "HSU v MAHONEY" (2021) was caused by lack of supervision by Employer and non-compliance to the construction Standards by the Authors have further attempted to identify common areas of disputes among the selected 35 cases. Figure 12 depicts the areas and causes that led to a particular dispute area. Disputes related to payment issues were found on most cases (12 out of 35 cases) and causes for that dispute area were poor contract understanding and administration, poor contractual arrangements, non/delayed payments, Contractor's quality of works and weather and environment issues.

	Poor Contract Understanding and Administration	Poor contractual arrangements	Contractor's quality of works	Unrealistic expectations of Employer	Non or Delayed Payments	Unrealistic expectations of Contractor	Employer initiated scope changes	Weather and Environmental Issues	Engineer's faults	Financial Failure of Contractor	Other sub-contractors conducts
Payment Issues	4	3	1		3			1			
Quality of works			3	1							
Vairation Entitlement		1					1				
Termination	1										1
Variation Procedural	1								1		
Compliance to authority			1	1							
Continuation of the Contract	1					1					
Design responsibility		1									
Act in Good Faith				1							
Undefined Party		1									
Who should pay for the works		1									
Compliance to Employer's Instruction	1										
Contractor's Design				1							
Abandon works										1	
Testing and Inspection	1										
Suspension	1										

Figure 12: Primary causes and common areas of disputes

Though many stakeholders are involved in construction projects, disputes between the Contractor and the Employer are identified as the most common, accounting for 26 out of 35 cases. Amongst the cases between employer and Contractor (27), 15 were claimed/appealed by Contractor, and eight cases were decided in favour of Contractor. The rest of the 12 cases were claimed/appealed by employer, and employer managed to obtain a decision for their side in 7 cases. A total of 4 cases were identified between the Contractor and the sub-contractor in which majority of them were claimed/appealed by the sub-contractor (3 cases out of 4) who managed to win two of them. Overall, the claimed/appellant party were only successful in 15 cases. Table 8 shows the summary of court cases based on parties and their decisions.

Table 7 : Disputant parties in Cases

Parties	Claimed / Appealed by	Decision in Favour of				
		Contractor	Employer	Sub-Contractor	Consultant	Authority
Employer VS Contractor (26)	Contractor (16)	8	8			
	Employer (10)	7	3			
Contractor VS Sub-Contractor (4)	Contractor (1)			1		
	Sub-Contractor (3)	2		1		
Contractor VS Consultant (2)	Contractor (1)				1	
	Employer (1)		1			
Authority VS Contractor (1)	Authority (1)					1
Employer VS Sub-Contractor (1)	Sub-Contractor (1)		1			
Employer VS Consultant (1)	Employer (1)		1			
		17	14	2	1	1

Traditional procurement, in which the Contractor only involves to the construction relying on the design provided by the employer, is identified in 70% of the cases as shown in figure 13. Importantly, findings show that extremely low number of cases (3%) were reported with regard to "design and built procurement" method. Some cases were raised from labour only (7%) and material only (7%) procurement settings. Besides the cases between employer and Contractor, few cases were reported between employers and consultants and contractors and authorities as well.

Cases were reported in various contract types. More than one third of cases (39%) were raised from lumpsum contracts whereas cost reimbursement contracts and measure and value contracts were highlighted in 13% and 9%, respectively. Noticeably, the parties of one out of ten cases have not agreed to a type of their contract at all. In some instances, parties had entered into very specific contracts such as "Working together agreements" and mixed type of contracts but could not resist carrying their disputes to the courts.

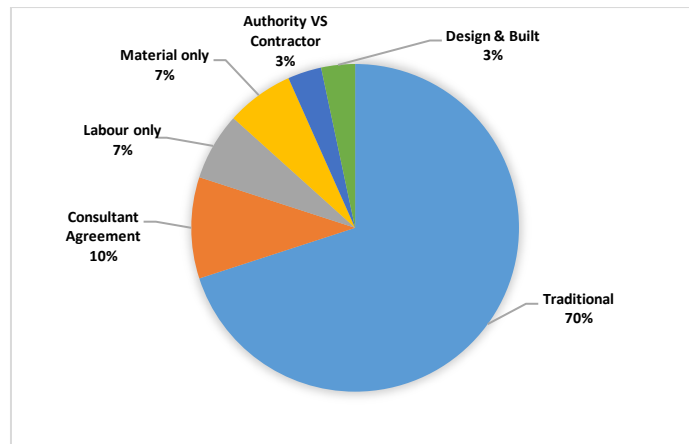


Figure 13 : Distribution of cases based on procurement type

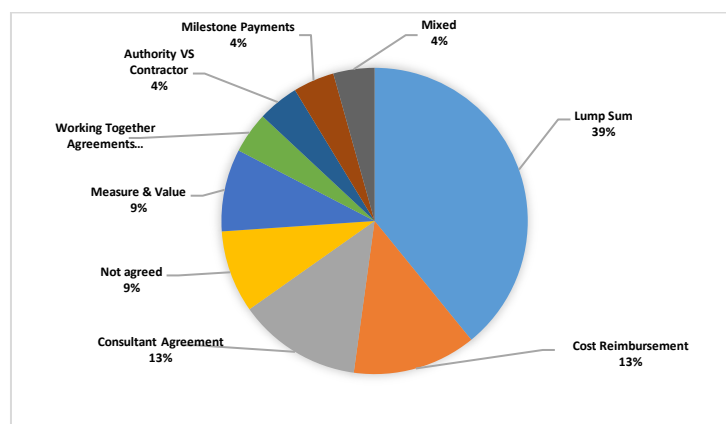


Figure 14 : Distribution of cases based on Contract Type

Amongst the studied cases, 23 of them had written contracts. Out of those 23 cases, 10 of them have clearly mentioned that parties had followed a standard form of contract such as NZS 3910:2003. However, three cases had not had a written contract at all.

The studied court cases were heard before different levels of courts in NZ as shown in the below list.

- Supreme Court = 8 cases
- Court of appeal = 11 cases
- High Court = 10 cases
- District Court = 6 cases

Most of the cases which were initially referred to high court or district court were subsequently referred to a superior court. Based on the cases reviewed, most of them were finalised at the Court of Appeal. It is important to highlight that 8 out of the 35 cases studied (about 25%) were heard in the highest court in NZ – the Supreme Court.

As shown in figure 15 below, court cases were reported across the two islands of NZ. However, the majority of them were reported in Auckland (16 cases) and Wellington (12 cases).

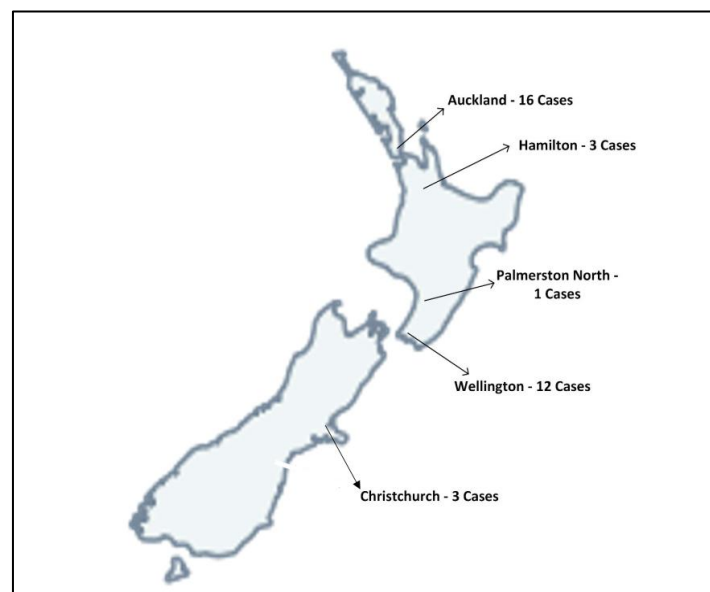


Figure 15: Geographic distribution of cases across NZ

5.6 Discussion

A previous study by Jelodar et al. (2016) reviewed court cases in NZ from 2009 to 2014 and revealed 26 causes of disputes and amongst those causes, opportunistic behaviour, breach of contract, poor workmanship and contract and documentation problems were identified as the most common. The study by Jelodar et al. (2016) have identified causes of disputes in a narrower manner whereas this study identifies causes more broadly. In other words, the causes of disputes identified in this study can be seen as overarching factors or themes that encompass multiple causes identified in Jelodar et al.'s (2016) study. Further, the said previous study has

highlighted that a significant number of disputes (around 70% of the cases examined) were instigated by multiple distinct causes, aligning with the findings of this study.

Two prior studies conducted in New Zealand have explored the parties that frequently contribute to disputes. Ramachandra and Rotimi (2011a) revealed that four-fifths of the cases in NZ were between the employers and contractors and Jelodar et al. (2016) found that disputes between employer and the contractor as the most frequent type of dispute to proceed to the courts. Similar to those previous studies, this study has also revealed that most construction disputes were between employers and contractors.

5.7 Conclusion

Analysing court cases has been a popular research method for many studies related to disputes and law. As a part of a larger study, this paper has presented only quantitative findings of 35 court cases in the construction industry of NZ. The most significant cause of a particular court case has been considered as "primary cause" and eleven "primary causes" of disputes were identified. Poor contract understanding and administration, poor contractual arrangements, Contractor's quality of work and unrealistic expectations of employer were identified as the most frequent "primary causes" of disputes. Similar to few previous studies in NZ, payment issues were highlighted in most of the cases followed by disputes related to quality of works, variation entitlement and termination. Most of the cases were between contractors and employers in which Contractor claimed/appealed often. Traditional procurement route and lumpsum contracts were reported in most of the cases. The findings of this quantitative study pave the path for an in-depth study investigating the reasons and avoidance strategies for the disputes which arise out of traditional procurement route and lumpsum contracts in NZ. Industry practitioners can also be aware of more common types of disputes and causes that mainly contribute to each type of dispute in NZ.

6 ATTRIBUTE ANALYSIS OF LEGAL CASES IN NEW ZEALAND CONSTRUCTION INDUSTRY

6.1 Chapter Introduction

Following the quantitative analysis of the legal cases as explained in chapter 5, this chapter discusses the qualitative aspects of the causes of disputes in court cases. The qualitative aspects, including the significance of dispute causes, the relationships among them, and underlying themes, were investigated in the study's second objective and are discussed in this chapter. The identified characteristics of the causes of disputes were purely based on the actual court cases in NZ; therefore, it has given a more realistic and more specific idea of the causes of disputes in the NZ construction industry and insights of avoidable causes of disputes. This chapter is based on the following journal article (published):

Silva, P.M., Domingo, N. and Ameer Ali, N.A.N. (2024), "Attribute Analysis of Legal Cases in the Construction Industry ", Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, <https://doi.org/10.1061/JLADAH.LADR-1194>

6.2 Abstract

Disputes in the Construction industry are inevitable and badly impact a construction project's objectives. Hence, causes of disputes were discussed internationally and in New Zealand (NZ), utilizing various research mechanisms that gathered data from literature, experts, and cases. The absence of a study that critically analyzes the causes of disputes of actual court cases in NZ has paved the way for this study. This study has purely focused on legal cases in NZ construction industry to investigate qualitatively the causes of disputes, their significance and relationships. Initially, a background study was conducted using 'Lexis Nexis – NZ' to identify relevant cases, followed by a detailed analysis of those cases. The contents of the cases were studied manually with assistance from the NVIVO's features in search of primary and secondary causes of disputes and their relationships. Among the identified causes or attributes of disputes in NZ, five main themes were identified; poor contract understanding, poor contract practices, poor contractual arrangement, over expectations of contractor and over expectations of principal. The significance of each attribute has been determined by frequency of occurrence and the level of dependencies to other attributes. Minimal awareness about the purpose of clauses in the Construction Contract Act of NZ, improper payment schedules, and poor quality of work were identified in relatively more cases and have shown many relationships to other attributes as well; therefore, they were identified as the most significant attributes. The developed attribute map illustrates the dependencies among the causes/attributes of the legal cases while highlighting their significance. The identified relative significances, themes, and dependencies provide a basis for understanding the nature of causes of construction-related disputes in NZ and for further investigating dispute avoidance strategies.

Practical Applications

The construction industry is complex, generally dependent on distinct parties and their diverse expectations; therefore, disputes are inevitable. A comprehensive study of construction-related

cases heard before New Zealand courts has been the source for this study. Industry practitioners may utilize the attribute map to understand the causes of disputes, their similar patterns and interconnections among causes. Insights from the attribute map could be useful to highlight dispute-prone causes, foresee potential disputes and to avoid those causes beforehand. Limited understanding of the Construction Contract Act in New Zealand was identified as the most prevalent cause for those disputes, while improper payment schedules (payment certificates) and poor quality of work also contributed to many cases. Having a sound understanding of the actual purposes of Construction Contract Act, establishment of robust payment certifying process and meeting the quality expectations may alleviate many conflicts in the construction industry.

Keywords:

Attribute Analysis, Causes of Disputes, New Zealand Construction

6.3 Introduction

Disputes take place in construction projects from the early precontract stages until the completion and they are caused by conflicts due to incompatibilities of interests among the parties involved in construction projects (Fenn et al., 1997; Sari et al., 2021). Kumaraswamy (1997) has defined a dispute as a "situation in which a claim or assertion made by one party is rejected by the other party and the rejection is not accepted in return". As disputes heavily impact the time, cost and quality objectives of the parties, they hinder the success of the projects (Naji et al., 2020). Further, disputes cause worries, reflexive responses, decline in connections among parties and communication failures even after the completion of the construction project (Naismith et al., 2016).

Several previous studies had focused on causes of construction-related disputes internationally. 28 causes of construction-related disputes were categorized under seven categories namely

owner-related, contractor-related, design-related, contract-related, human behaviour-related, project-related, and external factor-related by Cakmak and Cakmak (2013) based on their comprehensive literature. Moreover, Molenaar et al. (2000) and Tanriverdi et al. (2021) used the same categorization proposed by Diekmann and Girard (1995), which divides dispute causes into three main categories: people-related (owner, contractor, and business relationships), project-related (both external and internal), and process-related (pre-construction planning and construction contracts). Although the overarching focus of those previous studies was the causes of disputes, there were notable limitations, such as geographical, project type, and procurement type, which impacted the outcomes of their studies.

Similar to any other country, disputes in NZ construction industry are growing and cost project objectives significantly, hence NZ studies had focused on causes of disputes, dispute resolution and dispute avoidance (P. M. Silva, N. Domingo, & N. A. N. A. Ali, 2023). Few studies in the NZ construction industry had preferred court case analysis as their research method. For instance, Jelodar et al. (2016) conducted a literature review and a review of litigation cases in NZ from 2009 to 2014 and aimed at observing how the parties' relationships were impacted by a dispute. Further, the same study ascertained that most of the cases were caused by multiple causes, and it identified disputes between client and the contractor as the most frequent type of dispute to proceed to the courts, while disputes between the contractor and the sub-contractor were the second largest. In NZ, Ramachandra and Rotimi (2011a) analyzed liquidators' reports and court cases in order to understand the nature of payment problems. There are a considerable number of studies internationally that focus on the causes of construction-related disputes, but very few have utilized actual court cases as their sole source of information. Particularly in the NZ construction industry, no study has investigated both the causes of disputes (attributes) and their characteristics by reviewing legal cases comprehensively.

6.4 Literature Review

In the field of construction industry disputes, several studies have focused on investigating the causes of these disputes. Cakmak and Cakmak (2013) conducted a literature review and determined that delays in work progress, time extensions, and inadequate incomplete specifications were identified as being of higher relative importance. A systematic literature review was carried out considering 44 previous publications and identified that poor contractual arrangements, principal-initiated scope changes, unforeseen site changes, poor contract understanding and administration as the four mainly discussed categories of causes of disputes in the construction industry globally (P. M. Silva, N. Domingo, & N. A. N. Ameer Ali, 2023). The data collection method for those two studies was literature reviews.. Moreover, a combination of industry experts' inputs and previous literature was the source for the studies by Viswanathan et al. (2020) and Tanriverdi et al. (2021), which focused on reasons for construction-related disputes. Tanriverdi et al. (2021) conducted a comprehensive literature review and obtained inputs from expert professionals during their investigation on the causes of disputes and the relationships amongst causes. The studies which focused on the causes of disputes, mostly utilized either/both previous literature reviews or inputs from industry experts as their source of data, hence, the need for a study based solely on actual legal cases to identify the causes of disputes has been recognized.

Although there were several studies (in the area of construction disputes) that adopted actual court cases as the primary data source, those studies have not aimed to identify the causes of disputes and their characteristics. For instance, Barman and Charoenngam (2017) delved into 48 legal cases to explore why disputes moved from arbitration and adjudication to litigation in England and Wales. Arditi and Pulket (2005) examined 114 construction-related court cases in the USA to create a tool capable of predicting the outcome of the litigation process. Further, Davenport and Brand (2013) investigated how Australian high courts have relied on the

effectiveness of the time bar clause in the case *Andrews v. Australia and New Zealand (NZ) Banking Group case*.

Geographical limitations or other limitations of previous studies on the causes of disputes have also urged the requirement of this study specific to the NZ context. For instance, Tanriverdi et al. (2021) considered the projects contracted through the design and build procurement path in Turkey, while the study by Kumaraswamy (1997) was limited to the Hong Kong construction industry. Even though two studies in NZ had partially adapted to gather data from NZ court cases, they aimed at (1) investigating the impact on the parties' relationship amidst a dispute environment and (2) investigating the nature of payment problems (Jelodar et al., 2016; Ramachandra & Rotimi, 2011a)

Previous studies assessed the significance of the identified causes of disputes in several ways. The studies by Tanriverdi et al. (2021) and Viswanathan et al. (2020) assessed the level of influence or reliance of a particular cause towards another cause. After analyzing the available literature and the opinions of the industry experts, Tanriverdi et al., (2021) developed a map that illustrates linkages among the causes of disputes based on their study, which focused on design and build contracted through FIDIC Yellow Book. Similarly, Vishwanathan et al. (2020) gathered information from the literature and from industry experts to develop a model to represent the interdependencies of causes of disputes, and the hierarchical significance of causes of disputes. Kumaraswamy (1997) assessed the significance of ten common causes of claims considering the monetary or timely impact of those causes and their probability of occurrence. The causes identified in a systematic literature review were assessed based on the number of times those causes were discussed in previous literature (P. M. Silva, N. Domingo, & N. A. N. Ameer Ali, 2023). Again, there hasn't been a thorough study that examines the characteristics (significances, dependencies and underlying themes) of the causes of disputes by exclusively analyzing real court cases.

Initially, as a part of this study, quantitative aspects such as distribution of contract types, disputant parties, procurement routes, and contract types in 35 court cases of NZ were investigated (P. Silva et al., 2023). This study has been initiated as a further step, considering the absence of a qualitative study to investigate the attributes/causes of actual court cases in the NZ construction industry. Additionally, this study evaluates the significance of the attributes/causes of court cases in New Zealand, taking into account their interdependencies with other attributes and their frequencies of occurrence at the same time, which was previously unexplored by other researchers.

6.5 Goal and Objectives

This study aims to delve into the insights of actual court cases in NZ and to analyze its attributes or causes in a qualitative manner. The data has been collected purely based on court cases in NZ. In order to achieve the aim, several objectives were established, namely (1) investigating how attributes or causes led to the disputes (2) identifying the significances of causes/attributes considering both interdependencies with other attributes and their frequencies of occurrence (3) understanding main themes of causes of disputes (4) developing a thematic analysis map which demonstrates interconnections, significances and main themes of attributes of disputes. Given that the data source for this study is NZ court cases, the findings related to the causes of disputes (attributes), the significance of these attributes, the underlying themes, and the developed thematic analysis map are also relevant to the NZ construction context.

6.6 Research Method

This study is comprised of four main stages, namely background study, detailed study, detailed analysis of cases and presentation as explained with activities in figure 16. The background study investigated cases broadly to filter out any case that did not fall within the study's focus. In the second stage, the main ideas, the primary and secondary causes of all the selected cases

were identified and recorded methodically. The contents of the cases were manually analyzed with assistance from the NVIVO software. Finally, the gathered and analyzed information was presented in a "thematic analysis map".

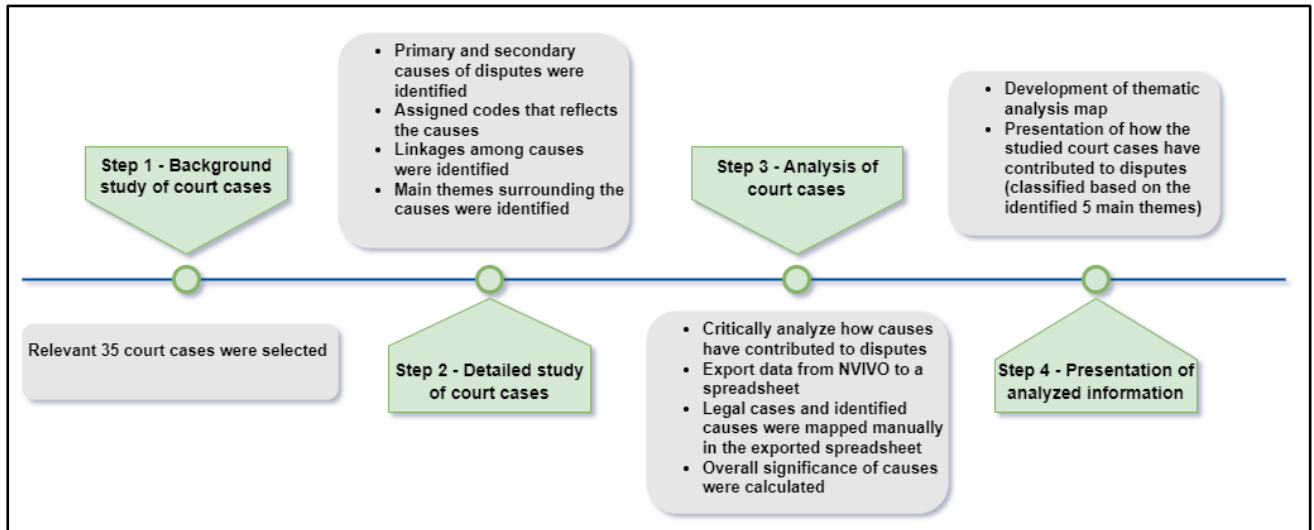


Figure 16: Research Process

This study relied entirely on actual court cases in New Zealand. "Lexis Nexis – NZ," a well-recognized online database of court cases, was used as the source for all cases due to its user-friendly nature and accuracy. "Lexis Nexis - NZ" offers a wide range of cases, allowing users to filter by category, and for this study, the categories "Building and construction", "Building Contracts", "Construction" and "Subcontractors" were selected. Under those selected categories, seventy court cases were reviewed during the background study and almost half of them were not further considered as they were related to condominium property, building consent or litigation procedure-related disputes. In other words, cases that occurred during the construction period amongst the parties directly involved to the construction were only selected. The selected 35 cases are listed in the table 9.

Table 8: List of court cases

Code	Case Name and year	Code	Case Name and year
C1	<i>Asphalt Supply Co Ltd v Cole John Ltd (2021)</i>	C19	<i>J & J C Abrams Ltd v Ancliffe (1981)</i>

C2	<i>Beetham v Blakeley (1928)</i>	C20	<i>Foggo v R J Merrifield Ltd (2009)</i>
C3	<i>Mike Wylie Ltd v Brown (2011)</i>	C21	<i>O'Connor Holding Ltd Vs. Ace Builders Construction Ltd (2005)</i>
C4	<i>Morley v Spencer (1994)</i>	C22	<i>Mills v McWilliams (1914)</i>
C5	<i>Pitcaithly & Co v John McLean & Son (1911)</i>	C23	<i>C.J. Parker Construction Ltd V Ketan & Ors (2017)</i>
C6	<i>Stein V Anderson (1937)</i>	C24	<i>Andrews Property Services Ltd v Body Corporate (2017)</i>
C7	<i>Amg Trust Ltd V Skellerup Industries Ltd (2018)</i>	C25	<i>Herman and Weger Manufacturing and Contracting Company (Limited) v Mangaone Oilfields Limited (1914)</i>
C8	<i>Dicks v Hobson Swan Construction Ltd & Ors (2006)</i>	C26	<i>The Fletcher Construction Co Ltd v Spotless Facility Services (NZ) Ltd (2020)</i>
C9	<i>Hsu V Mahoney (2021)</i>	C27	<i>Wilson v Harcourt (1911)</i>
C10	<i>Auckland City Council v Selwyn Mews Ltd (2003)</i>	C28	<i>Chen V Zhong (2011)</i>
C11	<i>New Zealand Structures & Investments Ltd v McKenzie (1983)</i>	C29	<i>Landtech Systems Ltd v Ca'bella Construction Ltd (2002)</i>
C12	<i>Forrest v Chairman, Councillors, And Inhabitants of Ohinemuri County (1909)</i>	C30	<i>Green Meadows Farm Co Ltd v Techni-Plan Ltd (2017)</i>
C13	<i>Richina Pacific Ltd V Samson Corporation Ltd (2018)</i>	C31	<i>Edwards v Ireland & Co (1892)</i>
C14	<i>Solidcrete Technology Ltd v First Pacific Investments Ltd (2005)</i>	C32	<i>Pyne Gould Guinness Ltd v Montgomery Watson NZ Ltd (1999)</i>
C15	<i>George Developments Ltd v Canam Construction Ltd (2005)</i>	C33	<i>Morning Star (St Lukes Garden Apartments) Ltd v Canam Construction Ltd (2005)</i>
C16	<i>Envisage Construction Ltd v Bulmer (2018)</i>	C34	<i>Focus Construction Interiors Ltd v Spaceworks Design Group Ltd (2020)</i>
C17	<i>Jade Residential Ltd v Paul (2020)</i>	C35	<i>Dutton v Breen (1909)</i>
C18	<i>Winslow Properties Ltd v Wooding Construction Ltd (2006)</i>		

The selected 35 court cases were reviewed in detail in search of the conflicting situation, primary cause of dispute, secondary causes of dispute, and judgment. The root cause of dispute,

in other words, a cause which can be considered as the basis for a few other secondary causes, are defined as "primary causes" of disputes. Usually, primary causes are the most significant contributors to the disputes. "Secondary causes" are defined as the resultant cause of a "primary cause" and still contribute to the dispute. For instance, in case 17, "mis-understanding about the payment mechanism" is identified as the a primary cause of dispute and it resulted a secondary cause namely "sudden stoppage of work", both collectively attributed to this particular court case. Depending on the context of court cases, a cause of dispute can be a primary cause in one case and the same cause can be a secondary cause in another case. Amongst the filtered 35 court cases in NZ, 34 causes/attributes were identified. For the easy identification, a simple coding pattern for the selected cases was utilized as C1, C2, C3 ... which represents case 1, case 2, case 3... respectively (codes are listed in the table).

Following the background study and in-detailed study, the identified cases were analyzed manually with the use of several features of the NVIVO application. The NVIVO facilitates qualitative data to be organized in a very user-friendly and effective way. Therefore, the NVIVO application has been used to store the reviewed causes of disputes and to code them. Causes or the attributes of disputes were coded in a way that the surrounding theme of a particular attribute is identifiable by the code itself. In other words, codes for the attributes are formed by a prefix representing the theme (PCU, PCMP, PCA, OEC and OEP) and an integer unique to the attribute. Each identified cause of dispute was given a code, and those codes were marked in the relevant court case document. In each case, the way primary cause and secondary causes of disputes had caused the dispute was studied comprehensively, and then, considering the nature of the identified causes and their commonalities, five themes of disputes have also been discerned.

One of the objectives of this study is to investigate the significance of causes of construction-related legal cases in NZ. The number of times each value of a variable occurs in a dataset is

simply understood as frequency (Turney, 2022). The frequency of occurrence of causes of disputes (attributes), as appeared in the studied 35 court cases, were identified, and the identified frequencies were utilized to prioritize the causes that are more prevalent in the NZ construction industry. In complex networks where several nodes or attributes are interconnected, "centrality analysis" could be utilized to determine which node/s are central or pivotal within a network by unveiling the patterns and behaviours of attributes (Borgatti, 2012; Lamb, 2016). Given that the causes of disputes generally behave similarly to nodes in a network (with interconnections amongst other nodes), this study has also investigated each attribute's centrality level to understand the level of reliance of attributes on others. Both the discussed aspects, "frequency" and "centrality" were taken into account when ascertaining the "overall significance" of each attribute. In other words, the "overall significance" of the causes of disputes were ascertained by taking two aspects into account namely (1) how often causes appeared in court cases (frequency analysis) and (2) how many subsequent attributes were caused by a particular cause (centrality analysis). Frequency analysis was carried out predominantly with the features of NVIVO as it enables to assign codes whenever a particular attribute is identified in a case. Centrality analysis is done manually by identifying the linkages among primary causes and subsequent secondary causes of each court case. The overall significance of each cause was calculated based on both the frequency analysis and the centrality analysis.

Considering both "frequency" and "centrality" of each attribute, this study has adopted a method to calculate the "overall significance". The overall significance of a particular cause was calculated considering three parameters namely; (a) prevalence as a primary cause linked to another secondary cause, (b) prevalence as a primary cause only and (c) prevalence as a secondary cause. When calculating the overall significance, a higher weightage was given for "primary cause linked to another secondary cause" (parameter a) as its level of centrality is

high And parameters (b) and (c) were given with comparatively low weightage (as weightage 2 and weightage 3, respectively) according to their level of centralities. To exemplify, if an attribute is solely identified as a primary cause without any resultant attributes (relevant to parameter b), its level of centrality is less than an attribute that acts as a primary cause and also contributes to another attribute (relevant to parameter a), therefore the parameter b is associated with a less weightage. The weightages and the method of calculating the overall significance are explained in the table 10

Table 9: Calculation method of Overall Significance

<i>Considering a particular cause of dispute</i>	Number of occurrences in cases	Weightage
(a) As a primary cause linked to another secondary cause	<i>a</i>	3
(b) As a primary cause only	<i>b</i>	2
(c) As a secondary cause	<i>c</i>	1
Overall Significance of a particular cause	$(a \times 3) + (b \times 2) + (c \times 1)$	

For example, "Payment schedule is not prepared properly" is identified as a primary cause of dispute without any subsequent linkage to any other cause in 2 number of cases (parameter b), and the same cause is identified as a primary cause linked to another secondary cause in 1 case (parameter a) and two other cases were evident to consider the same cause only as a secondary cause (parameter c). Considering mentioned details, below calculation shows how the overall significance is calculated for the attribute; "Payment schedule is not prepared properly".

Overall Significance of the "Payment schedule is not prepared properly" = $(a \times 3) + (b \times 2) + (c \times 1)$

Assigning values for parameter a, b and c = $(1 \times 3) + (2 \times 2) + (2 \times 1)$

Overall significance = 9.0

During the final stage of this study, the identified five main themes, causes under each main theme, linkages among primary & secondary causes and overall significances of each cause

of disputes as calculated using the method specified in table 10 are gathered together to develop the final "attribute analysis map". Further, the core ideas of the attributes under each theme were presented.

6.7 Findings

6.7.1 Identification and development of underlying themes of causes of disputes

The qualitative study of the selected 35 court cases has identified primary and secondary causes of disputes. Primary causes of disputes were the ones that fundamentally contribute to the dispute whereas the secondary causes are the resultant causes of a primary cause and still contribute to the dispute. In each court case, both primary causes and secondary causes have been identified and recorded in NVIVO.

Figure 17 summarises the process of deriving five themes of disputes based on the identified causes of disputes. Both primary and secondary causes have initially identified and coded with the use of NVIVO along with their frequencies. Based on the commonalities of the causes, 11 groups of causes of disputes have then been identified. Finally, five broader themes based on stakeholders' perceptions and practices have been derived based on the mentioned groups of disputes.

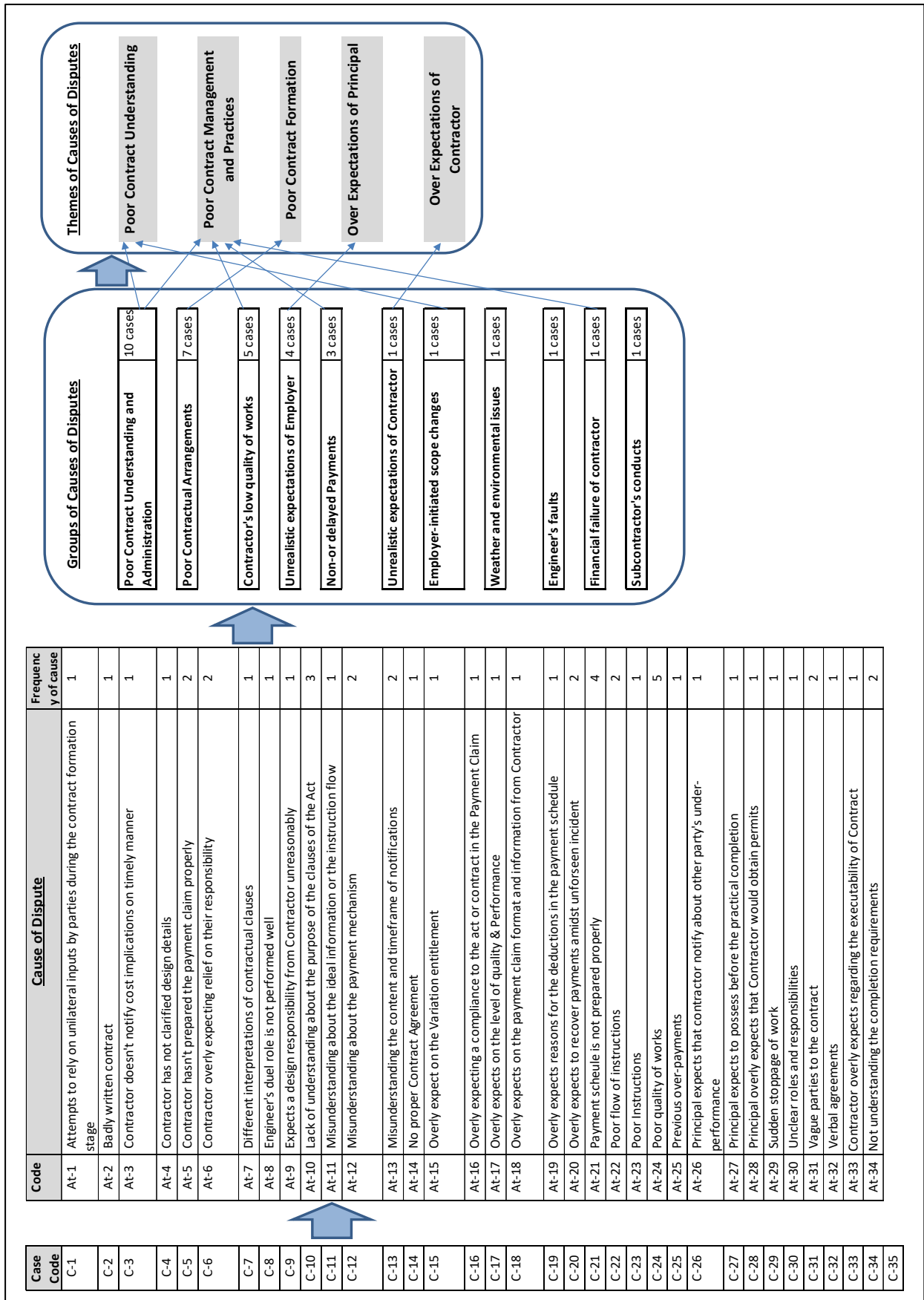


Figure 17 : Development of themes of causes of disputes

6.7.2 Development of attribute map of case studies

Based on the nature of the identified causes from the focused 35 legal cases, five themes were identified: poor contract understanding, poor contract management and practices, poor contract arrangements, over-expectation of contractor and over-expectation of principal. Table 11 presents the causes/attributes of disputes under five main themes, which were identified from the 35 court cases studied. Further, it shows the prevalence of disputes in the studied legal cases as primary or secondary causes against the identified attributes. The calculated overall significance of each attribute is also shown in table 11. The overall-significance was calculated based on the formula mentioned in the table 10 which considered the frequency of occurrence of the causes and the degree of centrality (how many other attributes were caused by a particular attribute) of the attributes as identified in the 35 legal cases of NZ.

Table 10: Overall Significance of Attributes

Attribute Code	Main themes and causes of disputes / Attributes	Identified as Primary Cause linked to another cause (a)	Identified as primary cause only (b)	Identified as Secondary cause (c)	Overall Significance (a x 3) + (b x 2) + (c x 1)
PCU	1 – Poor Contract Understanding (PCU)	5	2	3	22.00
PCU - 1	Lack of understanding about the purpose of the clauses of the Act	3		1	10.00
PCU - 2	Misunderstanding about the ideal information or the instruction flow			1	1.00
PCU - 3	Misunderstanding about the payment mechanism	1	1		5.00
PCU - 4	Misunderstanding the content and timeframe of notifications		1	1	3.00
PCU - 5	Not understanding the completion requirements	1			3.00
PCMP	2 - Poor Contract Management or Practices (PCMP)	3	12	10	43.00
PCMP - 1	Contractor doesn't notify cost implications on timely manner		1		2.00
PCMP - 2	Contractor has not clarified design details		1	1	3.00
PCMP - 3	Contractor hasn't prepared the payment claim properly		1	3	5.00
PCMP - 4	Engineer's dual role is not performed well	1			3.00
PCMP - 5	Payment schedule is not prepared properly	1	2	2	9.00
PCMP - 6	Poor flow of instructions		1	1	3.00
PCMP - 7	Poor Instructions		1		2.00
PCMP - 8	Poor quality of works		4	1	9.00
PCMP - 9	Previous over-payments	1	1	1	6.00
PCMP - 10	Sudden stoppage of work			1	1.00
PCA	3 - Poor Contract Arrangement (PCA)	4	5	2	24.00

PCA - 1	Badly written contract		2	1	5.00
PCA - 2	Different interpretations of contractual clauses	1		1	4.00
PCA - 3	No proper Contract Agreement	1			3.00
PCA - 4	Unclear roles and responsibilities		1		2.00
PCA - 5	Unilateral addendums to the Contract	1			3.00
PCA - 6	Vague parties to the contract		2		4.00
PCA - 7	Verbal agreements	1			3.00
OCE	4 - Over Expectation of Contractor (OEC)	0	4	3	11.00
OEC - 1	Contractor overly expecting relief on their responsibility		1	1	3.00
OEC - 2	Contractor overly expects regarding the executability of Contract		1		2.00
OEC - 3	Overly expect on the Variation entitlement			1	1.00
OEC - 4	Overly expects reasonings for the deductions in the payment schedule		1		2.00
OEC - 5	Overly expects to recover payments amidst unforeseen incident		1	1	3.00
OEE	5 - Over Expectation of Principal (OEP)	2	5	1	17.00
OEP - 1	Principal expects that contractor notify about other party's under-performance	1			3.00
OEP - 2	Principal expects to possess before the practical completion		1		2.00
OEP - 3	Principal overly expects that Contractor would obtain permits		1		2.00
OEP - 4	Expects a design responsibility from Contractor unreasonably		1		2.00
OEP - 5	Overly expecting a compliance to the act or contract in the Payment Claim	1		1	4.00
OEP - 6	Overly expects on the level of quality & Performance		1		2.00
OEP - 7	Overly expects on the payment claim format and information from Contractor		1		2.00

As a theme, *Poor Contract Management or Practices* show the highest overall significance (43 total overall-significance) as its corresponding ten attributes were identified (a) in 3 legal cases as primary cause of dispute with a link to another cause (b) in 12 legal cases as a primary cause of dispute and (c) in 10 legal cases as secondary causes. Based on overall significance, themes can be ranked as follows: Poor Contract Management Practices (overall significance: 43), Poor Contract Arrangement (overall significance: 24), Poor Contract Understanding (overall significance: 22), Over-expectation of Principal (overall significance: 17), and Over-expectation of Contractor (overall significance: 10). When attributes are considered individually, lack of understanding about the Act's clauses, improper preparation of the payment schedule and poor quality of work were recorded with higher overall significances.

The degree of centrality is one of the two aspects (frequency of occurrence and degree of centrality are the two aspects as explained in the research method section) that determine the

overall significance of each attribute. The degree of centrality represents the reliance of a particular attribute on other attributes, in other words, how many precedent links were found for a particular cause. The main purpose of the figure 17 is to illustrate the links among the attributes which were identified from the studied 35 court cases in NZ. Further, relevant cases that highlight a particular attribute as a cause of a dispute are mentioned in the figure 17 (eg C21 represents case 21) together with any links to a secondary cause. The attribute PCU-1 (lack of understanding about the purpose of the clauses of the Act) is identified as the one with the most links to other secondary causes (cause of dispute with the highest centrality value).

Dispute causes in 35 selected New Zealand cases were identified, categorized into five main themes, and analyzed for overall significance using frequency and centrality, with their connections mapped and presented in Figure 17. Finally, an "attribute map" that represents (1) five main themes and its attributes, (2) overall significances of each attribute and (3) linkages among attributes to other attributes was developed (as shown in the figure 18).

Attribute Code	Main themes and causes of disputes	PCU	PCU-1	PCU-2	PCU-3	PCU-4	PCU-5	PCMP	PCMP-1	PCMP-2	PCMP-3	PCMP-4	PCMP-5	PCMP-6	PCMP-7	PCMP-8	PCMP-9	PCMP-10	PCA	PCA-1	PCA-2	PCA-3	PCA-4	PCA-5	PCA-6	PCA-7	OCE	OEC-1	OEC-2	OEC-3	OEC-4	OEC-5	OEE	OEE-1	OEE-2	OEE-3	OEE-4	OEE-5	OEE-6	OEE-7														
PCU	1 - Poor Contract Understanding (PCU)																																																					
PCU-1	Lack of understanding about the purpose of the clauses of the Act			C18																C15																																		
PCU-2	Misunderstanding about the ideal information or the instruction flow																																																					
PCU-3	Misunderstanding about the payment mechanism				C3																																																	
PCU-4	Misunderstanding the content and timeframe of notifications					C22																																																
PCU-5	Not understanding the completion requirements																																																					
PCMP	2 - Poor Contract Management or Practices (PCMP)																																																					
PCMP-1	Contractor doesn't notify cost implications on timely manner																																																					
PCMP-2	Contractor has not clarified design details																																																					
PCMP-3	Contractor hasn't prepared the payment claim properly																																																					
PCMP-4	Engineer's dual role is not performed well																																																					
PCMP-5	Payment schedule is not prepared properly																																																					
PCMP-6	Poor flow of instructions																																																					
PCMP-7	Poor Instructions																																																					
PCMP-8	Poor quality of works																																																					
PCMP-9	Previous over-payments																																																					
PCMP-10	Sudden stoppage of work																																																					
PCA	3 - Poor Contract Arrangement (PCA)																																																					
PCA-1	Badly written contract																																																					
PCA-2	Different interpretations of contractual clauses		C15																																																			
PCA-3	No proper Contract Agreement																																																					
PCA-4	Unclear roles and responsibilities																																																					
PCA-5	Unilateral addendums to the Contract																																																					
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OEC-5	Overly expects to recover payments amidst unforeseen incident																																																					
OEE	5 - Over Expectation of Employer (OEE)																																																					
OEE-1	Employer expects that contractor notify about other party's under-performance																																																					
OEE-2	Employer expects to possess before the practical completion																																																					
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OEE-6	Overly expects on the level of quality & Performance																																																					
OEE-7	Overly expects on the payment claim format and information from Contractor																																																					

Figure 18: Attributes linkage overview

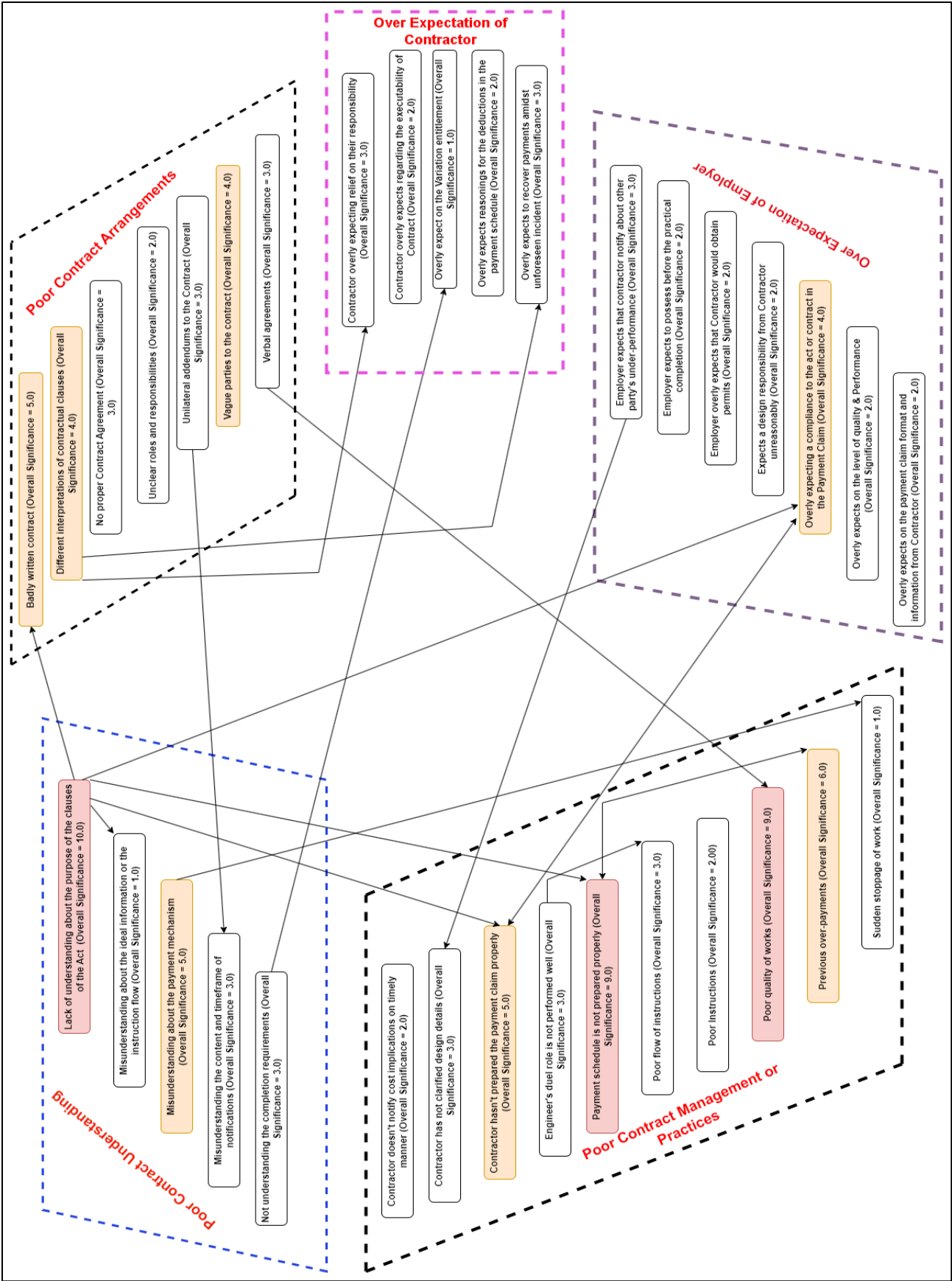


Figure 19: Attributes Map

6.7.3 Themes of causes explained

Summarised findings of court cases and literature under each theme have been discussed under this section. How attributes under each theme contributed to disputes have been discussed in this section, taking actual court cases in NZ into account. While this study is focused exclusively on the NZ construction industry, this section also compares the findings of this research and those from several previous international studies aiming at highlighting similarities, differences, and broader implications of the causes of disputes."

6.7.3.1 Poor Contract Understanding

This section discusses instances where contractual parties of construction projects in NZ misunderstand the payment mechanisms, contract documents and correspondences, which led to disputes. The poor understanding was primarily due to ambiguities, misinterpretations and lack of knowledge.

The contract in case 13 lacked the clarity in terms of grounds that the performance bond would be discharged particularly when the principal gradually takes possession of a work which was covered under a provisional sum. Case 15 and 18 highlighted how technical deficiencies in payment claims, stemming from a lack of awareness of the CCA 2002's purpose, attributed to conflicts. Technical deficiencies such as the validity of payment claim, and aligning of payment circle with the actual construction cycle were conflicted, however, judges emphasized that the Construction Act is intended to be used as a framework to ensure fair and transparent payment processes in construction contracts rather than mere set of bureaucratic rules. Similarly, Case 17 demonstrates the impact of ambiguous milestones (as what work should have been completed to fulfill the "closed-in" milestone was not understood well by the parties), which led to a conflict. In Case 22, a subcontractor's misinterpretation of a notice triggered a dispute over contract termination and retention money. Further, Case 3 was triggered by divergent

interpretations of payment mechanisms (The principal's expectation of a fixed price conflicted with the contractor's understanding of a fixed rate for labor and reimbursement for material costs).

Internationally, several previous studies have also emphasized impacts of poor contract understanding for construction-related disputes. A Norwegian study by Omar et al. (2019) has revealed that "misunderstanding of the contract and the tender specification" is the leading cause of disputes in Norway and further indicated that Contractors have exploited the loopholes in contract/tender specification and unequally benefitted. The vagueness of contract documents and different interpretations of contract documents were ranked as 8th and 12th (out of 28 attributes) in sequence developed based on their relative importance (Cakmak & Cakmak, 2013). Emphasizing the importance of proper understanding and the interpretation of the contractual provision, Cheung and Yiu (2006) have proposed a conceptual model called "dispute triangle" which is comprised of three main components of disputes namely "contract provision", "conflict" and "triggering event". Causes of disputes for roads and tunnel projects were investigated by Omar et al. (2019) and ascertained that 25% of disputes were caused by the poor understanding of the contract and tender specification. A Malaysian study by Haron et al. (2020), which was based on Malaysian court cases has ascertained that factors that contribute to disputes, namely behavioural, design, technical and external, are caused by misinterpretations of conditions of contracts. Interestingly, a study in UK has focused on 41 cases and emphasized that some parties intentionally misinterpret the provisions while others do it unintentionally (Barman & Charoenngam, 2017). In summary, previous studies highlighted the misunderstandings of the contract, misinterpretations of contractual provisions and vagueness of the contract documents. In this study, seven cases among the studied 35 cases in NZ were primarily caused by poor contract understanding related to payment mechanisms,

purposes of act, scope definitions of provisional sum items and requirements for milestone payments.

6.7.3.2 Poor Contract Management and Practices

In NZ context, many court cases were caused by malpractices and mismanagement of construction contracts such as not adhering to contractual obligations, noncompliance with regulations and poor communications. Those malpractices and mismanagement often occur during the post-contract stage when parties perform their agreed roles and responsibilities.

Case 10 shows how a contractor created a conflicting situation by not following the local authority guidelines and the building act as well (as the contractor did not assure the wall's stability to avoid potential collapses).. In Case 24, the appellant failed to correctly install the new exterior cladding because the consultant did not conduct a proper inspection, and the appellant did not obtain design details from the consultant. However, the court held that the appellant was not responsible for ensuring the consultant's compliance with the inspection. In few court cases, Engineer had also managed the contract poorly. For instance, in case 11, Principal failed to instruct properly about the variation instruction. which caused a dispute around the entitlement of the variation. In contrast, in case 12, the Engineer failed to perform its dual role well as it didn't take reasonable steps to discuss the matters in the final certificate with all the parties prior to the formal issuance. Moreover, case 16, 19, 20, 23 and 26 were related to conflicts in payment procedures. In those 5 cases, the contractor's suspension of works until a payment, contractor's negligence in timely notification of cost increase, technical issues in payment claims/schedules (level of explanations about the deducted amounts in payment schedules, previous overpayments and unacceptable payment invoices) and vagueness in payment terms of the contract had primarily caused to those disputes.

Under this main theme, attributes related to payments, instructions and quality of work are identified in several NZ court cases. A previous study in Hong Kong by Kumaraswamy (1997) gathered information from 61 construction projects and 46 responses from questionnaires and identified "insufficient contract administration" as a proximate cause of dispute. Delays in site handover, delayed payments, stoppage of work by the principal and poor quality of construction were identified by an Indian study (Indian highway projects), and those attributes can be categorized under this main theme (Parikh, 2019).

6.7.3.3 Poor Contractual Arrangement

This theme focuses on how badly the parties have agreed and organized themselves until they reach an agreement. The cases under this theme exemplify how badly the parties shared their rights and obligations, shared their risks and how badly they had documented their contract.

Inclusions of provisions/notes in a sub-optimal way after signing the construction contract were prevalent in Cases 27 and 28. In case 27, the defendant's unilateral inclusion of a note to their contract has triggered that dispute. The case 28 was primarily caused by an asserted verbal agreement after the initial agreement by the claimant, in which they asserted that a deck was included in the contract. Another dispute took place when the parties in case 30 were unable to agree that invoices rendered for partial construction of the dairy shed and bridge were payable by the applicant or applicant's subsidiary. Conditional payment provision in which a payment for the sub-contractor was dependent upon the payment for the main contractor caused the dispute in case 29. Different interpretations of the contract provisions for the (1) contractor's liability to rectify damages and (2) ownership and the payment of on-site material were highlighted as causes of disputes in case 31. Similarly, the contract in case 35 has not provided adequate provisions as to how to settle payment for the work done (the completed portion) at the event of an unforeseen incident and therefore, it caused a conflicting situation regarding the payment entitlement amidst a fire event.

Several attributes that can be considered under this theme have been highlighted by many previous studies as well. For instance, Kumaraswamy (1997) identified poor understanding of the construction contract & tender specification and low-priced contract as root causes of disputes which recurred more frequently. Further, the ambiguous language of a contract document emerged as the trigger for the other factors and was positioned at the bottom of the interpretative structural model's hierarchy which was developed to present the dependent levels of attributes of disputes (Viswanathan et al., 2020). Both these studies exemplify that several attributes under this theme are primary/underlying reasons for other causes of disputes as well. Insufficiency of the contract has also been identified in several studies. Cheung and Pang (2013) emphasized that contract incompleteness as a root cause for several types of construction related disputes. The insufficiency of contractual provisions in small to medium projects in Ireland, particularly on how to deal with additional works, was highlighted as an emerging cause of disputes in small to medium projects in Ireland (David et al., 2016). Vague and unclear information in the conditions of contract leads to discrepancies and subsequently to disputes, further, a vague information can be misused opportunistically by some parties for their benefit (Barman & Charoenngam, 2017; Haron et al., 2020). Even though several studies identified that not following standard forms as a cause of disputes, Ting et al. (2014) emphasized that having standard forms causes disputes and it does not actually resolve disputes effectively. Hashem M. Mehany et al. (2018) showed that project delivery methods and procurement methods do not have an impact on the disputes but those methods may strengthen trust and partnering.

6.7.3.4 Over Expectations of Contractor

This theme discusses high, unrealistic and/or unreasonable expectations of the contractor from the principal or any other party who engaged with the construction. Contractors' over expectations were often related to monetary, information and justifications from other parties.

In case 34, the contractor unrealistically expected the defendant to refer more projects and perform beyond reasonable and genuine performance boundaries. However, the Court of Appeal upheld the decision that contractor had acted reasonably in referring projects to the contractor. The appellant in case 5, had expected that the "material supplying sub-contract" contained a warranty or covenant for the respondent to perform the work unconditionally, irrespective of the feasibility of the main contract. The court emphasized that the respondent was only obligated to order materials as long as the performance of the main contract was possible. The contractor's main critique in case 14 was that the applicant (principal) failed to indicate how the payer calculated the scheduled amount and the payer's reasons for the difference. The judges dismissed the appeal as the reason for the valuation difference on this occasion had already been known to the applicant before, and the previous claims had already been dealt with the same basis as the valuation schedule in question. These cases highlight how contractor's over-expectations can lead to contractual disputes when their assumptions about the scope and conditions of their agreements do not align with legal interpretations and practical realities.

Based on 61 projects and 46 responses from the Hong Kong construction industry, Kumaraswamy (1997) has identified, contractors' unrealistic information expectations as one of the root cause of disputes amongst 11 other root causes, which were identified as more underlying causes with a higher controllability. Internationally, very few studies have identified contractors' over-expectations as a cause of disputes; however, in New Zealand, some legal cases have resulted from contractors' over-expectations, as explained above..

6.7.3.5 Over Expectations of Principal

The principal or the procuring entity assumed high, unrealistic and/or unreasonable expectations from the contractor or any other party, which attributed to disputes. In four studied cases, principals held specific expectations regarding the contractors' responsibilities,

liabilities, or the longevity of potential claims. These over-expectations led to disputes because they did not align with the actual contract terms or legal constraints.

In case 4, the principal believed they had a valid claim despite the time limitation set by the law. When their expectation clashed with the legal time limit, it resulted in litigation and disagreement over whether the contract was a deed. In Case 3, the principal over-expected that the contractor had a duty to notify them about potential cost increases. They believed the contract was for a fixed price, despite the contract terms stating otherwise. The principal in case 2 expected the labor contractor to obtain necessary authority approval for work commencement, however, principal seemed to overlook the fact that another contractor had already begun work before the appellant became involved. The principal in case 6 sought damages from the builder for issues related to the roof and guttering system (expected the builder to be responsible for design-related issues, assuming that the builder had the same responsibilities as an architect), however the court clarified that the builder had not assumed such responsibilities. The cases of NZ regarding Principal's over expectations are associated with disagreements over contract type, failure to acknowledge legal constraints, lack of clarity and communication and misinterpretation of roles. In summary, these cases collectively demonstrate how over-expectations of principals regarding contractors' roles, responsibilities, and the interpretation of contract terms can lead to disputes.

A considerable number of previous authors have pointed out that over-expectations of principals lead to disputes, further, it was identified as a primary cause of several legal cases in NZ as well. Viswanathan et al. (2020) developed a six-level hierarchy of factors that lead to disputes utilising an Interpretative Structural Modeling (ISM) and categorized "unrealistic client expectations" under the second most significant level (out of six levels), which acts as an underlying or one of the root-like cause of construction related disputes. Moreover, Tanriverdi et al. (2021) developed a causal map to explain the interconnections among causes

of disputes in Turkey based on a literature review and expert interviews. That study identified "unrealistic expectations of the principal" as one of the five main concepts with numerous connections to other preceding and resulting causes. Preceding causes include "supremacy of the principal," "principal's lack of experience with the project and contract type," and "unfamiliarity with local conditions," and resulting causes include "prevention of progress by the principal," "requests for acceleration of work," and "incomplete or unclear information". Overall, previous studies have emphasized that the principal's over-expectations can act as both a precedent cause and a resultant cause of disputes, depending on the context. This study also highlights this dual role, identifying several attributes under "over-expectation of the principal" that serve as both resultant causes and precedent causes for other issues.

6.8 Discussion

The main categories or themes developed by previous studies regarding the causes of construction-related disputes were generally varied. However, Kumaraswamy (1997), Cakmak and Cakmak (2013) and Naji et al. (2020) followed an identical and inherited categorization of causes of disputes, which consisted of main dispute-causing groups namely owner-related, contractor-related, design-related, contract-related, human behaviour-related, project-related and external factor related. Another broad way of dispute causes categorization, comprised of people-related, project-related and process-related themes as proposed by Diekmann and Girard (1995) was followed by Molenaar et al. (2000) and Tanriverdi et al. (2021) as well. Considering a significant number of previous studies, Silva et al. (2023b) conducted a SLR and derived four main categories of disputes: principal responsible, contractor responsible, common and external causes. In general, all the categories of dispute causes proposed by previous researchers were predominantly derived from the contractual parties' perspectives (i.e: contractor, principal), whereas this study discerned five themes or categories of disputes based on the perspective of parties' misperceptions and malpractices in numerous aspects during the

pre and post contract stages. Several themes which were identified in previous studies, such as “human behaviour related causes” and “process related causes” could be considered under the “poor contract practices” theme in this study. Most categories in previous studies emphasized stakeholder responsibilities and expectations, either entirely or partially. Similarly, this study identified two themes solely related to stakeholder expectations. However, unlike several previous studies, 'causes related to external factors' were not identified as a theme in this study.

Poor understanding of the grounds for performance bond discharge, technical aspects of payment claims, purpose of payment mechanisms, and milestone payment processes were prevalent in several court cases in NZ. Previous studies in Norway, Malaysia and UK have emphasized the importance of understanding the contract & tender documents well (Barman & Charoenngam, 2017; Haron et al., 2020; Omar et al., 2019). Instances where the construction contracts were managed poorly, were primarily attributed to the actions and ignorance of both contractors and principals' representatives in NZ, such as building certain parts of the construction in a substandard manner, failures in instructing variations properly and mispractices in payment claim/schedule processes. Hong Kong and Indian studies have also reinforced the significance of poor quality of work and mispractices in the payment process as causes of disputes (Kumaraswamy, 1997; Parikh et al., 2019). The poor contractual arrangement theme represents several court cases in NZ which were attributed to unilateral changes to the initial contract and different interpretations of contractual provisions. However, the previous research findings that can be considered under this theme have mostly discussed ambiguities and the incompleteness of the construction contracts as causes of disputes (Cheung & Pang, 2013; Kumaraswamy, 1997; Viswanathan et al., 2020). Both principal's and contractor's over expectations were identified as reasons for many studied cases in NZ ; hence, two themes have been discerned in this study accordingly. Previous researches (the study by Kumaraswamy (1997)) emphasized that contractors overly expect some information from other

parties whereas this study in NZ, exemplified the over-expectations of contractors with regards to the timely validity of contracts and higher expectations for explanations on the payment deductions.

This study relied entirely on actual court cases in NZ to develop an attribute map representing three aspects of the causes/attributes at the same time, namely (a) underlying themes of causes for disputes (b) linkages among attributes and (c) significance of each attribute (based on the frequency of occurrence and the level of centrality of each attribute). Amongst the three aspects of the attributes, one aspect, linkages among attributes was investigated and presented in the causal map by Tanriverdi et al. (2021) and the hierarchical model by Viswanathan et al. (2020). Further, it is also notable that the mentioned two previous studies were limited to design and build projects and opinions from the industry experts respectively which are different limitations and data collection strategies as compared with this study.

The “overall significance” of each attribute (causes of disputes) in this study was derived from considering both the level of dependability to other attributes (level of centrality) and the frequency of occurrence combinedly. Firstly, when the level of dependability is taken into account individually, this study identified “lack of understanding about the purpose of the Construction Contract Act of NZ” as the attribute with the highest dependability. In contrast, Viswanathan et al. (2020) ascertained that ambiguous contract language as the attribute with highest level of dependability in their study. Secondly, if the frequency of occurrence is considered individually, improperly prepared payment schedules and poor quality of work were found in a comparatively high number of cases (in 5 cases) in this study. A previous study that investigated the frequencies of occurrences of causes of disputes in the prior literature also ranked poor quality of work as third out of 28 causes (P. M. Silva, N. Domingo, & N. A. N. Ameer Ali, 2023). Thirdly, when the “overall significance” of the attributes in this study was taken into account, three attributes could be highlighted: unawareness of the purpose of the

Construction Contract Act of NZ, improper payment schedules, and poor quality of work. However, aside from “poor quality of works” other two attributes mentioned above were not identified as relatively significant causes of disputes by the previous studies by Kumaraswamy (1997), Cakmak and Cakmak (2013) and Silva et al. (2023b).

6.9 Conclusion and Further Research

The comprehensive review of 35 construction-related legal cases in NZ has identified 34 attributes or causes that caused those disputes which ended up in NZ courts. By considering the nature of those attributes, five main themes were identified as poor contract understanding, poor contract management & practices, poor contractual arrangement, over expectations of principal and over expectations of contractor.

Attributes under "poor contract understanding" often stemmed from ambiguities and misinterpretations of information in the CCA, contracts, notices, and correspondences. Overall, “poor contract understanding” theme had many relationships with the attributes under “poor contract management and practices” as well. Failures in payment claim & schedule procedures, poor instruction flow, lack of design details and noncompliance with building codes caused difficulties in managing the contracts, which led to disputes. When parties formed their construction contracts, several court cases had exemplified that conditional payment provisions, insufficient payment provisions, and unclear roles & responsibilities had caused conflicts at later stages. Both principals and contractors had over expectations due to faulty assumptions about scopes and the purpose of contract provisions. For instance, contractors overly / unreasonably expected to recover certain costs from the principal while principals expected unreasonable design responsibilities and early site possession from contractors.

This comprehensive study was purely based on court cases in New Zealand have identified a list of attributes or causes of construction-related disputes. Each attribute's significance was

derived based on the number of occurrences of each attribute in the studied cases and the level of dependencies on other attributes. Minimal understanding of the purpose of contractual provisions of the CCA in NZ has been identified as the most significant attribute or cause of disputes, followed by “poor quality of works” and “improper preparation of payment schedule”. The developed attribute map visualized how attributes of disputes have formed 5 main themes and how attributes have been linked with other attribute/s.

Industry practitioners and researchers, particularly in NZ, can comprehend a more realistic idea of how the identified attributes resulted in disputes as this study is purely based on actual court cases heard before NZ courts. Further, the calculated significances and the relationships among attributes provide insights to the industry in terms of what factors to be considered or what attributes should be avoided to minimize potential disputes. The five themes, which were purely formulated based on actual court cases in NZ could be worthwhile for future researchers, particularly in NZ, to investigate a particular theme in a more detailed manner. Additionally, investigating possibilities of enhancing the understanding of the purposes of the clauses of CCA in NZ is also recommended for a future research.

7 PRE-CONTRACT MEASURES TO AVOID POTENTIAL DISPUTES IN THE NEW ZEALAND CONSTRUCTION INDUSTRY.

7.1 Chapter Introduction

The background study identified the importance and the need to investigate the possible pre-contract measures to avoid potential disputes in the NZ construction industry. This chapter investigates steps or strategies applicable to the pre-contract stage to avoid potential disputes by doing 14 semi-structured interviews with industry experts. Further, chapter 5 concluded that the majority of the construction-related disputes were reported from traditionally procured projects, therefore, the expert interviewees were asked about pre-contract dispute avoidance methods specific to the traditionally procured projects only. The themes of causes of disputes identified in chapter 6 based on the case studies and construction stages proposed by the RIBA plan of works have provided a more organised structure to gather and present the pre-contract dispute avoidance steps. This chapter is based on the following journal publication (published)

Pre-Contract Measures to Avoid Potential Disputes in the New Zealand Construction Industry.
(2025). *Construction Economics and Building*, 25(2).
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7.2 Abstract

The New Zealand (NZ) construction industry suffers from negative implications of disputes in construction projects, similar to other countries. Hence, the importance of avoiding disputes has become a vital topic to discuss and research. Avoiding disputes in construction projects has always been challenging, with limited research on this topic. Notably, no studies have explored potential pre-contract measures to prevent disputes in the New Zealand construction industry. To address this research gap, this study was designed, and it is limited only to construction projects in NZ that followed the traditional procurement path. Fourteen professionals in the NZ construction industry with significant experience and knowledge in construction disputes were interviewed, and the gathered data were analyzed qualitatively. A total of 84 pre-contract measures to avoid potential construction-related disputes were identified under five themes (themes of causes of disputes). The most responsible party/parties and most applicable pre-contract stage/s for each dispute avoidance step are also presented. The clarity of communication, risk management, proper documentation and standardization, review and continuous improvements, and collaboration are the main underlying characteristics of the identified avoidance measures. Among the identified dispute avoidance measures, respondents emphasized clear scope documentation and expectation management meetings as the most significant. The proposed measures could help principals, tenderers, and consultants in New Zealand to minimize potential disputes. Additionally, this study opens avenues for further research into dispute avoidance strategies for other procurement methods (other than the traditional procurement path) and practical approaches to clearly document the construction scope.

Keywords: construction disputes, dispute avoidance, pre-contract stage, New Zealand construction

7.3 Introduction

Gerber (2013) emphasized the importance of preventive measures to reduce disputes, noting that the initial cost of setting up a dispute avoidance procedure can be recovered many times over through savings from reduced disputes and early resolution. Previous research has also focused on the assessment and prediction of potential disputes. Various statistical and mathematical methods have been employed by researchers to develop dispute prediction models. For example, Diekmann and Girard (1995) utilized logistic regression to forecast the likelihood of disputes, highlighting the importance of competent human resources in dispute avoidance and the impact of project complexity on disputes. Similarly, Molenaar, Washington and Diekmann (2000) used Structural Equation Modeling (SEM) to underscore management ability and project complexity as key factors in dispute prediction. Ayhan, Dikmen and Birgonul (2021) applied machine learning (ML) techniques, drawing data from a comprehensive literature review and expert interviews, to predict the occurrence of disputes.

De Alwis, Abeynayake and Francis (2016) emphasized the necessity of forecasting disputes during the “briefing stage” of a construction project in Sri Lanka, where the client’s requirements and objectives are established. They identified factors such as risk allocation, contractor selection, quality of documentation, time management, and procurement methods as critical in avoiding potential disputes.

Zhu and Cheung (2020) proposed a framework illustrating how incentivization can reduce construction disputes by reinforcing relational governance (narrowing gaps in risks, responsibilities, and power), increasing investment in relationships, and improving perceptions of fairness. A study in Saudi Arabia, based on nearly 93 questionnaires, found that fair contract risk allocation, drafting dispute clauses, team building, provision of a neutral arbitrator, and binding arbitration are effective contract administration methods for dispute avoidance and resolution (Jannadia et al., 2000).

Tabish and Jha (2023) used principal component analysis (with orthogonal rotation) to identify three primary factors for consideration during the post-contract stage: (a) comprehension and monitoring of scope, (b) support from higher management, and (c) the expertise of the contractor's design consultant. Additionally, a Malaysian study suggested that discussions and negotiations between top management with decision-making and financial authority (without third-party involvement) from both contracting parties could be a more effective way of avoiding and resolving disputes.

In Singapore, Aibinu (2009) identified a high level of conflict regarding time claims in the construction industry, particularly when there was minimal pre-contract negotiation and agreement on the rules for quantifying and assessing anticipated delays. The authors highlighted the necessity of negotiating and agreeing during the pre-contract stage on record requirements for claims, methods for maintaining records, and the format of construction schedules. They also emphasized the importance of establishing methods for analyzing delay claims and a formula for calculating prolongation costs.

In the New Zealand (NZ) context, there are several studies about the causes of disputes in the construction industry and dispute resolution mechanisms, but very few studies have focused on dispute avoidance. Finnie (2021) proposed a two-stage early contractor involvement framework in the NZ context. It addresses potential complications, such as determining the variation entitlements due to drawing changes and legal implications of a contractor's involvement in the design development. Broadly, Yiu, Lu and Ang (2021) recommended that the entire New Zealand construction industry adopt a professional and accountable approach. They advised defining project scopes as early as possible with minimal changes afterward and investigating the other party's history before entering a construction contract to minimize potential disputes. Ramachandra and Rotimi (2011) emphasized the importance of incorporating proper payment provisions in New Zealand construction contracts. They

recommended several measures to minimize payment-related conflicts, including prompt settlement of financial claims to maintain cash flow, early securing of financial guarantees, and mandatory prequalification of funding parties' financial status.

Many previous studies have proposed measures to resolve construction-related disputes after a dispute has taken place. Kumaraswamy (2002) pointed out the importance of “dispute avoidance” and “dispute minimization” over “dispute resolution”. Globally, as explained above, there were few studies that have recommended methods to predict disputes using statistical mechanisms. Furthermore, there are some suggestions and strategies to minimize and resolve disputes that were found in a few international studies; however, those studies were applicable to the post-contract stage. In addition to the (1) framework proposed by Finnie (2021) on a two-stage early contractor involvement and (2) recommendations proposed by Ramachandra and Rotimi (2011b) about the payment provisions in NZ construction contracts, there were no other studies that focused on dispute avoidance in the NZ context. Even these mentioned studies have not focused on the projects that followed the traditional procurement path and have not focused on the possibilities of avoiding potential/future disputes during the pre-contract stage. Therefore, this study attempted to investigate dispute avoidance steps that can be performed during the pre-contract stage, aiming to avoid potential disputes.

7.4 Methodology

An initial review of the existing literature in NZ and the international context has highlighted the need to conduct a proper study on possible strategies or steps that can be done in the pre-contract stage to avoid potential disputes in NZ's construction industry.

The ideal number of interviews for an in-depth qualitative study depends on the study's purpose, design, and data saturation where the quality of findings is more important than the

number of interviews in a qualitative study (Guest et al., 2006; Saunders, 2016). Furthermore, when the research area is broad, a larger number of interviews may be required, whereas studies focused on a specific topic often reach saturation with fewer interviews, particularly when participants are highly experienced and knowledgeable (Guest et al., 2006; Saunders, 2016). Given that this research focuses on a practical and a very specific area (pre-contract dispute avoidance in traditionally procured projects), it was planned to interview 10-15 industry experts until reaching the data saturation in each of the five themes of causes of disputes. A series of semi-structured expert interviews were conducted until a minimum of ten pre-contract dispute avoidance measures were identified under each theme (which was achieved by the fourteenth interview). Fourteen industry experts who had at least 15 years of experience in construction contract management and/or construction disputes were selected for a series of semi-structured interviews. The selected interviewees' professions, experiences, and identification codes are stated in Table 12.

Table 11 : Respondents' profiles (Source: Authors own creation)

Interviewee code	Current profession/position	Overall experience	Experience in New Zealand
Respondent A	Technical Director—Project Management	>18 years	12 years
Respondent B	General Manager—Operations	>25 years	>18 years
Respondent C	Technical Director—Structural Engineering	>20 years	10 years
Respondent D	Director	28 years	28 years
Respondent E	Founder/Director	24 years	24 years
Respondent F	Managing Director	31 years	31 years
Respondent G	Estimating Manager	22 years	>10 years
Respondent H	Chief Executive Officer	>32 years	21 years
Respondent I	Senior Quantity Surveyor	>30 years	16 years
Respondent J	Senior Quantity Surveyor	25 years	10 years
Respondent K	Commercial Manager	18 years	>11 years

Respondent L	Planner—Major Projects	26 years	12 years
Respondent M	Senior Quantity Surveyor	>28 years	>10 years
Respondent N	Senior Associate Contracts	>20 years	13 years

The Royal Institute of British Architects (RIBA) plan of work has broken down a construction project into eight stages, and it outlines core tasks, stage outcomes, and information exchanges required at each stage (RIBA, 2023). This study considered the four stages of the RIBA plan of work and adjusted the four stages as below in order to obtain and analyse responses more methodically.

Under the mentioned five themes, expert interviewees were questioned regarding the (1) concerns/issues that come under the themes (detailed causes of disputes under a theme) and (2) measures applicable to the pre-contract stages (under the four adjusted pre-contract stages in Table 13) to avoid potential disputes. This chapter only discusses the findings related to the dispute avoidance measures. Initially, all the measures identified from the expert interviews were recorded and then during the first validation stage, those measures were presented to the respondents. Only the validated measures during the first validation stage were considered to the subsequent research steps (toolkit development). Only the validated dispute avoidance measures have been included to the tables in the section 7.5 which lists the dispute avoidance measures under each of the five themes.

Table 12 : Formation of four pre-contract stages (Source: Authors have developed this table based on the stages mentioned by RIBA, [2023])

RIBA stage	Adjusted stage for this study	Description of the adjusted stage
Preparation and Briefing	Preparation and Briefing (PB)	Prepare project brief including project outcomes and sustainability outcomes, quality aspirations and spatial requirements.
Concept Design		

Spatial Coordination	Concept design and spatial coordination (CDSC)	Architectural concept, which is aligned with the project brief, is approved by the client. Architectural and engineering information is spatially coordinated.
Technical Design stage	Technical Design—A (TDA) Until tender submission (tender preparation and pricing)	All the design information required to construct the project is almost complete. The client prepares the tender document and tenderers price and bid.
	Technical Design—B (TDB) Until signing the Contract (tender evaluation, award and signing contract)	Client selects a suitable tenderer. Potential contractor and client work together until signing the contract

With the permission from the interviewees, interview sessions were recorded, and the files were stored methodically using the NVIVO software. Then, the audio/video recordings and their written transcripts were carefully reviewed to identify core ideas with regard to dispute avoidance steps. The identified dispute avoidance steps were given with a unique identification number as well. Furthermore, the most suitable/responsible party and applicable pre-contract stage (among the four stages in Table 2) to perform a particular avoidance step were identified from the transcripts and recordings accordingly. As an indication of the significance of any avoidance step, the number of respondents who pointed out a particular dispute avoidance step has also been recorded. The content of the gathered data has been critically analysed manually, with some configuration options available in the NVIVO software. Under the five themes, the analysed information has been presented, providing important insights into the dispute avoidance steps, applicable pre-contract stages, and the most responsible parties to perform those steps. Figure 20 illustrates the overall research process of this study.

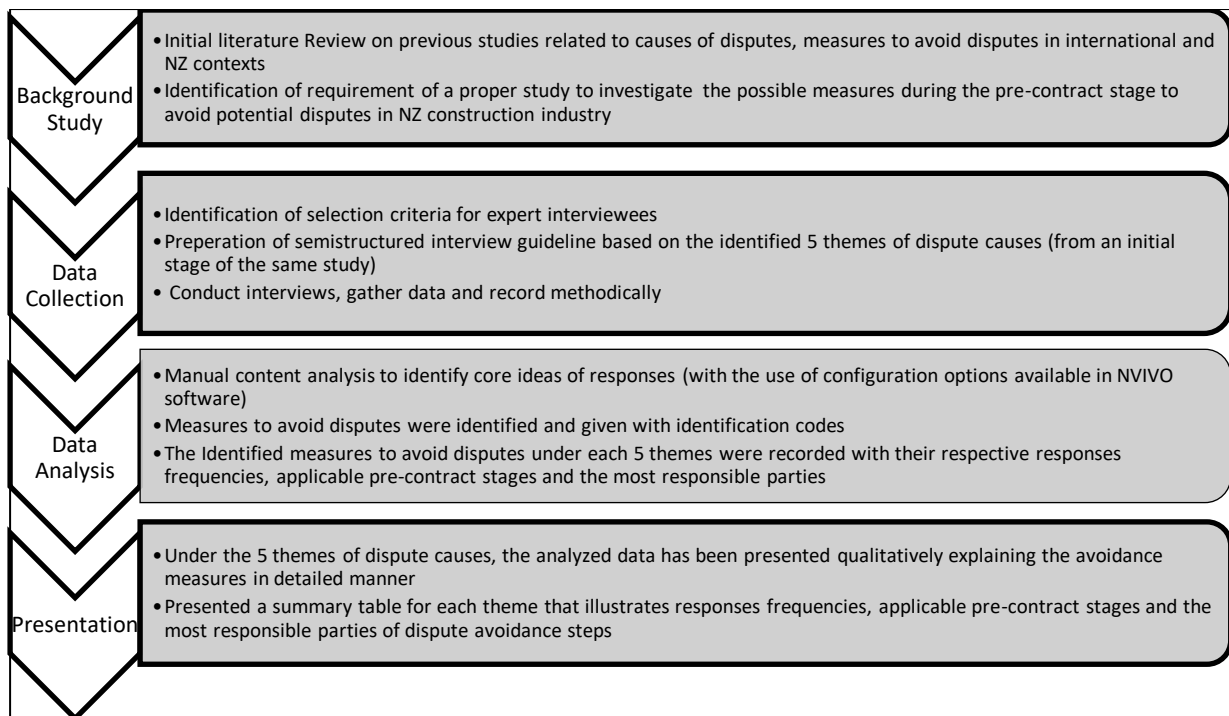


Figure 20 : Research process (Source: Authors own creation)

7.5 Findings

7.5.1 Poor contract understanding

The clarity of the contract documentation and the level of understanding are co-related, as per several respondents. A respondent highlighted the importance of detailed and accurate design information and the necessity of considering what constitutes a complete set of contract documents. Table 14 summarises the collected pre-contract measures along with their applicable pre-contract stages and responsible parties under this theme. Respondent L emphasized the importance of using clear and easily understandable language with fewer legal terms. However, respondent N expressed a different perspective, stating, "...In my view, we need a well-structured contract document with precise language, especially regarding contract conditions... ..while some advocate for plain English, I am not a great fan of it, certain contractual matters cannot be fully conveyed in plain English, so I believe a combination of contract-specific language and plain language works best...". A clear indication of

measurement methods for construction activities or stating the standard method of measurements could avoid many quantity-related disputes, particularly in service-related activities (respondents K and N). A few other respondents highlighted the importance of understanding the construction programme, including how activities are linked, the scale of activities, and key activity timings. They also emphasized that being aware of the completion requirements is essential for enhancing overall understanding.

Table 13 : Dispute avoidance measures under poor contract understanding theme (Source: Authors own creation)

Steps to avoid potential disputes	Number of responses	Responsible party				Pre-contract stage *			
		Client	Eng/design team	Tenderer	Selected tenderer	PB	CDSC	TDA	TDB
Be clear about the allocation of risks	3	✓	✓				✓	✓	
Tenderer to identify its portion of risk	3			✓				✓	
Educate the Principal about the construction process	3			✓	✓			✓	✓
Be clear about responsibilities	2	✓	✓	✓				✓	
Define and use a standard method of measurement	2	✓		✓				✓	
Detailed and accurate design documentation	2	✓	✓				✓	✓	
Draft the contract in clear and simple language	2	✓						✓	
Bring the lessons learnt from the past projects	1	✓	✓			✓	✓		
Tenderers should utilize their previous experiences to understand the tender documents	1			✓	✓			✓	✓
Legal workshop or reviewing the contract with a lawyer	1			✓				✓	
Client should make it clear about the accessibility of the supply chain early	1	✓							✓
Bear in mind to hold frequent site meetings	1				✓				✓
Understand the involvement of Principal's representative (engineer PMs, etc.) well	1				✓			✓	
Usage of diagrams to visualize contractual aspects	1	✓		✓	✓			✓	✓
Understand the construction programme	1	✓		✓	✓			✓	✓
Understand the completion requirements	1	✓		✓	✓			✓	

* PB- Preparation and briefing, CDSC- Concept design and spatial coordination, TDA- Technical design—A (until tender submission), TDB- Technical design—B (until signing the contract)

Being clear about the allocation of risks during the pre-contract stage was highlighted by respondents H and G. Respondent H highlighted the importance of the client being honest and open when transferring the risks to the contractor. In other words, it is paramount for the client

to clearly draft the contractual provisions that will transfer the risks to the contractor. Respondents H and M added that understanding and clarifying the roles and responsibilities and having a better understanding of them may avoid potential confusion. Furthermore, respondent H said, “an innovative schedule that identifies what the responsibilities of each party would be helpful”.

Utilising the previous experience for the current project and sharing knowledge in good faith with other parties are important to avoid potential disputes, as indicated by respondents E and L. Using the experience gained from the previous projects will enhance the understanding of the contract and best practicing methods; also, sharing the knowledge, such as educating the client about the construction process and practicalities during a pre-contract stage, will provide an opportunity for the contractor/tenderer to understand the client's expectations. If a party's internal knowledge regarding the contract administration is inadequate, it can even seek an external legal service. Respondent G stated, “2-hour workshop with a lawyer, just to talk about the nuances of clauses rather than just assuming the other person's opinion would be worthwhile”. Innovatively, parties can even use diagrams to understand and explain contractual matters and responsibility hierarchies.

7.5.2 Poor contract management and practices

Setting up a contractual environment during the early stage to work collaboratively in the post-contract stage has been recorded from several responses. The responses varied across agreeing on reasonable and sufficient time for pricing variations, offering incentives for working collaboratively, and negotiating more workable contract administration procedures for both parties (refer table 15 for all the pre-contract dispute avoidance measures under this theme). Unless an agreed rate or a similar rate is available in the contract, a contractor needs to rely on

external quotations. Therefore, interviewee K opined to discuss during the pre-contract stage to allow sufficient time to properly price variations. Similarly, interviewee N also emphasized that it is possible to adopt a different, more workable administrative methodology without undermining the risk profiles or without disturbing the project's objectives. Furthermore, respondent N commented, “maybe you have a very poor, poorly structured contract, but if you have an intent or mindset to work collaboratively, you can deliver the project in a dispute-free environment”.

Table 14 : Dispute avoidance measures under poor contract management and practice theme (Source: Authors own creation)

Steps to avoid potential disputes	Number of responses	Responsible party				Pre-contract stage *			
		Client	Eng/design team	Tenderer	Selected tenderer	PB	CDSC	TDA	TDB
Involvement of competent people to understand the contract administration well	3				✓				✓
Contractor should keep in mind to inform Principal and submit any claims in a timely manner	2				✓				✓
Setting out reporting requirements in the contract	2	✓	✓				✓	✓	
Training and learning from past experiences	2	✓	✓			✓	✓		
Tenders to establish training and learning opportunities	2			✓	✓			✓	✓
Agreeing on suitable communication channels and their limitations beforehand	1	✓	✓		✓				✓
Agree to allow reasonable time to price new variation items to Contractors	1	✓						✓	✓
Check the background of the other party beforehand	1	✓		✓				✓	
Clarifying details from the Engineer	1								
Agreement on timeframes of when the information should be transferred	1	✓	✓			✓	✓	✓	
Establishing a robust change control procedure	1	✓	✓	✓	✓			✓	✓
Establishing a robust risk management procedure	1	✓	✓				✓	✓	✓
Offering incentives for working collaboratively	1	✓	✓				✓	✓	✓
Bear in mind to keep the site records well	1				✓				✓
Obtain and save supplier's producer statements and warranties	1				✓				✓
Keep in mind to obtain approvals for variation prices beforehand	1				✓				✓
Pass the pre-contract assumptions to the post-contract team effectively within a company	1	✓		✓	✓			✓	✓
Pre-contract meeting on process of contract administration process	1	✓			✓				✓
Use of robust information technology systems/software	1	✓	✓			✓		✓	

Tenderers should use robust information technology systems/software	1				✓				✓
Smooth transition from pre-contract team to post-contract team	1	✓		✓	✓				✓
To keep significant design portions separate from the construction contract	1	✓	✓			✓	✓		
* <i>PB- Preparation and briefing, CDSC- Concept design and spatial coordination, TDA- Technical design—A (until tender submission), TDB- Technical design—B (until signing the contract)</i>									

Three respondents said that proper record-keeping is essential to avoid disputes. It is common in construction companies that employees shift to other positions or different companies, leaving significant loopholes in the knowledge and records of the project. Hence, it is paramount to record important information well, particularly to smoothly transfer and record the assumptions, correspondences, and the like from the pre-contract team to the post-contract team (respondent N). While an interviewee with significant main-contractor experience highlighted the hardship of establishing the entitlement of a claim without proper recording, another interviewee pointed out some complications of not keeping suppliers' warranties and producer statements well. To avoid those kinds of complications, which potentially lead to disputes, setting out report requirements in the contract, understanding the reporting requirements, and organizing measures to gather information for those reports were suggested.

For both the client and tenderer, it is important to bring the lessons learnt from past projects and seek experienced practitioners' knowledge and expertise to avoid potential malpractices and mismanagement (respondents D and L). Furthermore, the respondents emphasized the importance of having capable individuals who can understand and effectively use a well-crafted contract, and they stated that even with a high-quality contract, the absence of people who can comprehend and apply its terms could lead to failure. A senior quantity surveyor from a reputed company in NZ indicated the importance of carrying out a background check to identify the financial potential of the client and the importance of identifying the experiences of the tenderers regarding past projects.

Variations and claims and their surrounding administrative mechanisms are prone to disputes during the construction stage; hence, three respondents provided recommendations to establish during the pre-contract stage. “We should incorporate robust change control procedures into the contract to establish a protocol for managing changes and identifying the owner of those changes”, respondent L added. The importance of bearing in mind from the early stages of the projects to notify the other party about upcoming cost and time implications has also been emphasized. Moreover, to facilitate the practice, it has been recommended that suitable information technologies be used to establish robust risk management procedures and to keep significant design portions as separate contract/s.

7.5.3 Poor contract formation

Several respondents opined that when forming their contract, the client and contractor/tenderer must go through the tender documents thoroughly to identify errors, communicate them to the other party, and manage them well. Specifically, when a tenderer notices a major omission, respondent K advised explicitly listing both the priced items and those that were not (the missing items) to prevent potential pricing misunderstandings while remaining competitive. From a tenderer’s perspective, the respondent further emphasized the importance of conducting a general review of the schedule of quantities, even in a cost-reimbursement arrangement. This is because significant differences in actual quantities during the post-contract stage can lead to substantial variations in unit costs, potentially causing conflicts. The importance of agreeing to a list of comprehensive rates has been highlighted by respondent N, saying that, “client should let tenderers to price a comprehensive set of daywork rates which are detailed enough to apply in the post-contract stage alongside the tender price”. Moreover, the involvement of experienced persons for pricing and the inclusion of a comprehensive set of pricing preambles

were also suggested by two interviewees. Table 16 summarises the pre-contract measures to properly form the contract.

Table 15 : Dispute avoidance measures under poor contract formation theme (Source: Authors own creation)

Steps to avoid potential disputes	Number of responses	Responsible party				Pre-contract stage *			
		Client	Eng/design team	Tenderer	Selected tenderer	PB	CDSC	TDA	TDB
Document the scope clearly	5	✓	✓			✓	✓		
Develop the design to a greater extent during pre-contract stage	3	✓	✓			✓	✓	✓	
Selecting competent Principal's representatives	3	✓				✓	✓		
Tenderer to ask questions and get answers	2			✓				✓	
Document and summarize pre-contract correspondences	2	✓		✓	✓			✓	✓
Manage significant missing items, drastic quantity variances, and errors in a Schedule of Quantities (SOQ) in a Bid well	2			✓				✓	
Understanding the current market conditions when drafting the contract	2			✓				✓	
Tenderers should be given sufficient time to price	2	✓					✓		
Arranging the warranties well	1			✓	✓			✓	✓
Collaborative contractual clauses	1	✓		✓				✓	
Principal's consultants' fees should be percentage-based	1	✓	✓			✓	✓		
Engage a Contractor only when the designs are developed to a greater extent	1	✓					✓	✓	
Provide the Contractor with environment-related information	1	✓	✓					✓	
Not to include too many special conditions of contract	1	✓					✓	✓	
Pre-contract site investigations	1			✓				✓	
Selecting the right Contractors in the first place	1	✓							✓
To have a comprehensive set of rates	1	✓		✓					✓
To have comprehensive set of preambles	1	✓		✓					✓
To have experienced persons for pricing and tender document review	1			✓				✓	
Contract to be drafted by an experienced person	1	✓					✓		

* *PB- Preparation and briefing, CDSC- Concept design and spatial coordination, TDA- Technical design—A (until tender submission), TDB- Technical design—B (until signing the contract)*

The contract documents are complex and consist of many sub-documents; their clarity and tidiness are paramount (respondents E and M). Particularly, before compiling the entire contract document, all the correspondences made in various modes must be well-organized and perhaps require summarizations. Regarding the special conditions of the contract, respondent

B opined, “there’s no need to add a whole layer of extra/particular conditions of contract unless there’s a specific need to include them”. From a tenderer’s perspective, it is essential to thoroughly review the tender, clearly understand what is being priced, and, most importantly, seek clarification from the client, obtain responses, and properly document them.

A senior quantity surveyor with significant experience in NZ and overseas stated that the designs of most of the construction projects in NZ are not developed to a greater extent at the time of signing the contract; hence, it causes a considerable margin of error regarding their associated lump sum prices and the like. Therefore, he suggested not relying on concept designs or very preliminary designs for pricing jobs, as this could potentially lead to scope creep, cost overruns, numerous extension-of-time claims, and disputes since the design has not yet been fully developed. Respondent J suggested paying the consultants’ fee on a percentage basis from the project’s value rather than paying on an hourly basis to ensure that the consultants produce a complete design with the expected level of detail. Five interviewees pointed out the importance of clearly documenting the scope as a primary action to avoid potential disputes. The client and its consultants are required to compile the scope with an adequate level of detail in an understandable way for tenderers. Respondent E added, “A client wants to ensure that their contractor is not surprised halfway through the job when they realise, they need to paint the cable containment in addition to installing it”. Particularly in a lump sum contract, which is more common in NZ, it is essential to clearly mention the assumptions and scope inclusions and exclusions to avoid potential disputes surrounding variation entitlements (interviewees E and J).

“Collaborative contract clauses are usually quite good as well where you work together as opposed to sitting on opposite sides of the table”, respondent G added. Furthermore, he explained that the possibilities of including clauses to incentivise parties who work collaboratively in the post-contract stage would encourage parties to be open and honest. A

client can assist in good faith in providing access to the information (such as ground investigation reports) and organizing site visits to assist the preferred tenderer in obtaining the necessary information and assessing the risk effectively (respondents D and N).

7.5.4 Over-expectations of contractor

If the client is willing, the preferred tenderer can be involved in collaborative design reviews so that it (1) can share its specialized knowledge with the design team and (2) can understand the level of detail that would be available to the contractor during the post-contract stage (respondent H). Relevant pre-contract measures to avoid over-expectations of contractor are summarised in table 17.

Table 16 : Dispute avoidance measures under over-expectations of contractor theme (Source: Authors own creation)

Steps to avoid potential disputes	Number of responses	Responsible party				Pre-contract stage *			
		Client	Eng/design team	Tenderer	Selected tenderer	PB	CDSC	TDA	TDB
To hold expectation management meetings	4	✓	✓	✓			✓	✓	
Contractors should inform about the alternative products at early stage	2			✓			✓		
Get clear about the scope of the Contractor's quotes	2			✓			✓		
Tenderers should not overly rely on the Principal's knowledge of the project	2			✓			✓	✓	
Collaborative design reviews	1	✓	✓	✓	✓		✓	✓	
Tenderer to roughly check the quantities (if applicable) calculated by Principal in the bidding document	1			✓			✓		
Investigate whether the tender document includes even a minor design requirement	1			✓			✓		
Not to fully rely on Principal's prepared schedules	1			✓	✓		✓	✓	
Review and understand the contract well before signing	1			✓	✓		✓	✓	
Review closely the design developments to determine whether they actually result in any cost implications	1			✓	✓		✓	✓	
Tenderers should inform the scope exclusions clearly to the Principal	1			✓			✓		
Tenderers should not overly expect design details from the Principal	1			✓			✓	✓	

Tenderers should not sign a contract with an impractical completion date for them	1			✓				✓	
Tenderers should not place their bids with unachievable productivity levels	1			✓				✓	
Tenderers should not overly rely on the accuracy of the forecasts and schedules	1			✓				✓	
* PB- Preparation and briefing, CDSC- Concept design and spatial coordination, TDA- Technical design—A (until tender submission), TDB- Technical design—B (until signing the contract)									

Respondent A, with significant main contractor experience, highlighted that certain instructions and drawing issuances could not necessarily be treated as variations with cost or time implications, as they are just further details that would have been envisaged since the pre-contract stage. Therefore, he suggested that the preferred tenderer consider all foreseeable costs as reflected in the tender documents and price them accordingly without getting involved in unnecessary disputes about the price scope. Three respondents stated that the list of items requiring pricing and the quantities provided in the tender documents should not be considered as the full scope of the project. Therefore, the tenderer must independently verify the listed items and quantities rather than relying entirely on the client-prepared schedules. Additionally, the tenderer should ensure that all foreseeable costs are accounted for in the rates or prices, as applicable.

Two respondents from the main contractor side emphasized that tenderers should understand and accept the resources and potential of their company and should not price tenders with unachievable productivity levels. In other words, tenderers should not be overly confident about their strengths or sign a contract with an impractical completion date (with impractical resource allocations). Moreover, even though the overall project follows the traditional procurement path, where the client primarily holds design responsibility, it is important for the tenderer to identify any minor design responsibilities outlined in the tender document. This allows the tenderer to be aware of the client's expectations and assess whether they can fulfil those responsibilities (respondent M). Three respondents emphasized the importance of

organizing a pre-contract meeting to discuss the expectations of the client, contractors, and other stakeholders regarding quality, budget, and timeline expectations while building a positive working relationship and trust. Respondent E from the contractor side commented, “I dread to think of what it would be like if we signed a contract with our client without having those expectation management meetings where we explain stuff”.

7.5.5 Over-expectations of principal

Defining and clearly communicating the quality and performance expectations of the principal before signing the contract is essential to avoid potential quality-related disputes; also, those quality expectations should be realistic, as mentioned by a respondent. Respondent H added that the principals can explain their desired procedure and information expectation from the contractor regarding the submission of extension of time claims and variations to avoid unnecessary confusion surrounding variation entitlements and extension of time claims. Moreover, some assumptions or expectations may be helpful to share with the other party in the first place to avoid potential confusion; for instance, respondent L suggested that principals can disclose any specific software that they expect to use during the post-contract stage (refer table 18 to see all the pre-contract dispute avoidance measures under this theme).

Table 17 : Dispute avoidance measures under over-expectations of principal theme (Source: Authors own creation)

Steps to avoid potential disputes	Number of responses	Responsible party				Pre-contract stage *			
		Client	Eng/design team	Tenderer	Selected tenderer	PB	CDSC	TDA	TDB
Be clear on what Contractor should design and what documentation should be provided	3			✓				✓	
Agreement on quality and standard criteria beforehand	2	✓		✓				✓	

Engage consultants for design aspects rather than Contractors as much as possible	2	✓					✓		✓
Understand where Principal's design risk finishes and where Contractor's risk starts	2	✓		✓				✓	✓
Agreement on rates and Extension of Time (EOT) granting mechanisms in advance	1	✓		✓				✓	
Be clear on assumptions made by any party	1	✓	✓	✓	✓				✓
Principal's awareness of releasing the Contractor of its liability at the end of the construction	1	✓							✓
Minimize unnecessary shared design responsibilities for certain works	1	✓	✓			✓	✓	✓	
Pass suitable portions of design responsibilities to Contractor	1	✓					✓		
Robust communication up-front	1	✓	✓	✓	✓			✓	✓
* <i>PB- Preparation and briefing, CDSC- Concept design and spatial coordination, TDA- Technical design—A (until tender submission), TDB- Technical design—B (until signing the contract)</i>									

While some respondents viewed the early involvement of preferred tenderers in pre-contract designs positively, respondents J and N highlighted negative consequences, such as ambiguities in design responsibilities and unrealistic expectations from the principal that the tenderer would bear certain risk profiles associated with the design stages. Moreover, another respondent highlighted the importance of minimizing unnecessary shared design responsibilities with the preferred tenderers. However, he said it is also essential to agree on transferring the right portions of design responsibilities to the preferred tenderer, particularly in instances where the potential contractor has more competencies than the client (or client's consultants) or the potential contractor would be in a more controllable position to come up with a more buildable design. For instance, respondent N added, "in a construction project near coastal area, it is better to pass the design responsibility of earth retaining structures to the contractor as it is in a better position to develop designs considering the highly uncertain coastal soil conditions". Moreover, tenderers need to review the tender document carefully and identify any minor design responsibility expected from the tenderer; if so, the tenderer needs to discuss and understand the boundary of design responsibility (respondents N and J).

7.6 Discussion

Not being able to understand the specifications in the tender document and the construction contract was identified in one-fourth of the studied cases in Norway, which caused many disputes (Omar et al., 2019). According to a Turkish study by Cakmak and Cakmak (2013), the vagueness of contract documents and the varying interpretations of these documents were ranked 8th and 12th, respectively, out of 28 attributes based on their relative importance. A New Zealand study based on construction-related court cases found that a significant number of court cases were caused by misunderstandings of the parties, and this caused disputes around payment issues, termination, suspension, and testing and inspection (P. Silva et al., 2023). Even though the poor contract understanding is highlighted in many international studies, the possibilities of enhancing the parties' understanding have not been investigated. This study emphasized that the level of understanding is co-related to the clarity of the contract documents and to the level of information that is available at the time of signing the contract. Many experts emphasized the importance of understanding risk profiles and clearly defining the roles and responsibilities of all parties—something that can be effectively achieved during “technical design stage—A”, when the principal prepares the tender documents and tenderers develop their pricing.

A previous study in Hong Kong by Kumaraswamy (2002) identified “insufficient contract administration” as a proximate cause of dispute. Instances where the contract is managed very poorly, such as delays in the construction site handover process, delayed payments, stoppage of work by the principal, and poor quality of construction, were identified by an Indian study by Parikh, Joshi and Patel (2019). In order to address these issues surrounding poor contract management and practices, Yiu et al. (2021) recommended that the entire NZ construction industry should behave in a professional and accountable way to minimize potential disputes. Even though the management and practice of the construction contract are more relevant to the

post-contract stage, there are many steps/strategies that can be done even during the pre-contract stage to make their post-contract stage have fewer disputes. Experts recommended establishing a collaborative contractual environment from the early stages. The key elements of this approach include agreeing on reasonable timeframes for pricing variations, providing incentives for collaboration, setting up effective variation and change control procedures, and negotiating contract administration processes that are practical and workable. Furthermore, setting out proper risk management procedures, discussions/agreements on the reporting requirements, and the levels of required information in reports could also avoid potential disputes.

When construction contracts were formed poorly in NZ, disputes related to variation entitlement, design responsibilities, and payment issues were caused, and the poor contract formation was attributable to 7 out of 35 studied court cases in NZ (P. Silva et al., 2023). Ambiguous language, a characteristic of a poorly formed contract, is positioned at the lowest level of the interpretative structural model hierarchy, as it serves as a root cause for many other attributes that lead to disputes (Viswanathan et al., 2020). Similarly, in this study, a significant portion of respondents opined on the importance of documenting the scope clearly with fewer ambiguities to avoid potential disputes. Moreover, several other studies have also emphasized the incompleteness of the contract, vagueness, and unclear information of the conditions of the contract as causes of disputes (Cheung and Pang, 2013; Barman and Charoenngam, 2017). Even though there have been several studies discussing how the construction contracts are poorly formed and their implications, very few have recommended measures to form a contract properly. Ramachandra and Rotimi (2011) recommended a few measures to minimize payment-related conflicts that are applicable to the pre-contract stage in NZ, namely, securing financial guarantees early in contracts and including pre-qualification criteria to assess the financial status of the parties. Similarly, Yiu et al. (2021) also stressed that investigating the

other parties' background, including their financial stability, could be worthwhile to avoid potential disputes in the NZ context. This study also emphasized the importance of investigating the other party's background before forming the contract. This study revealed the importance of having a comprehensive and more practically meaningful set of rates along with necessary assumptions for pricing inclusions. Tenderers should be experienced enough to price the job properly with all the foreseeable costs, with realistic productivity levels. Also, the tenderer, being the reviewer of the tender document, needs to verify the scope by reviewing the documents properly and by raising questions to the principal for clarification.

Both contractors' and clients' unrealistic expectations are major contributors to disputes in construction projects. Kumaraswamy (2002) identified contractors' unrealistic information expectations as a key root cause of disputes in Hong Kong construction projects. However, Viswanathan et al. (2020) identified "unrealistic principal expectations" as a significant underlying cause of disputes in a six-level hierarchy of factors. Moreover, Tanriverdi et al. (2021) highlighted those unrealistic expectations of the principal as one of the five main concepts causing disputes, with extensive linkages to other causes of disputes. Particularly in the NZ context, both unrealistic expectations of the principal and contractor were identified as primary causes of five legal cases (out of 35 reviewed cases), which caused predominantly quality issues and contract terminations (Silva et al., 2023). This study attempted to investigate possibilities during the pre-contract stage to ensure that parties' expectations do not extend beyond the ideal boundaries. To avoid disputes over the scope and pricing, tenderers should be realistic about their capabilities and include all foreseeable costs in their tenders. Principals need to clearly communicate quality, performance, and procedural expectations before signing contracts, ensuring that these are realistic. The early involvement of preferred tenderers in design reviews could be helpful, but it must be managed well to avoid ambiguities in design responsibilities and unrealistic risk expectations.

7.7 Conclusion and further research

The main aim of this study was to investigate possible steps during the pre-contract stage to avoid potential construction-related disputes in the NZ context. In order to achieve that aim, industry experts with more than 15 years of experience in construction contracts were selected to undergo semi-structured interviews. The initial part of this study identified 11 primary causes of disputes based on actual legal cases in NZ; however, considering commonalities of those primary causes, this study adopted five derived themes of causes of disputes. To gather, analyse, and present the information methodically, four pre-contract stages were discerned from the RIBA plan of work. Under each theme, recommended steps to avoid potential disputes were identified and further categorized under applicable parties and the relevant pre-contract stage.

Most of the steps that could be done to enhance the overall understanding are related to the stage of “technical design stage—B” where the tendering process takes place. The allocation of risks, responsibilities, construction schedule, and construction processes are the areas that parties require to enhance their knowledge. Clarity and the level of detail of the tender/contract documents were highlighted as impactful factors for all areas where an increased awareness is required to avoid potential disputes. Knowledge and experience (i.e., from past project experiences and employees’ competencies) play an important role with regard to effective contract practices. The information expectations and their timing constraints need to be discussed and well-established between the parties before signing the contract to manage the contract easily during the post-contract stage. Documenting the scope clearly was highlighted by a majority of the experts and indicated its positive impacts on other dispute avoidance steps as well. Furthermore, other key recommendations for forming a well-structured contract included better management of tender errors, more developed design work during the pre-contract stage, and clearer pricing scopes. These recommendations apply across all four pre-

contract stages. To avoid unrealistic expectations, it is advised that both the principal and the contractor hold expectation management meetings, openly communicate concerns, and avoid placing excessive reliance on tender documents prepared by others.

The identified steps to avoid potential disputes are related to the pre-contract stage and can be considered as early preventive measures to overcome post-contract disputes. The dispute avoidance steps were identified under five themes and categorized under the most suitable pre-contract stage and the most responsible party. Industry practitioners from the client, client's representatives, or tenderers can perform these avoidance steps throughout the pre-contract stage as avoidance strategies for potential disputes. The presented tables for each theme map the avoidance steps with their applicable pre-contract stage and applicable party, along with the number of respondents who indicated a particular avoidance step, to provide an idea of the significance of a particular step.

As this study is limited to NZ construction projects that follow the traditional procurement path, further research could be done to investigate the suitability of the suggested avoidance steps on other procurement paths as well. This study identified clear scope documentation as the most significant dispute avoidance step, considering its frequency of responses; therefore, a more in-depth study on how to document the scope clearly would be worthwhile. Furthermore, a user-friendly framework can also be developed that links pre-contract dispute avoidance steps and potential causes/concerns of disputes (in the post-contract stage).

8 AN INTERACTIVE PRE-CONTRACT DISPUTE AVOIDANCE TOOLKIT FOR NEW ZEALAND CONSTRUCTION INDUSTRY

8.1 Chapter Introduction

Causes of disputes were identified by conducting a court case analysis on actual court cases, as explained in chapters five and six. And the chapter seven described the interview series carried out with the industry experts to inquire about possible measures during the pre-contract stage to avoid potential disputes. By combining the findings from case studies and expert interviews, this research has developed an interactive web-based toolkit to visualise pre-contract dispute avoidance steps in a meaningful and user-oriented way. This has been achieved by using Microsoft Power BI for data organizing, data modelling, and data visualisation (development of the toolkit's user interface). Initially, the developed toolkit underwent a two-stage validation process consisting of semi-structured interviews and a focus group session, during which the toolkit's content, understandability, and user-friendliness were evaluated. The toolkit was then revised and finalized based on the feedback received. This chapter explains (1) the data organizing, data modelling and data visualisation processes associated with the toolkit development process (2) the toolkit's validation process & findings and (3) toolkit and its features including examples. This chapter is based on the following journal publication (published);

Pramod Malaka Silva, Niluka Domingo, Noushad Ali Naseem Ameer Ali; An interactive pre-contract dispute avoidance toolkit for New Zealand construction industry. *Construction Innovation: Information Process Management* 15 December 2025; 25 (7): 268–291. <https://doi.org/10.1108/CI-10-2024-0309>

8.2 Abstract

Purpose

Avoiding disputes in the New Zealand (NZ) construction industry is crucial but challenging. While many studies focus on post-contract measures, there is limited research on pre-contract dispute avoidance, especially in traditionally procured projects, which are more prone to disputes in NZ. Therefore, this study investigated pre-contract steps to avoid potential disputes in NZ and presented the findings in an interactive toolkit.

Design/methodology/approach

An analysis of 35 construction-related court cases in NZ was conducted to identify the causes of disputes, and fourteen expert interviews were carried out to collect recommendations for the pre-contract stage to avoid potential disputes. The gathered data was analysed manually and then recorded and coded using NVIVO software. Microsoft Power BI was used for data modelling and toolkit interface development (data visualisation). Sixteen industry practitioner responses during one-to-one interviews and focus group sessions were considered to validate and refine the toolkit.

Findings

The toolkit has been located on an online platform, allowing users to access it conveniently. The finalized toolkit provides a user-centred and flexible way to select the pre-contract stage, party and theme to visualize dispute avoidance steps and their relationships towards the causes of disputes.

Originality/value

The toolkit offers guidance for avoiding disputes in traditionally procured projects before construction begins, focusing on contractual understanding, practices, contract formation and

expectations. The interactive nature of the toolkit assists practitioners from contractor, client and consultants to configure dispute avoidance steps in a user-friendly manner. The tender preparation and pricing stage is identified as the stage where more focus is worthwhile to minimise potential post contract disputes. This toolkit could evolve into new versions for other procurement methods, and its outcomes could train language models for improved conversation handling.

Keywords:

Interactive toolkit, Dispute avoidance, New Zealand Construction, Pre-Contract Stage

8.3 Introduction

A dispute is defined as a situation where another party rejects one party's claim or assertion and that the first party does not accept rejection, and it hinders main objectives of a construction project, namely timely completion, quality expectations and cost boundaries (Kumaraswamy, 2002; Naji et al., 2020). Disputes are caused by conflicts that occur due to the incompatibility of interests among the parties and often disputes require resolutions from external parties (Fenn, Lowe & Speck, 1997). Completion of a project within the expected time and cost is the main objective of any construction project, and disputes over these two factors cause a major hindrance to the success of the project (Naji et al., 2020). Construction-related disputes arise from several areas in construction projects: scope variations, contractual clause interpretation, extension of time claims, site conditions and obtaining approvals (Al-Keim, 2017). Given that disputes in the construction industries are inevitable and severely impact the project objectives, many researchers have attempted to identify reasons for disputes, dispute resolution mechanisms, and dispute avoidance possibilities. Kumaraswamy (1997) categorized dispute causes into two types as (1) root causes, which are underlying factors like unfair or unclear risk allocation, inappropriate contract types, and unrealistic pricing or expectations; and (2)

proximate causes, which directly trigger disputes, such as poor communication, inadequate briefs, and slow client responses.

Gerber (2013) emphasised the importance of taking preventive measures to reduce disputes, noting that the initial cost of establishing a dispute avoidance procedure will be recovered many times over through the savings generated by a dispute-less environment. Similarly, Kumaraswamy (2002) stressed the importance of proactively preventing and reducing disputes rather than merely addressing and resolving them after they arise. While highlighting the importance of forecasting future disputes during the “briefing stage” (where the client's requirements and objectives for the project are established), De Alwis et al. (2016) mentioned that proper risk allocation, selection of right contractors, quality of documentation, and effective procurement planning during the early “briefing stage” could be beneficial to avoid future disputes.

Similar to the construction industry globally, New Zealand (NZ) construction industry also suffers from disputes and a considerable number of disputes in the NZ construction industry were even developed to a position that parties sought a resolution from the NZ courts (P. M. Silva, N. Domingo, & N. A. N. A. Ali, 2023). Further, the authors ascertained that significant portion of the studied cases were attributable to payment issues, conflicts around the quality of works and disagreements on variation entitlements. In a study focused on construction payment issues in New Zealand, Ramachandra and Rotimi (2011) found that nearly 82% of court cases involved disputes between the main contractor and the client, while 10% were between the contractor and subcontractors, and 8% were between the principal and subcontractors. Considering the necessity of avoiding disputes in the NZ construction industry and the limited research conducted in this area, this study was initiated.. The primary aim was to develop an interactive pre-contract dispute avoidance toolkit for the NZ construction industry. To achieve this aim, the study focused on three key objectives: (1) identifying the main causes of disputes

in the NZ construction industry, (2) identifying effective pre-contract measures to prevent such disputes, and (3) developing and validating an interactive pre-contract dispute avoidance toolkit for the NZ construction industry..

8.4 Literature Review

Besides the extensive amount of previous studies that investigates the causes of disputes and dispute resolution, there are several other studies on dispute avoidance. Under the “dispute avoidance” topic, researchers have mostly studied about post-contract strategies/steps to avoid disputes and few have studied about pre-contract dispute avoidance strategies/steps. Previous findings on these two research avenues have been summarised in the following paragraphs.

Several studies have focused measures to avoid disputes during the post contract stage. A framework was developed by Zhu and Cheung (2020) to demonstrate how incentivisation can mitigate construction disputes by aiming at decreasing disputes by strengthening relational governance, closing gaps in risks, enhancing investment in relationships, and fostering a greater sense of fairness. During the construction phase, the importance of (a) comprehension and monitoring the scope, (b) support from the higher management and (c) the expertise of the design consultant of the contractor were recognised as the three primary factors from a “principle component analysis” that contribute for less conflicts (Tabish & Jha, 2023). Moreover, a Malaysian study suggested to involve higher management (with decision-making & and financial authority) from both disputant parties to actively discuss and negotiate the issues as a more effective way of minimising and resolving disputes (Danuri et al., 2015). Few studies in NZ have also focused on the avoidance of disputes in NZ construction sector.. For instance, for the post-contract stage, Yiu et al. (2021) recommended to behave in a professional and accountable way and Ramachandra and Rotimi (2011) recommended to settle financial claims to maintain cash flow promptly. These studies have proposed measures applicable to

the post-contract stage to minimise ongoing or potential disputes and have not focused on the pre-contract stage.

For the pre-contract stage, several studies attempted to produce effective recommendations aimed at minimising future disputes in the construction industries. A few previous studies have also focused on assessing and predicting potential disputes considering the attributes in the pre-contract stage. Diekmann and Girard (1995) used logistic regression to estimate the likelihood of disputes occurring, emphasising the crucial role of skilled human resources in preventing disputes and the significant influence of project complexity on dispute occurrence. Similarly, Molenaar et al. (2000) employed Structural Equation Modelling (SEM), highlighting management capabilities and project complexity as key factors controlling future disputes' likelihood. In the Singapore construction industry, if proper pre-contract discussions on how to evaluate the impacts of delays were taken place and the information requirements for time-related claims were established before signing the contract, there could be minimal conflicts around construction schedules and timings (Aibinu, 2009). Equally, few researchers made recommendations applicable the NZ construction industry as well. For example, Finnie (2021) proposed two-staged early contractor involvement framework to the NZ context, which addresses the complications around variation entitlements and legal implications of drawing changes, taking the contractor's involvement in the pre-contract design development stage into account. Moreover, Ramachandra and Rotimi (2011b) focused on payment related disputes in NZ construction context and few recommendations made to the pre-contract stage, namely securing financial guarantees early in contracts and including mandatory pre-qualification of funding parties' financial status.

8.5 Research Gap

In summary, numerous past studies have suggested ways to address construction-related disputes after they have arisen. However, Kumaraswamy (2002) emphasised that 'dispute

avoidance' and 'dispute minimisation' should take precedence over 'dispute resolution.' Internationally, as previously mentioned, there have been only a few studies that recommended predictive methods for identifying potential disputes through statistical techniques. Although the dispute prediction methods proposed by previous researches had accounted pre-contract factors, those prediction methods were not necessarily dispute avoidance steps. Additionally, while some international research has offered strategies and recommendations for minimising and resolving disputes, these approaches were mainly relevant to the post-contract stage of construction projects. For instance, those studies have encouraged good post contract practices such as professionalism, good relationships amongst parties and accountability.

The construction industry in New Zealand significantly impacts the economy, contributing 6.3% to GDP and employing 10.7% of the workforce in 2023 (MBIE, 2023). According to the NZ Construction Industry Council (2016) each dollar invested in the construction sector generates around two dollars and eighty cents in total economic activity, making it one of the sectors with the highest economic multiplier effects. Therefore, disputes that cost the construction project objectives, considerably weaken NZ's overall economy by badly impacting GDP, employment and returns on investment. Further, in New Zealand and Australia, fixed-price contracts based on incomplete designs transfer significant risks to contractors, and this inequitable risk allocation has driven major contractors to exit the industry (Harris et al., 2019; Tower & Baccarini, 2008). Therefore, arguably, avoiding construction disputes will secure monetary objectives of construction projects which will positively impact on the NZ's macro-economic indicators.

Although the importance of a comprehensive study to investigate dispute avoidance in NZ construction industry is high, there are very few studies around that area. For instance, in the NZ construction research context, Ramachandra and Rotimi (2011) focused specifically on payment issues and recommended measures for both the pre-contract and post-contract stages

to ensure healthy payment cycles with less conflicts. Their study focused only on payment-related disputes, and their recommendations were applicable to both the pre-contract and post-contract stages. Another NZ study by Yiu et al. (2021) recommended investigating the other parties' background, including their financial stability, before entering the contract. Finnie (2021) focused on projects where a potential contractor is involved during the early pre-contract stage (considered as a different procurement method) and suggested a two-staged early contractor involvement framework. A study on 35 court cases related to the NZ construction industry by P. Silva et al. (2023) found that majority of the projects in which the dispute occurred followed lumpsum contracts and traditional procurement paths. None of the aforementioned studies by (a) Ramachandra and Rotimi (2011), (b) Yiu et al. (2021) and (c) Finnie (2021) were specifically focused on traditionally procured lumpsum contracts, which are identified as more prone to disputes in NZ. Therefore, this study has been designed to purely focus on pre-contract dispute avoidance measures in traditionally procured lumpsum construction contracts in NZ.

As mentioned, internationally, few studies have considered dispute avoidance during the post contract stage but had not properly focused on possible precontract measures to avoid potential post-contract disputes. Further, the need to minimise construction disputes (particularly traditionally procured lumpsum contracts which are more prone to disputes) is also paramount considering its influence to the overall economy of NZ. Therefore, minimal research on pre-contract dispute avoidance strategies and the growing need of minimising disputes in the NZ construction sector have led researchers to develop an effective and interactive solution to avoid potential disputes. Interactive data visualization enhances engagement by providing tools that allow users to modify data, explore details, generate insights, and better understand its value (Vorontsova, 2024). Considering the benefits of interactive data visualisations, the researchers aimed at presenting the findings of “pre-contract measures to avoid potential

disputes” in an interactive manner. An end-user (practitioners of NZ construction industry) centered design and with more freedom of flexibility and a scalability were also expected in this outcome.

In order to present pre-contract dispute avoidance measures interactively three research objectives have been established, as stated at the end of the introduction section. The first objective (identifying causes of disputes in the NZ construction industry) has already been achieved by conducting a court case analysis. This paper primarily discusses the interactive pre-contract dispute avoidance toolkit and its content (dispute avoidance steps). The research methodology section discusses the applicability of the selected research method, data collection/analysis process, toolkit development process and toolkit validation process. The findings section summarises the findings from court case analysis, and presents the toolkit. In the final section, this study is discussed in comparison to previous studies, and contributions to theory/ industry and future research opportunities are presented.

8.6 Research Methodology

In order to achieve the mentioned objectives effectively, a proper research methodology has been developed which is comprised of a court case analysis to identify the causes of disputes in the NZ context, an expert interview series to identify pre-contract dispute avoidance steps, development of an interactive toolkit to present the findings and the validation process (another series of expert interview and a focus group session) of the toolkit . As a prior step, the causes of disputes along with their significances in the NZ construction industry were identified by conducting a comprehensive analysis of actual court cases in NZ (Silva et al., 2025)This article primarily presents the industry expert’s insights on the pre-contract dispute avoidance steps and the developed interactive toolkit. This section describes more details regarding the research philosophy, data collection process, toolkit development process and the toolkit validation process. The overall research process has been summarised in the figure 1, however,

this particular paper presents the findings of the expert interviews and the developed interactive toolkit (from step 3 to step 7 in the figure 21).

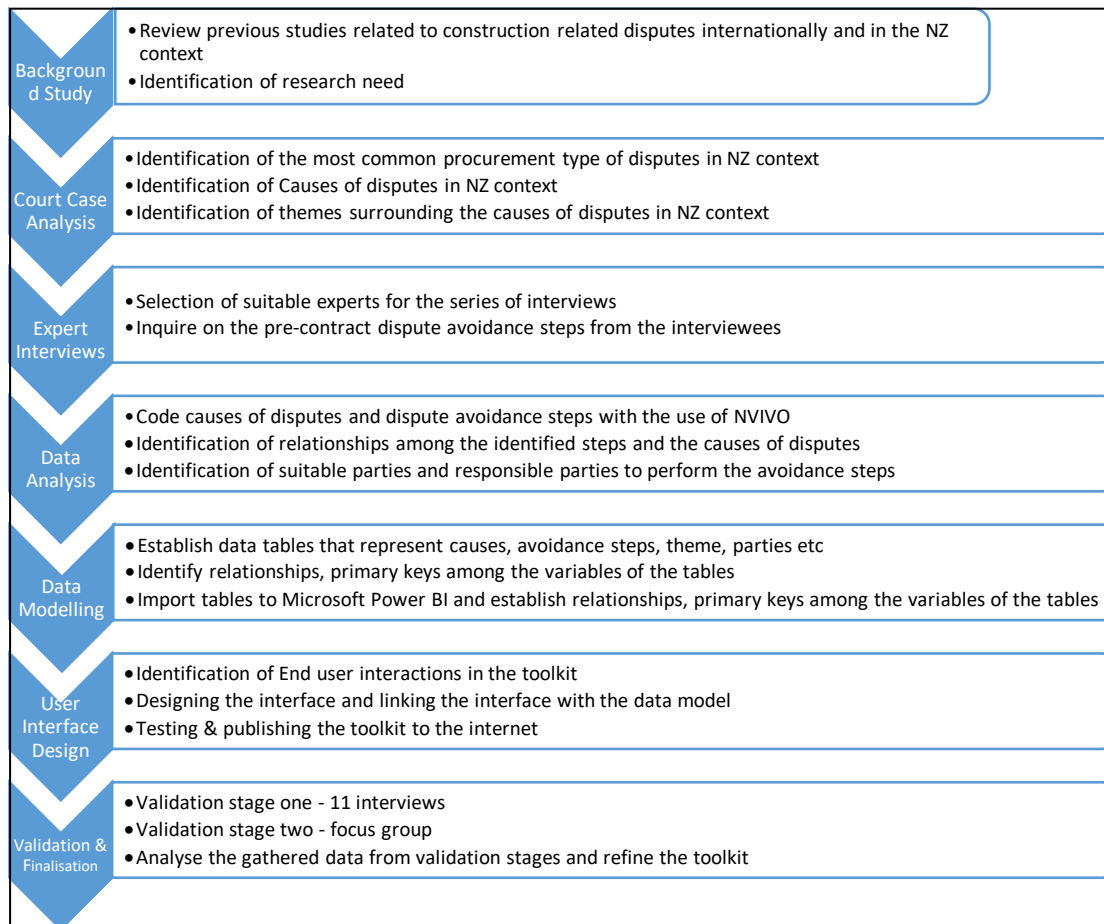


Figure 21 : Research Process (Source: Authors own creation)

8.6.1 Research Philosophy and Research Approach

Research philosophy concerns the nature of knowledge and the methods through which it is acquired or developed (Saunders et al., 2023). Most research philosophies fall between two extreme research philosophies namely subjectivism (reality is shaped by human experiences and perceptions) or objectivism (reality is independent of human perception) (Saunders et al., 2016). Relying solely on either subjectivism or objectivism has led to various debates, prompting researchers to explore ways to combine both perspectives, allowing for multiple interpretations of reality—this approach is known as pragmatism (Mingers, 1997; Creswell,

2007). This study is guided by research questions from a literature review rather than a predefined theory. It focuses on dispute causes and pre-contract dispute avoidance, relying on case studies and industry insights to understand the evolving nature of reality. Prioritizing research objectives over specific methods, the study takes a pragmatic approach, balancing between objectivism and subjectivism.

Research design typically follows either a deductive approach, which tests existing theories using collected data, or an inductive approach, which develops theories by identifying patterns in observed data (Saunders et al., 2023; Tan, 2002). This research primarily aimed at identifying pre-contract dispute avoidance measures based on the industry experts' perspectives. Hence, the researcher gradually developed the findings instead of trying to confirm a pre-established theory or foundation, making the inductive approach the most suitable for the entire research process.

8.6.2 Data collection and analysis processes

34 causes of disputes and five surrounding themes of those causes in NZ construction industry were identified initially from the court case analysis (Silva et al., 2025). Following the court case analysis, a series of expert interviews were carried out. The identified causes were taken into the attention of the expert interviewees and enquired about possible measures during the pre-contract stage to avoid the causes and the potential disputes. Purposive sampling is used when there is no defined population or database to select participants from, and the researcher relies on their judgment to choose suitable participants (Fellows & Liu, 2015). Since no defined population was available and expertise was determined based on the researchers' opinions, purposive sampling was chosen. In other words, the data, the researchers expected to obtain were not necessarily linked to a specific profession or any defined population. Therefore, the authors opted to gather data from interviewees with a specialised knowledge and/or experience

about a subject matter (about construction contracts and/or dispute) rather than from a broader population type (such as profession). The selected fourteen industry experts had at least fifteen years of experience in construction contract management and/or construction disputes. The selected interviewees' professions, experiences and identification codes are summarised in table 19.

Table 18 : Profiles of Expert Interviewees (Source: Authors own creation)

Interviewee Code	Current Profession / Position	Overall Experience	Experience in New Zealand
Respondent A	Technical Director - Project Management	> 18 years	12 years
Respondent B	General Manager - Operations	> 25 years	> 18 years
Respondent C	Technical Director – Structural Engineering	> 20 years	10 years
Respondent D	Director	28 years	28 years
Respondent E	Founder / Director	24 years	24 years
Respondent F	Managing Director	31 years	31 years
Respondent G	Estimating Manager	22 years	> 10 years
Respondent H	Chief Executive Officer	> 32 years	21 years
Respondent I	Senior Quantity Surveyor	> 30 years	16 years
Respondent J	Senior Quantity Surveyor	25 years	10 years
Respondent K	Commercial Manager	18 years	>11 years
Respondent L	Planner - Major Projects	26 years	12 years
Respondent M	Senior Quantity Surveyor	> 28 years	> 10 years
Respondent N	Senior Associate Contracts	> 20 years	13 years

The 14 expert interviewees provided many pre-contract dispute avoidance steps, which were analysed manually with the assistance of NVIVO software. During the analysis process for each identified pre-contract dispute avoidance steps following aspects were analysed;

- In-depth ideas of the avoidance steps

- Relationships among the identified steps and the causes of disputes
- The most responsible/suitable parties to perform those avoidance steps
- The most suitable pre-contract stage to perform the avoidance steps

8.6.3 Database development process of the interactive toolkit

A primary objective of this study was to develop an interactive toolkit to avoid potential disputes in the pre-contract stage. “An interactive system is designed to involve the user in the exchange of information.” (Cambridge Dictionary, 2024). The researchers have attempted to present the gathered information regarding the causes and dispute avoidance steps in an interactive way, allowing the users to engage with the developed toolkit during its run-time.

After analysing the gathered data from the court cases and the expert interviews, the nature of the data, including their relationships were recorded methodically in tabular forms with unique identification numbers (primary keys). Subsequently the data was modelled as shown in the 5th step of the figure 1 by considering the basic principles database modelling. Database modelling, which is paramount for a successful application, is the process of learning about the data and developing a data model that accurately demonstrates the information landscape of the focused phenomenon (Hoberman, 2014).

Although researchers have not intend to develop a high-end application as the outcome, certain principles and processes related to application/database development processes were followed. For an application or database (DB), six stage development lifecycle comprised of DB analysis, DB conceptual design, DB logical design, DBMS selection, DB implementation and DB management could be followed (Zygiaris, 2018). Following table 20 summarises brief ideas of DB development process and how did the researcher utilised the principles when developing the toolkit.

Table 19 : DB Development Process (Source: Table created by authors, partly based on information presented in Zygiaris (2018))

DB lifecycle stage	Description of the lifecycle stage	Methods followed during the development of toolkit
DB analysis	The information needed from the DB is defined.	Identified the end-user's requirement (user's selection criteria, illustrations and level of details in the toolkit)
DB conceptual design	Entities and their relationships are defined	Main data entities were identified (causes of disputes, dispute avoidance steps, pre-contract stages, parties, themes of causes of disputes of disputes). The relationships and primary keys of each entities were identified Relationship logics among the variables were established using the data modelling options in Microsoft Power BI
DB logical design	The conceptual design advances to design a relational database model	
DBMS selection	The nature of the database (distributed / centralised), security were considered to select a database	Opted for a simple Microsoft excel file as the database. The Microsoft excel database was linked to the Power BI report and that report was published to the web. However the published report only allowed the end-user to retrieve the data therefore database security was not compromised
DB implementation	Data was entered and reports were generated	In Microsoft Power BI, two tables for causes of disputes and avoidance steps and a "force-directed graph" that illustrates the relationship between causes and avoidance steps were created.
DB management	Database maintenance options (backing up and restoring)	In addition to the primary database few backups were created and saved securely.

Following the data modelling stage, the next step was to develop the toolkit user interface using Microsoft Power BI. Whilst providing informative data visualisations being the primary purpose of Microsoft Power BI, it also facilitates data sourcing, modelling analysis, and act as

an integration platform with other Microsoft services (Greg, 2019). Microsoft Power BI has been selected as the primary tool for developing the interface of the toolkit as it provides a streamlined method to link the collected data stored in an Excel spreadsheet. Another reason was that the research aimed to develop an interactive report (based on the stored data in excel spreadsheet) which required to be published online for further validation sessions from industry practitioners.

As explained before the gathered data were coded and stored in an excel spreadsheet. Then, a live link between Microsoft Power BI and Microsoft Excel was established. Once the data is transferred to Microsoft Power BI, following characteristics were considered;

- Data tables and their columns (variables)
- Variables that are uniquely identified in each table (Primary keys)
- Relationships amongst the variables (one to many, one to one and many to many)

By considering the above factors, the data model has been developed as shown in the figure 22.

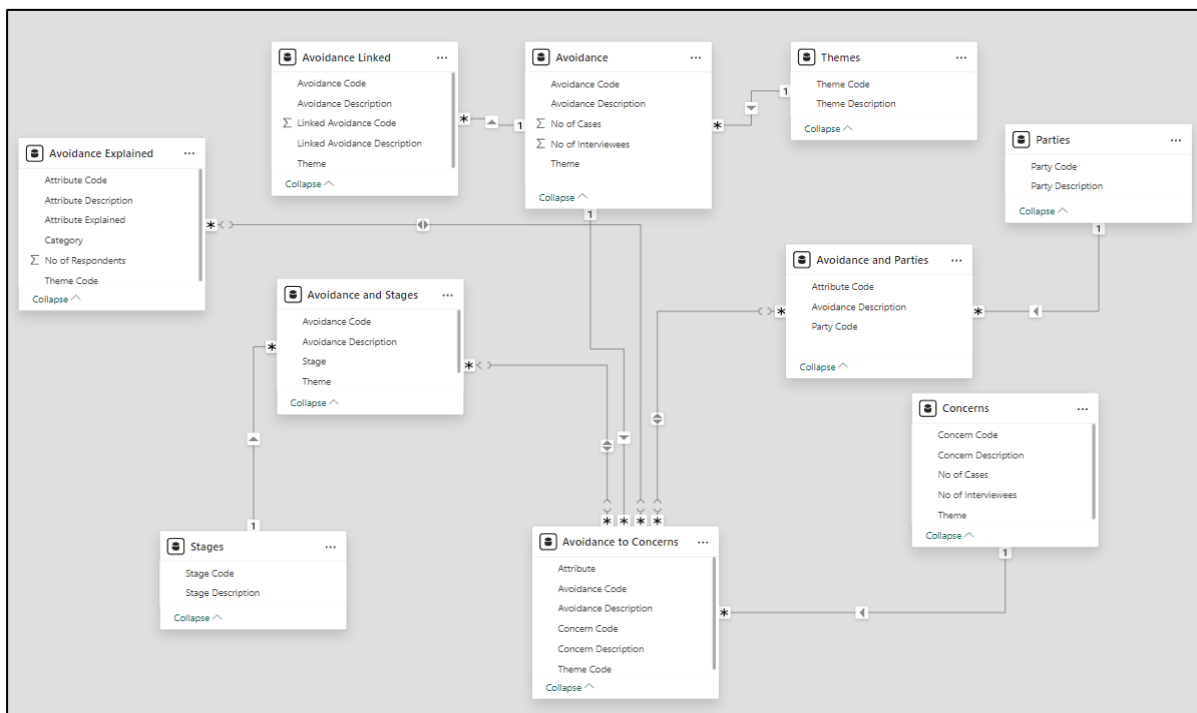


Figure 22 : Data model for the toolkit (Source: Authors own creation)

As illustrated in the figure 2, ten boxes represent ten data tables or data entities and attributes in each table shows the column names. Lines that connect entities depict the relationships amongst the variables; for example, “Concern Code” variable in “Concerns” table keeps an one-to-many relationship with the “Concern Code” variable in “Avoidance to Concerns” table.

8.6.4 Interactive tool development process – tool interface development process

After modelling the data, next step was to develop the user interface of the toolkit. The interface was prepared in a way to allow users to visualise causes/concerns of disputes and related pre-contract dispute avoidance steps based on the user’s preferred pre-contract stage, party and theme. The visualisation options available in Power BI, namely slicers, tables and force-directed graphs (hereinafter referred to as objects) were used to develop the user interface as

indicated in the figure 23.

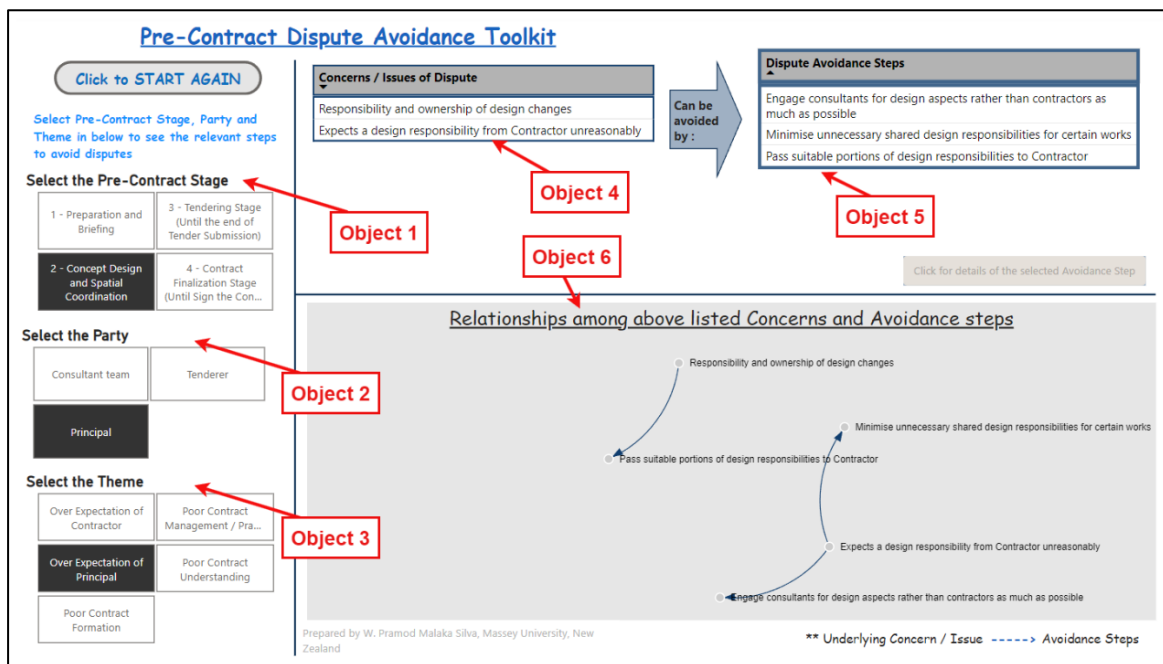


Figure 23 : User Interface of the toolkit (Source: Authors own creation)

The objects shown in the figure 23 are linked to one or few variables in the data model. The six objects shown in the figure 23 were , categorized as slicers, tables, and a force-directed graphs. The three slicers (Objects 1–3) allow users to filter data based on pre-contract stages,

parties, and themes. Two tables (Objects 4–5) display causes of disputes and pre-contract dispute avoidance steps based on user selections, enabling further configuration of relationships. The force-directed graph (Object 6) visually represents the relationship between causes and avoidance steps based on selected criteria. All these objects are linked to several tables in the data model such as stages table, parties table, themes table, concerns table, and avoidance descriptions table.

8.6.5 Validation process of the toolkit

Validating a research outcome is about checking the correctness of the study by verifying the collected, analysed and interpreted data (Creswell,2008). The main outcome of this study; pre-contract dispute avoidance toolkit was validated by a two-stage validation process comprised of a series of interviews with the experts in the subject area and a focus group session. The overall validation process is summarised in the figure 24.

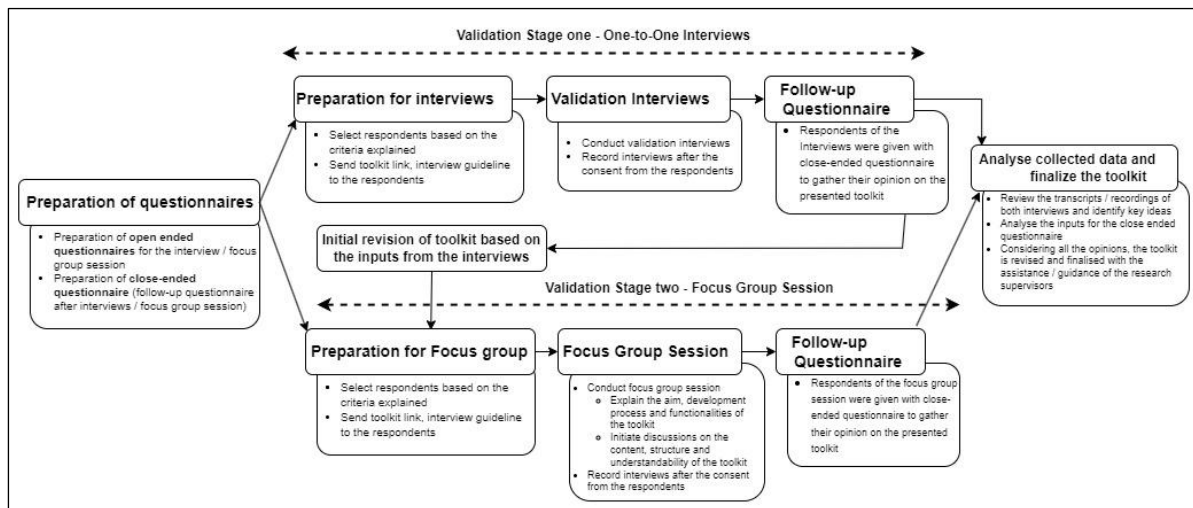


Figure 24 : Validation Process of the toolkit (Source: Authors own creation)

During both the validation stages (1) the content (identified dispute avoidance steps, causes/issues of disputes and relationships between causes and avoidance steps), (2) the structure of the toolkit and (3) the overall understanding and the user-friendliness were the three questioned areas/sections. Open-ended questionnaires for both validation stages were

developed, covering the aforementioned three areas to gather more elaborative and comprehensive answers from the respondents.

For the validation interviews, the industry experience in the NZ construction industry has been the main criteria in selecting respondents, however, few respondents with an academic/research background have also been selected to gain a more wholistic opinion. Therefore, eleven respondents with a minimum of 10 years of overall industry experience and/or research expertise (atleast 5 years in NZ) in construction contract management and/or construction disputes were selected for one-to-one semi-structured interviews during the first validation stage. The respondents' details of the validation interviews are shown in the first section of the table 21. The respondents were contacted to arrange a convenient time and mode for the interviews. They were provided with an open-ended questionnaire, an online link to the toolkit, and guidelines on its use to prepare in advance. After the validation interviews, each respondent received a close-ended questionnaire to assess their level of agreement on the three mentioned areas (content, structure and the understanding of the toolkit).

Focus group interviews bring together small group of respondents to discuss a subject matter and it provide exciting and interesting opinions within a shorter timeframe and also considered as comparatively inexpensive qualitative research strategy (Saunders, 2016; Sekaran & Bougie, 2016). Researchers believed that focus group session would be important in addition to an interview series for a toolkit validation process because it allows for interactive discussions, diverse perspectives, and real-time feedback exchange, which may not be fully captured in one-on-one interviews. Therefore, following the first validation stage, a focus group session was also conducted to further validate and refine the developed toolkit. Respondents who had atleast 8 years of experience (atleast 4 years in NZ) in construction contract management and/or construction disputes were selected for the focus group session. The second section of the table 3 shows the profiles of respondents in the focus group session. All the selected respondents

were provided with a link to the toolkit, a session plan, introductory guideline about the toolkit and a questionnaire to allow them to review the toolkit beforehand. the Considering the convenience of the respondents, a suitable time and a suitable mode (online mode) was selected. During the focus group session, firstly an introduction (on the overall research and the toolkit) and few examples of the toolkit were presented. Then discussions on content, structure and understanding were initiated. The entire session was recorded with the permission of all the respondents. After the focus group session, a questionnaire with close-ended questions were sent to all the participants to capture their responses.

Table 20 : Respondents' Profiles (Source: Authors own creation)

Validation Stage	Respondent code	Current Position / Profession	Overall experience
Validation Stage 1 – One to one Interviews	IA	Technical Director	25 years
	IB	Post Doctoral Candidate	13 years
	IC	Projects Planning Manager	22 years
	ID	Contracts Manager	25 years
	IE	Quantity Surveyor	11 years
	IF	Lecturer in Construction Law	>10 years
	IG	Executive General Manager – Major Projects	14 years
	IH	Associate Director – Cost Management	>20 years
	IJ	Contract Performance Manager	12 years
	IK	General Manager (Commercial and Finance)	20 years
	IL	Co-founder / Quantity Surveyor	10 years
Validation Stage 2 – Focus Group Session	FA	Commercial Manager	18 years
	FB	Commercial Manager	20 years
	FC	Senior Quantity Surveyor	10 years
	FD	Estimator	8 years
	FE	Quantity Surveyor	9 years

8.7 Findings

This section mainly presents the interactive toolkit with by explaining the user flow diagram of the toolkit and by explaining the content using two examples. Additionally, this section elaborates the content of the toolkit (causes of disputes and dispute avoidance steps) which were identified from the court case analysis and the expert interviews.

8.7.1 Findings from the court case analysis – causes of disputes

A qualitative and a quantitative analysis of 35 legal cases in NZ construction industry had been carried out as a prior step. Based on the previous step of this study regarding 35 court cases in NZ, majority of cases were attributable to payment issues, quality issues and disagreements on variation entitlements and also it has been ascertained that majority of cases had followed lumpsum contracts and followed traditional procurement route (P. Silva et al., 2023). Further, the qualitative analysis of the court cases identified 34 core causes of disputes, their dependencies and 5 surrounding themes as shown in figure 5 (Silva et al., 2025). Based on the court case analysis, the most significant cause of dispute was lack of understanding of the Construction Contracts Act (CCA), followed by poor work quality and improper payment schedules (Silva et al., 2025). A visual attribute map in figure 5 depicts how these causes interconnect.

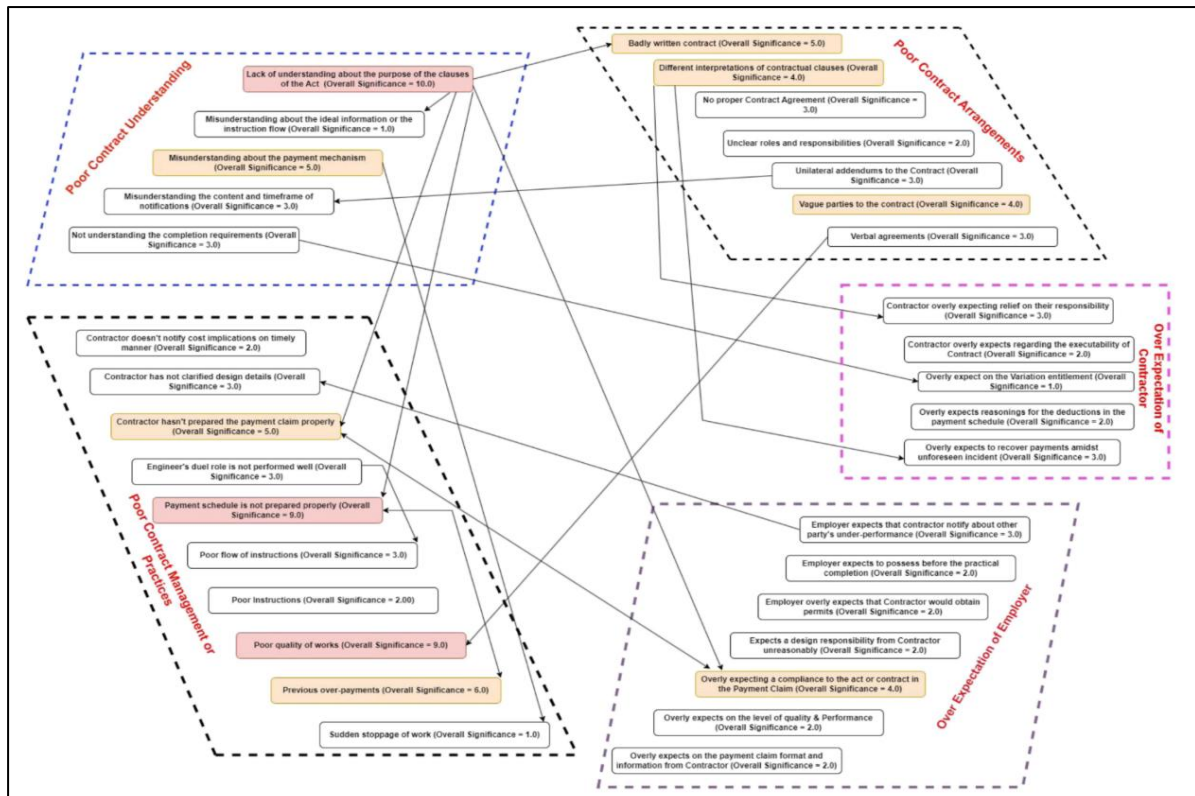


Figure 25 : Attribute analysis map of causes of disputes (Silva et al., 2025)

8.7.2 Findings from the expert interviews – Dispute avoidance steps

After identifying the causes and broad themes of causes of disputes, the research focus was then shifted towards pre-contract dispute avoidance steps which was inquired from experts in the NZ construction industry. The identified themes of causes of disputes from the prior “court case analysis” was the basis for the expert interview series. In other words, pre-contract dispute avoidance steps were investigated under the 5 themes and the main findings are summarised in the below table 22. Overall, the expert interview series has identified 84 measures to minimize disputes in traditionally procured construction projects in NZ, highlighting the importance of clear communication, better preparation, and proactive contract management to reduce conflicts in the post-contract stage (the table 22 only show the most commonly indicated measures. Further, the experts emphasized that most dispute avoidance measures should be

taken during the “tender preparation and pricing stage” (Technical design – A stage) focusing on clear documentation, risk allocation, and realistic expectations.

Table 21 : Pre-contract dispute avoidance steps (Source: Authors own creation)

Poor contract understanding	Over expectations of contractor
Be clear about the allocation of risks	To hold expectation management meetings
Tenderer to identify its portion of risk	Contractors should inform about the alternative products at early stage
Educate the Principal about the construction process	Get clear about the scope that Contractor quotes
Be clear about responsibilities	Tenderer should not overly expect on the Principal's knowledge on the project
Define and use a standard method of measurement	
Detailed and accurate design documentation	
Draft the contract in clear and simple language	
Poor contract management and practices	Over expectations of principal
Involvement of Competent people to understand the contract administration well	Be clear on what Contractor should design and what documentations should provide
Contractor should keep in mind to inform Principal and submit any claims in a timely manner	Agreement on quality and standard criteria beforehand
Setting out reporting requirements in the Contract	Engage consultants for design aspects rather than contractors as much as possible
Training and Learning from past experiences	Understand where Principal's design risk finishes and where Contractor's risk starts
Tenders to establish training and learning opportunities	
Poor contract formation	
Document the scope clearly	
Develop the design into a greater extent during pre-contract stage	
Selecting competent Principal's representatives	
Document and summarise pre-contract correspondences	

Manage significant missing items, drastic qty variances & errors in a SOQ in a BID well
Understanding the current market conditions when drafting the contract
Tenderers should be given sufficient time to price

8.7.3 Pre-contract dispute avoidance toolkit for NZ construction industry

As explained in the methodology and introduction section, the developed toolkit aims to provide a more interactive solution for the construction industry practitioners during the pre-contract stage to avoid potential disputes. The toolkit is limited to construction projects in NZ, which follow the traditional procurement path. The users are able to select a pre-contract stage, party and a theme to see the relevant issues/causes of disputes and pre-contract measures to avoid potential disputes. Further, users can select a particular avoidance step to see more details (how to perform that avoidance step, what parties and pre-contract stages will be more appropriate to perform that step). By mapping out the interactions of the user, below user flow diagram (in figure 26) illustrates the functionality or the logic process of the toolkit.

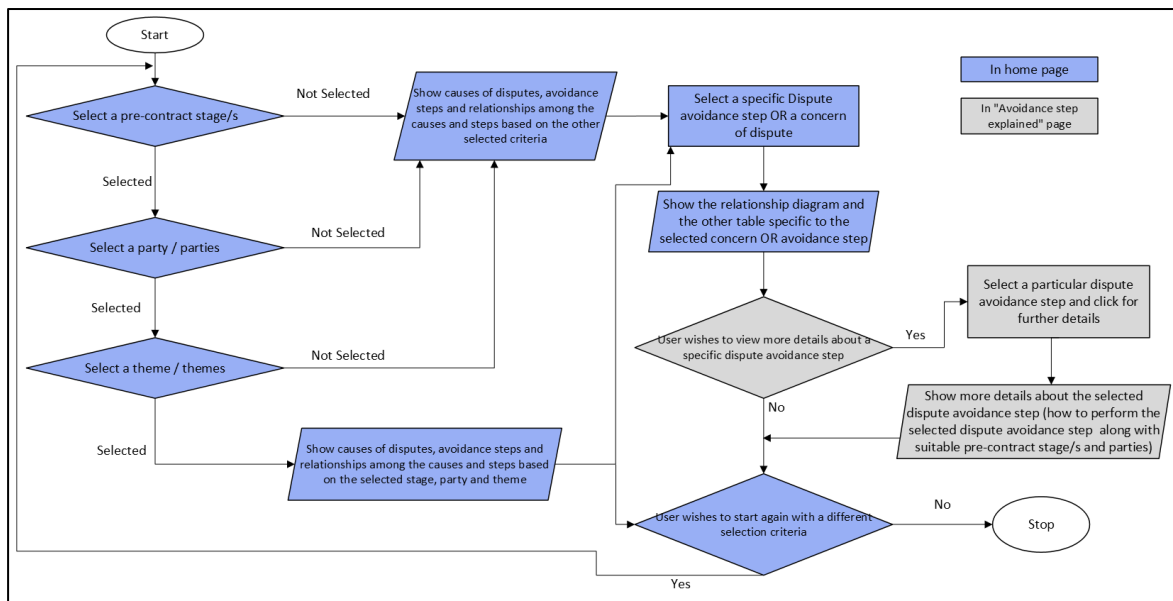


Figure 26 : User flow diagram of the toolkit (Source: Authors own creation)

The toolkit consists of two pages namely the home page and a “avoidance step explained” page. The home page (the functionalities are illustrated in blue colour in figure 6) allows users to select pre-contract stage, party and theme and to see concerns of disputes and to visualise concerns of disputes, dispute avoidance steps and relationships among the concerns and avoidance steps. Secondly, the “avoidance step explained” page (the functionalities are illustrated in ash colour in figure 6) receives the selected dispute avoidance step from the home page as an input and visualises (a) further details as to how to perform the selected dispute avoidance step (b) most responsible and suitable parties to perform the selected avoidance step and (c) most suitable pre-contract stage/s to perform the selected avoidance step.

The interactive toolkit provides numerous concerns and avoidance steps based on user’s selection criteria. Two examples are presented in figure 7 and figure 8, and explained further about those examples in the next paragraphs.

In example 1, user has selected “concept design and spatial coordination stage” as the pre-contract stage, “Principal” as the party and “poor contract understanding” as the theme. In other words, user wanted to see pre-contract avoidance steps applicable for the principal during the 2nd pre contract stage (concept design and spatial coordination stage) which would minimise concerns around poor contract understandings. Based on this selection, toolkit has suggested three avoidance steps and also it shows four concerns / causes of disputes which could be minimised by actioning the suggested avoidance steps. Further, force directed graph located at the bottom of the home page illustrates the suggested avoidance steps and potential concerns that can be minimised by actioning the avoidance steps. For instance, in this example, as illustrated in the force directed graph, “bringing the lessons learnt from the past projects” could be useful (a) to minimise lack of understanding about the purpose of the clauses of the Act and (b) to minimise unawareness about the variation procedures

Home Page

Pre-Contract Dispute Avoidance Toolkit

[Click to START AGAIN](#)

Select Pre-Contract Stage, Party and Theme in below to see the relevant steps to avoid disputes

Select the Pre-Contract Stage

1 - Preparation and Briefing	3 - Tendering Stage (Until the end of Tender Submission)
2 - Concept Design and Spatial Coordination	4 - Contract Finalization Stage (Until Sign the Con...

Select the Party

Consultant team	Tenderer
Principal	

Select the Theme

Over Expectation of Contractor	Poor Contract Management / Fra...
Over Expectation of Principal	Poor Contract Understanding
Poor Contract Formation	

Concerns / Issues of Dispute

- Unaware about Variation procedures
- Lack of understanding about the purpose of the clauses of the Act
- Inappropriate allocation of Risks
- Different interpretations of contractual clauses

Can be avoided by:

Dispute Avoidance Steps

- Be clear about the allocation of risks
- Bring the lessons learnt from the past projects
- Detailed and accurate design documentation

After selecting the dispute avoidance step ("Be clear about the allocation of risks" in this example) user will be directed to the next page

Relationships among above listed Concerns and Avoidance steps

Prepared by W. Pramod Malaka Silva, Massey University, New Zealand

** Underlying Concern / Issue -----> Avoidance Steps

Avoidance step explained Page

Selected Avoidance Step >>

Be clear about the allocation of risks

Further Details of the Selected Avoidance Step

Identify potential risks associated with the project and specifies how each risk will be managed or allocated considering the party best able to manage or mitigate that risk

Principal to clearly draft the contractual provisions that transform the risks towards the contractor

To obtain legal advice to ensure that the risk allocation is enforceable, clear and compliant with applicable laws and regulations.

Applicable Pre-Contract Stage and Responsible Parties

Applicable Stage / Party	Principal
2 - Concept Design and Spatial Coordination	☆
3 - Tendering Stage (Until the end of Tender Submission)	☆

Prepared by W. Pramod Malaka Silva, Massey University, New Zealand

[Back to HOME](#)

Figure 27 : Toolkit example 1 (Source: Authors own creation)

Similarly, all the suggested dispute avoidance steps and the related avoidable causes / concerns of disputes are shown in the “force directed graph”. Once the user has selected a particular dispute avoidance step in the home page, the toolkit directs the user to the next page that explains the avoidance step in detail. In this example 1 (figure 27), identifying the risk profiles, drafting contractual provisions around the risk transformations and obtaining legal advices are listed to further explain the selected avoidance step (be clear about the allocation of risks).

Further, the toolkit emphasises that the “concept design and spatial coordination stage” is the most appropriate stage and that the principal is the most responsible party in making clear about risk allocation.

The developed toolkit allows to configure dispute avoidance steps that are common to several pre-contract stages, parties and themes (multiple selection). For instance in Example 2 (figure 28), user has selected two parties namely principal and the consultant team to visualise dispute avoidance steps that are relevant to both the selected parties. This multiple selection functionality is relevant when selecting pre-contract party and the themes as well which allows user more flexibility. If a user is interested to focus only on a particular cause/concern of dispute or a dispute avoidance step, he/she can select any avoidance step / concern as illustrated in example 2 to visualise only the relevant attributes that are linked to the selection. For instance, in example 2, user has selected “develop the design into greater extent during the pre-contract stage” and the relationship diagram has automatically updated to configure three

causes/concerns which could be minimised by performing the selected dispute avoidance step.

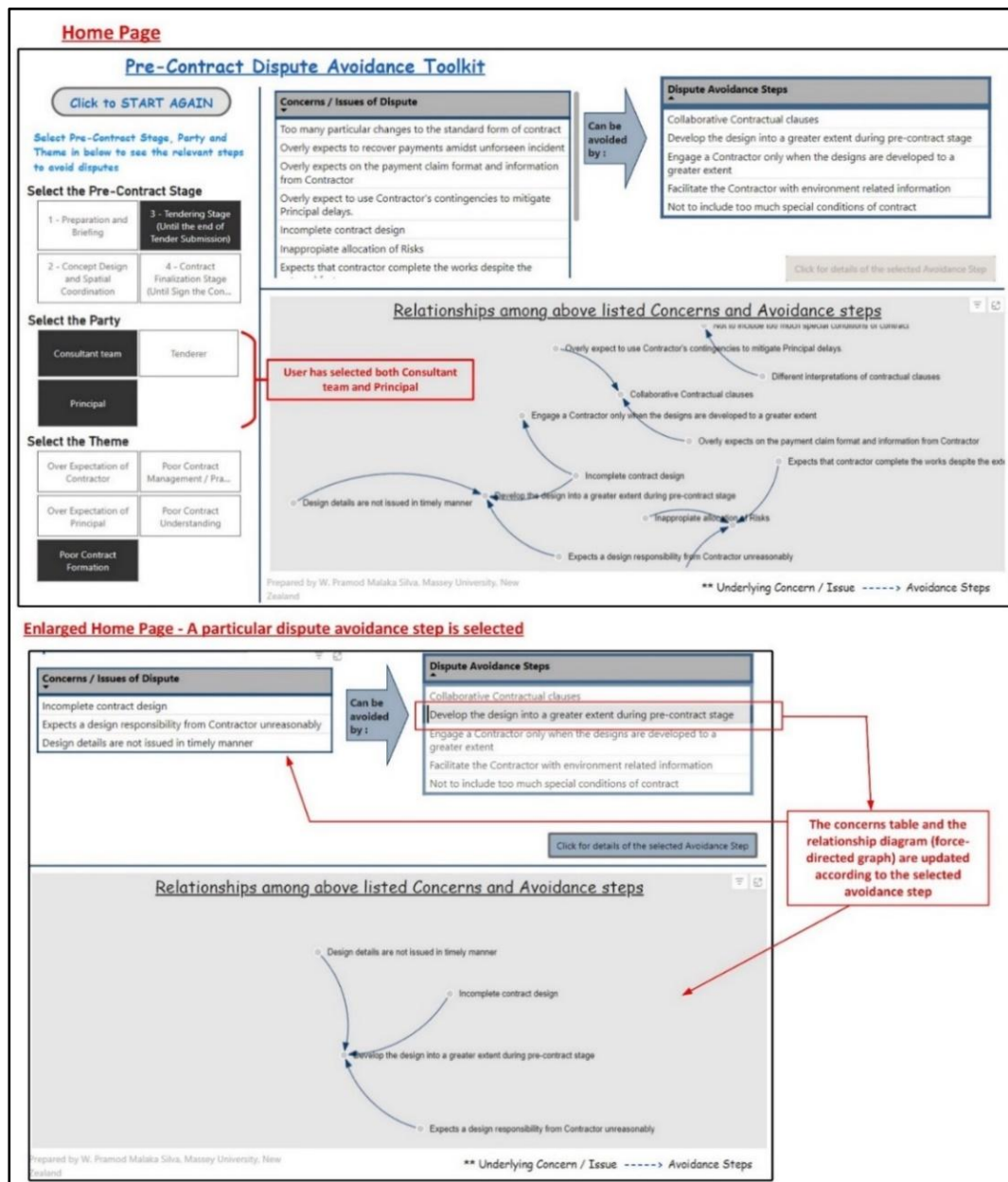


Figure 28 : Toolkit Example 2 (Source: Authors own creation)

8.7.4 Findings from the toolkit validation stage

As explained in detailed in the methodology section, the toolkit validation process was comprised with two stages namely one-to-one validation interviews and focus group session. In each stage, open ended questions were raised to gather the respondents' opinions on the content, structure and the overall understandability. Following every validation interview and

the focus group session the participants were provided with a followup questionnaire (predominantly close-ended questions) which was basically intended to understand the respondents agreeability on above-mentioned three areas. In other words, qualitative findings were derived from the responses to the open-ended questions in both the validation stages and quantitative findings were gathered from the responses to the closed-ended questions in followup questionnaires. Following paragraphs explains the qualitative and quantitative findings from both the toolkit validation stages.

In the initial toolkit (prior to the validation) the pre contract stages were not displayed in the chronological order, and that concern has been raised by three out of eight respondents and therefore the pre-contract stages were re-organised chronologically and even labelled the number of the stage as prefix to display it in more logical and intuitive manner. The respondents IA and ID found it difficult to understand the definition or the time scope of the pre-contract stages in the initial toolkit, IA said, “rather than using the stages in “RIBA plan of work” as it is, you may simply use preparation and briefing, design and coordination, tendering, contract signing stage”. In contrast to that, IE mentioned that “I’m comfortable with the pre-contract stages as I believe almost all the practitioners are well aware of the RIBA stages”. However, the stages suggested by IA were more clear and they were aligned with the concept of stages in “RIBA plan of work”, therefore stages were remaned as “preparation and briefing stage”, “concept design & spatial coordination stage”, “tendering stage” and “contract finalisation stage’.

The initial toolkit had four parties namely “employer”, “tenderer”, “preferred tenderer” and “engineer / designer”, and that categorisation was questioned by several respondents. Respondent IC and IG pointed out that having two separate parties as “tenderer” and “preferred tenderer” could be misleading and those two entities represent two status of a one party and recommended merging those two distinct entities into one party as “tenderer”. Respondent IA

recommended replacing 'engineer/designer' with 'consultant team' to encompass a broader range of professionals who provide expert advice, design, and management services. Further, two participants in the focus group session opined to use “principal” rather than “employer” as (1) the term “principal” is widely used in NZ context and even specified in NZ standard conditions of contracts and (2) the term “employer” could be misunderstood with employer and employee relationships by some industry practitioners. Considering the comments, the toolkit is refined with three parties as “principal”, “consultant team” and “tenderer”.

The comments received for the content of the toolkit were also considered when refining the toolkit. Respondent IG added, “...after the contract and the associated designs are established, parties realise that the established designs are not as detailed as they expected. Later on when the design changes, it becomes harder to keep on top of those changes and leads to disputes around variation entitlement. Therefore, I think design responsibility could be stand as an own theme as it is crucial..”. However, when deriving themes, researchers have considered the fundamental nature (being more underlying / root causes) and the broadness of causes of disputes, therefore, decided to not to form a new theme “design responsibility” as it is not as fundamental (a resultant theme from other theme/s or attributes under other themes rather than being fundamental) and not broad as compared to the existing themes. In the initial toolkit, few dispute avoidance steps related to “early contractor involvement” were included. However, those steps were removed as questions were raised as to why an entirely different procurement method was suggested as dispute avoidance step when this toolkit was meant to focus solely on traditional procurement path. Respondent IG and IH emphasised to include more dispute avoidance steps in the areas of principal’s timing expectations and quality requirements and they have proposed several measures as well. By taking into account of their comments and re-reviewing the interview transcripts of prior expert interviews, several pre-contract measures were added to the toolkit.

Structure or the interface of the toolkit was also questioned during the validation stages. Respondent IC recommended to prioritise the dispute avoidance steps, hence, the initial toolkit was further refined in a way that the dispute avoidance steps are listed according to the frequencies of responses for each avoidance step as indicated during the prior data collection stage. Regarding were interested in the way that the relationships among causes and avoidance steps were visualised, for instance, IA added “it's quite innovative what you've done in terms of the relationships” and IF added “nice visualisation, tried to present relationships nicely”.

The gathered responses from followup questionnaires after validation interviews and focus group session are summarised in the table 23. The table 23 shows the feedbacks (under 5 point likert scale) received under three main enquiry areas namely structure, content and overall understanding.

Table 22 : Results summary from validation stages (Source: Authors own creation)

Area of Enquiry	Point of Enquiry	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Structure	The four pre-contract stages are suitable when presenting the dispute avoidance steps effectively	0	0	1	11	4
	The five themes effectively cover the causes / issues of disputes	0	0	1	12	3
	The structure of the toolkit is meaningful	0	0	0	11	5
	The way that the concerns/issues of disputes and avoidance steps are linked (relationships) is meaningful	0	1	0	10	5
Content	The avoidance steps generated under "Poor	0	0	1	11	4

	Contract Understanding" theme are suitable to avoid potential disputes					
	The avoidance steps generated under "Poor Contract Practices" theme are suitable to avoid potential disputes	0	0	0	9	7
	The avoidance steps generated under "Poor Contract Formation" theme are suitable to avoid potential disputes	0	0	0	12	4
	The avoidance steps generated under "Over Expectations of Contractor" theme are suitable for avoiding potential disputes	0	0	3	11	2
	The avoidance steps generated under "Over Expectations of Principal" theme are suitable to avoid potential disputes	0	0	1	11	4
Overall understanding	Overall, the toolkit is user friendly	0	0	0	13	3
	Overall, the toolkit is understandable	0	0	1	9	6
	I believe that this toolkit is useful during the pre-contract stage to avoid potential disputes in the NZ construction industry	0	0	1	10	5

The toolkit's structure was evaluated, focusing on the overall framework, the presentation of relationships among concerns and avoidance steps, pre-contract stages, and themes. Most

respondents either "agreed" or "strongly agreed" with these aspects. Similarly, respondents provided positive feedbacks for the dispute avoidance steps that are generated under five themes as well. In the followup questionnaire, all the participants were clearly agreed to the fact that the toolkit is user friendly and fifteen out of sixteen participants were responded that the toolkit is understandable. Although most of the respondents believed that the toolkit could be useful in avoiding potential disputes in NZ construction projects, few have argued whether this type of toolkit would actually be used by industry practitioners. For instance, respondent IH mentioned "given that parties actively ignore the existing recommendations, I'm not sure if parties would actually use this toolkit" and IF mentioned "...this sounds a cool and innovative toolkit, however whilst practitioners can utilise this as a reference, their competencies and other characteristics would also impact on a smooth project with less disputes..".

8.8 Discussion

The main aim of this research is to develop an interactive toolkit that illustrates pre-contract measures to avoid potential post contract disputes in a meaningful and user-friendly way. Although the dispute avoidance had not directly been investigated, several previous studies produced tools and frameworks to predict future disputes considering the pre-contract and / or existing attributes. For instance, Naji et al. (2020) presented a model based on fuzzy logic incorporated with Structural Equation Modelling (SEM) that can evaluate the likelihood of dispute occurrence in traditional construction projects, Molenaar, Washington and Diekmann (2000) presented a SEM for describing and quantifying the fundamental factors affecting disputes predominantly arising out of construction contract itself. Further, by taking into people, process and project factors into account Diekmann and Girard (1995) developed a logistic regression model to predict future disputes of a particular construction project. The mentioned three studies utilised statistical methods to forecast the probabilities of disputes, however the toolkit presented in this study generates dispute avoidance steps based on the

preferred criteria by the user. With an objective to mitigate potential disputes due to the contractor's involvement during the early pre-contract stage, Finnie (2021) developed a framework for two stage early contractor involvement processes in NZ. The Finnie's framework is mostly relevant to the post contract stage and projects intend to follow early contractor involvement process whereas this study focuses on the pre-contract stage of traditionally procured projects in NZ. Even though the mentioned dispute prediction methods and the research on early contractor involvement provide constructive mechanisms or frameworks to foresee and minimise potential disputes, they were neither fully aligned with the focus of this study nor intended to produce an interactive solution for dispute avoidance. Moreover, the proposed interactive toolkit is applicable to the contract type and the procurement type which is reportedly more prone to construction disputes in NZ hence this main finding is unique to the most needed type of contract in the NZ construction industry.

Although several previous studies did not produce a constructive framework, toolkit or similar to avoid construction related disputes, they still provided important recommendations to avoid disputes and highlighted points of concerns to mitigate disputes. For instance, Kumaraswamy (1997), identified "insufficient contract administration" as a proximate cause of dispute and Parikh et al. (2019) highlighted instances where the contract is managed very poorly such as delays in construction site handover process, delayed payments, stoppage of work by employer and poor quality of construction. This study acknowledges the issues identified by previous researches and highlights additional issues like time constraints on claims/reports and poor communication, while recommending practical measures to improve contract management and practices. Relevant concerns under the "poor contract understanding" theme (in this study) were also highlighted in few previous studies as well; Norwegian study by Omar et al. (2019) emphasised that not being able to understand the specifications in the tender document and the construction contract as a cause of dispute and a Turkish study by Cakmak and Cakmak (2013),

emphasised the vagueness of contract documents and the varying interpretations as causes of disputes. Case studies of this research clearly pointed out the “lack of awareness of the purpose of the clauses of construction contracts act” as the most significant cause of disputes in NZ - a concern not identified in previous studies. However, none of these previous studies have recommended measures to enhance the understanding of the construction contract which is addressed by this study by providing pre-contract dispute avoidance steps covering areas of the understanding on risk, pricing and utilising the knowledge and experience effectively.

Several previous studies have suggested few measures to form the construction contract effectively. For example, Ramachandra and Rotimi (2011) recommended to secure financial guarantees early in contracts and include pre-qualification criteria to assess the financial status of the parties in NZ construction sector. Another NZ study by Yiu et al. (2021) recommended investigating the other parties’ background, including the financial stability, before entering the contract. Another study in Singapore by Aibinu (2009) pointed out the importance of pre-contract agreement and negotiation on the methods to evaluate the impacts of delays and disruptions including the requirements of evidence of claims, software to configure construction programme, formula for quantifying unabsorbed head office overhead and ownership of the construction float. The stated two NZ studies (Ramachandra and Rotimi [2011] and Yiu et al. [2021]) emphasised the importance of strengthening the payment related clauses in the contract and the checkings of the background of the other parties while the Singaporean study by Aibinu (2009) provides more indepth recommendations to avoid potential disputes arising out of time related conflicts. Similarly, the toolkit developed in this study also recommends many steps to ensure a smooth payment procedure and recommends to check the background of the other party. In addition to those areas, the developed toolkit provides pre-contract measures in the areas of management of warranties, management of the design development and collaboration as effective methods in forming the contract.

8.9 Conclusions and contributions of the research

The main aim of this research is to present findings about pre-contract dispute avoidance steps in an interactive and meaningful way. To achieve this aim, a court case analysis was conducted to identify the causes of construction related disputes followed by a series of semi-structured interviews to gather opinions on pre-contract measures to avoid potential disputes in the NZ construction industry. Considering commonalities of those causes identified during the court case analysis, five themes of causes of disputes were derived. Moreover, four pre-contract stages were discerned from the RIBA plan of work and the identified pre-contract measures were categorised under those stages. In order to produce an interactive solution, Microsoft Power BI application was used as the data modelling and visualisation platform.

The developed toolkit carries three types of outputs, namely dispute avoidance steps, causes/concerns of disputes and relationships among the causes & avoidance steps. Those outputs are generated by the user's inputs on the pre-contract stage, party and theme. Further, the toolkit allows to multi-select either party, stage or theme and as well as to drill into a particular dispute avoidance step to understand it in a detailed manner and also to visualise relationships between the focused avoidance step and its linked causes/concerns. These functionalities ensure that the toolkit is developed in a user-centered manner with a high level of flexibility and a scalability. The initial toolkit has undergone a two-stage validation process (a series of one-to-one interviews and a focus group session with industry practitioners in NZ construction sector) where the opinions were enquired on the toolkit's structure, content and overall understanding. Several functionalities and contents were improved based on the responses from the interviews and focus group sessions.

The understanding of the construction contracts needs to be enhanced in the areas of risk allocation, responsibilities, schedules, and construction processes. Knowledge from past experiences, employee competencies and establishment of information expectations are

essential for effective contract practices which would minimise potential disputes. Experts have also emphasised better management of tender errors, improving design development in the pre-contract stage, and ensuring pricing scope clarity as important measures to perform during the pre-contract stage to achieve a dispute less post contract stage. Overall, the toolkit has provided many recommendations to all the involved parties across four pre-contract stages. Most of the avoidance steps are related to the “tender preparation and pricing stage” (Technical design – A stage), hence it is worth paying more attention to that particular stage.

This study has identified precontract dispute avoidance steps for the construction contract type which is more prone to disputes (lump sum contract). Practitioners from contractors, consultants and clients can utilize the suggested dispute avoidance steps with an expectation of a conflict less post contract stage. Further the users can configure relevant avoidance steps of any preferred pre-contract stage/s. This research offers several valuable benefits to academic researchers. It enhances the understanding of construction-related disputes by identifying five key themes of dispute causes, providing a solid foundation for further exploration in dispute management. Methodologically, it demonstrates the effectiveness of combining court case analysis with semi-structured interviews, offering a replicable approach for studying dispute prevention. The research also highlights the innovative use of Microsoft Power BI for interactive data modeling and visualization, encouraging future studies on the application of digital tools in academic contexts.

8.10 Research limitations and further Research

The research aims to develop a dispute avoidance toolkit for New Zealand's construction industry. Data on dispute causes, avoidance steps, and feedback on the toolkit were collected from the NZ construction sector, making the findings most relevant to this context. An analysis of NZ legal cases showed that most disputes arise from traditionally procured projects on lumpsum contractual arrangement, leading the remainder of study to focus on that area. As a

result, the toolkit is specifically designed for traditionally procured construction projects on lumpsum contractual arrangement in New Zealand. Although this study included 35 court cases and 14 expert interviews, the conclusions are shaped by the specific contexts of these cases and participant opinions which impacts the generalizability and quality of its findings to a certain extent. Additionally, the effectiveness of the toolkit depends on project-specific constraints and the competencies of its users.

Since this toolkit is limited to traditionally procured projects, its suitability could be tested in projects where other procurement methods are used or could develop an entirely new toolkit that provide pre-contract dispute avoidance measures for another type of procurement method. Moreover, the basics of this toolkit such as its data model, data visualisation process could be used as a fundamental structure to further develop this toolkit incorporating a wider population aiming at providing more in-depth pre-contract dispute avoidance steps. Given the growing trend of language models, there is also an opportunity to feed the outcomes from this toolkit as an input to a language model to train it to steer more reliable and specific conversations about pre-contract dispute avoidance measures.

9 DISCUSSION

9.1 Chapter introduction

Chapters 3 to 8 discussed six parts of this study, which were published/developed in the form of a publication. This chapter gathers all the information collected and analysed so far and compares it to similar previous studies in the global and NZ context. This chapter has organized and discussed the causes of disputes, characteristics of causes of disputes, pre-contract dispute avoidance methods and innovative solutions to avoid disputes during the pre-contract stage.

9.2 Causes of construction-related disputes

In the area of disputes in the construction industry, many previous researchers have focused on the reasons for disputes. Although the overarching focus of those previous studies was the causes of disputes, there were notable limitations such as geographical, project type and procurement type, which impacted the outcomes of their studies. For instance, studies by Al-Momani (2000), HL and Sutrisna (2010), Omar et al. (2019) and Abdul Nabi and El-adaway (2022) were limited to Saudi Arabia, the UK, Norway and the US, respectively. Further, Mahamid (2016) focused only on residential buildings, Parikh et al. (2019) focused only on highway projects, and Tanriverdi et al. (2021) focused only on design and build projects. Table 23 summarises the findings of previous studies, including the authors, limitations, causes and categories of disputes. As table 24 illustrates, several previous studies investigated the “sources”, “types”, “origins” and “causes” of disputes; even though different terms were used, all these studies actually delved into the reasons behind the causes of disputes. Further, table 24 depicts (a) the diverse perspectives (i.e: contractual party and remoteness of the cause and its disputes) of previous researchers when investigating and presenting their findings of causes of disputes and (b) geographic / country-specific limitations of their studies.

Table 23 : Summary of previous studies on causes of disputes in construction industries

Ref	Description	Dispute Cause / Category	Citation
1	Types of Disputes	<ol style="list-style-type: none"> 1) Owner-related (change of scope, late giving of possession etc) 2) Design-related (design errors, inadequate specifications etc) 3) Contract-related (ambiguities, risk allocation etc) 4) Human behaviour related (adversarial culture, lack of communication etc) 5) Project-related (site conditions, unforeseen changes) 6) External factor related (weather, economic factors) 	Cakmak and Cakmak, 2014
2	Predictors of disputes	<ol style="list-style-type: none"> 1) People-related (owner, contractor, business relationship) 2) Project-related (external, internal) 3) Process-related (pre-construction planning, construction contract) 	Diekmann and Girard (1995)
3	Four Sources of Disputes	<ol style="list-style-type: none"> 1) Errors, Defects and omissions of Contract Documents 2) Underestimating the real cost of the project 3) Changed Condition 4) Stakeholder involvement in the project 	Kululanga, Kuotcha, McCaffer and F. Edum-Fotwe , 2001
4	Categories of origin related to disputes	<ol style="list-style-type: none"> 1) Management 2) Owner 3) Contractor 4) Nature of work 5) Quality of work 6) Insurances and guarantees submitted by the Contractor 7) Site status 8) Safety issues 9) Sub-Contractors 	Sayed-Gharib, Price and Lord, 2010
5	Three Root causes of disputes	<ol style="list-style-type: none"> 1) Conflict - task interdependency differentiation, communication obstacles, tensions, personality traits 2) Triggering events - non-performance, payment, time 3) Contract provision 	Cheung and Yiu, 2006
6	Factors leading to disputes	<ol style="list-style-type: none"> 1) Impact of changes in respect to time and cost not properly addressed. 2) Extension of time 3) Price Escalation 4) Failure of payments as per Conditions of Contract 5) Suspension of work 6) Defective work 7) Contractors' and Employers' risk 8) Tender evaluation 9) Work quality 10) Reluctance to seek clarification of financial stability 	Divakar and Kumar, 2015
7	Causes of Disputes in Saudi Arabian study A	<p>Direct dispute causes are:</p> <ol style="list-style-type: none"> 1) Delay in progress payment by the owner 2) Unrealistic contract duration 3) Change orders 4) Poor quality of completed works 5) labour inefficiencies, respectively. 	Mahamid, I. , 2016

		Indirect dispute causes are: 6) Inadequate contractor's experience, 7) Lack of communication between parties, 8) Ineffective planning and scheduling of projects by contractor, 9) Cash problems during construction 10) Poor estimation practices.	
8	Causes of Disputes in Saudi Arabian study B	1) Change or variation orders due to new requirements from the client 2) Variations in quantities due to new requirements from the client 3) Delay caused by contractor 4) Design errors or omissions 5) Inconsistencies in the drawings and specifications	Sadi, A., 2019
9	Underlying latent causes/pathogens of disputes	1) The practice of deliberately not adhering to policies and procedures 2) The task of failing to detect errors 3) misinterpreting contract terms and conditions	Love, P. E. D., Davis, P. R., Sai On, C., & Irani, Z. (2011).
10	Causes of disputes in Indonesia's EPC projects	1) Contract administration, 2) Ambiguous definition of contract documents, 3) Minimum understanding of the EPC contract 4) Claims for extension of time, 5) Late handovers 6) Late completion of work by contractors	Iskandar, Hardjomuljadi, S., & Sulistio, H. (2021).

The perspectives authors have looked at when categorising the causes of disputes were different. However, it was notable from the previous studies that Kumaraswamy (1997), Cakmak and Cakmak (2013), and Naji et al. (2020) adopted/produced a similar/identical categorization of dispute causes, which includes the following main groups: owner-related, contractor-related, design-related, contract-related, human behaviour-related, project-related, and external factor-related. Moreover, Molenaar et al. (2000) and Tanriverdi et al. (2021) used the same categorization proposed by Diekmann and Girard (1995), which divides dispute causes into three main categories: people-related (owner, contractor, and business relationships), project-related (both external and internal), and process-related (pre-construction planning and construction contracts).

Given that numerous studies investigated the causes of construction-related disputes, researchers aimed to produce a summarised set of causes of disputes by conducting a Systematic Literature Review (SLR) on almost all the previous studies. While doing a SLR on

44 previous publications, the researcher has produced a more objective and inclusive set of causes of disputes. The SLR has identified 29 core causes of disputes and categorised those causes of disputes into four main categories: employer responsible, contractor responsible, both parties responsible, and external causes. The identified core causes were categorised solely based on the contractual parties to a construction contract, whereas previous studies had not solely categorised their causes of disputes by the contractual parties. For instance, Diekmann and Girard (1995) categorised causes by the factors related to people, project and process and Divakar and Kumar (2015) categorised causes by incidents of disputes such as failure of payments, price escalation and suspensions of work. Even though SLR was not the research method, Naji et al. (2020) have also reviewed 18 previous studies and found that contractor's quality of work, ambiguities in contract documents, lack of communication, employer's unrealistic expectations, and employer's payment delays are the five most frequently discussed causes. However, this study, which followed a SLR based on 44 previous studies, identified poor contractual arrangements, employer-initiated scope changes, unforeseen site changes, poor contract understanding & administration, and contractors' poor quality of works as the most prevalent causes of disputes in the literature.

After conducting an SLR that identified causes of construction-related disputes based on the previous studies, as explained comprehensively in chapter 4, this research has narrowed its attention to the causes of disputes specific to the NZ construction context. This was achieved by conducting a quantitative and qualitative analysis of actual legal cases heard before NZ courts, as explained in chapters 5 and 6.

From the court case analysis in NZ, the number of cases between the main contractor and the principal was higher, with 26 cases out of 35 cases studied. This is similar to another NZ study by Ramachandra and Rotimi (2011b), which found that 80% of their investigated cases were

between the contractor and the principal. The table 25 compares the findings of the previous studies and the findings of this study.

Table 24 : Comparison of NZ studies related to causes of disputes with the current study

Previous research / Sources	Causes of disputes	Discussion in comparison to the findings of this study
Ministry of Business Innovation and Employment in New Zealand (MBIE, 2023)	<ul style="list-style-type: none"> a) Different perspectives of contractual provisions, b) Different levels of expectations on the quality of works, c) Late payments or payments that are not line with contract schedule, d) Underestimating the impact of making changes after accepting the initial bid e) Misunderstanding on the scale, complexity and time of the project 	The ideas of causes a, b and c have also been identified by the current study. The current study was entirely based on the actual court cases in NZ whereas MBIE has highlighted these causes based on previous research papers, opinions from practitioners and industry reports
Jelodar et al. (2016)	<ul style="list-style-type: none"> a) Opportunistic behaviour b) Breach of contract c) Poor workmanship d) Contract and documentation problems 	“Opportunistic behaviour” has not been identified as it is in the current study; however, other causes (b, c & d) were identified in the current study. “contract and documentation problems” identified in this study are discussed in a more detailed manner under the theme "poor contract formation" in the current study. The findings by Jelodar et al. (2016) are broad, perhaps due to the fact that their study’s primary objective is to investigate the influence to the quality of relationships amidst a dispute environment. Many of the causes identified in the court case analysis are comparatively “specific” and can be classified under these four broad causes.
Ramachandra & Rotimi (2015)	<ul style="list-style-type: none"> a) Lack of financing from other concurrent projects, b) Difficulties faced due to low initial capital, 	This previous study identifies the causes of payment issues, and the current study focuses on a wider area of disputes, including payment issues.

	<ul style="list-style-type: none"> c) The way of thinking of the payers, d) Easy exit of players e) Culture of poor payment in the construction industry 	
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In summary, this research conducted a SLR to comprehend the causes of disputes as identified by the previous researchers internationally, and secondly, a court case analysis was carried out to ascertain the actual reasons for construction-related disputes specific to the NZ construction industry. Furthermore, no previous study has systematically conducted a literature review to produce a more comprehensive and inclusive list of causes of disputes in the international construction industry. More importantly, this study incorporates a court case analysis in NZ to compare the identified causes of disputes in the NZ context with those at the international level. The figure 28 compares and summarises the findings from both the SLR (relevant to the international context) and court case analysis (relevant to NZ context). These research steps have assisted in identifying the most applicable/relevant set of causes of disputes in the NZ construction industry and to further investigate the pre-contract measures to avoid those causes and ultimately avoid disputes.

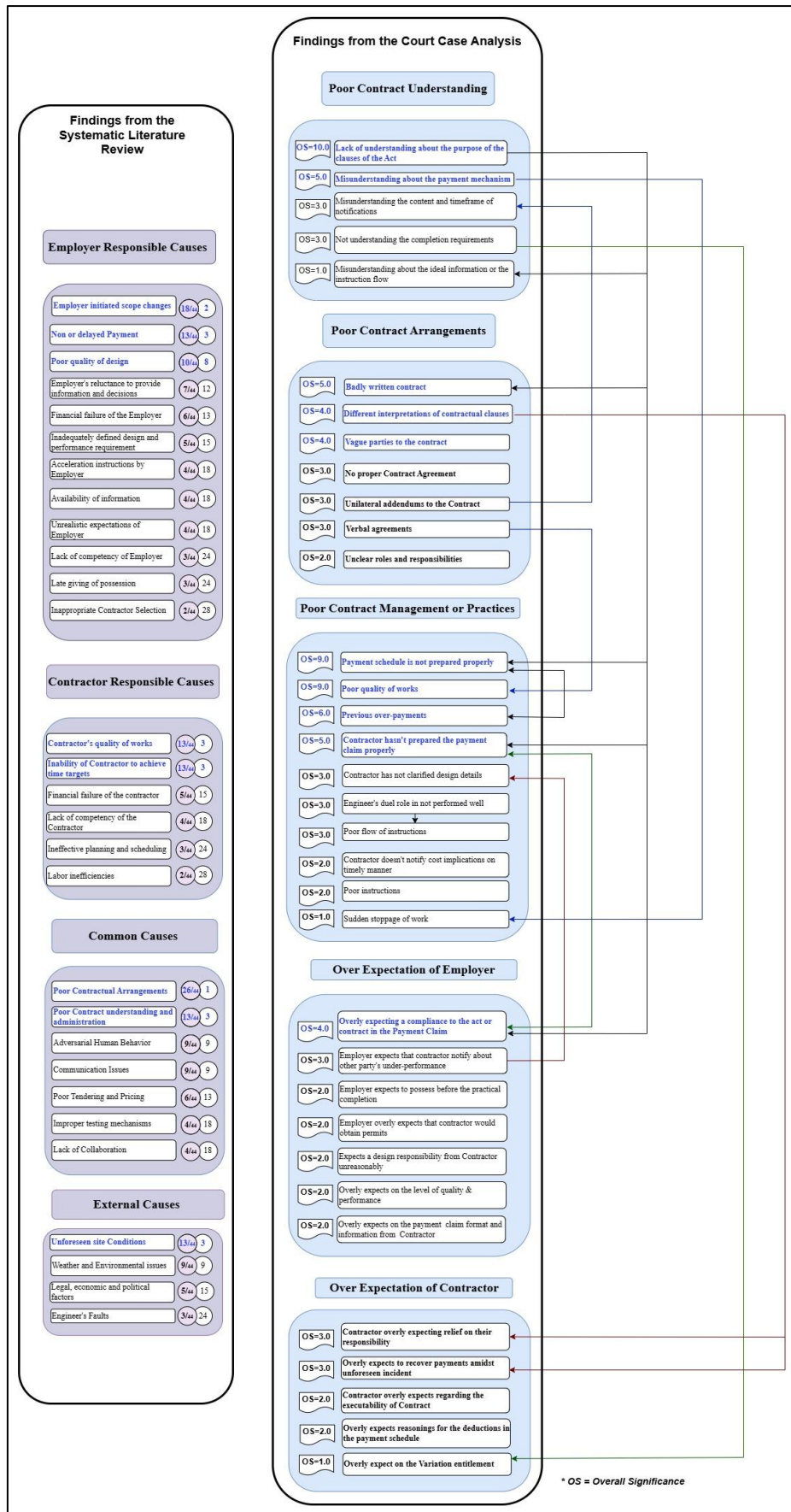


Figure 29 : Causes of disputes as identified from SLR and court case analysis

9.3 Characteristics of the causes of disputes in the NZ construction industry

Significances of causes of disputes

A considerable number of causes of disputes in the construction industry were identified by various studies internationally and in the NZ context; hence it is also essential to understand the significance or the importance of causes of disputes over the other. Even though there were numerous studies that identified the causes of disputes, only few have investigated the relative importance or the significance of the identified causes. Significances of causes of disputes were identified utilising various research methods and various research limitations in previous studies. Naji et al. (2020), focusing on the frequency of dispute causes from previous research, highlighted contractor quality issues, ambiguities in contracts, poor communication, unrealistic expectations, and payment delays as the most significant causes. Kumaraswamy (1997), based on inputs from industry practitioners in Hong Kong, emphasizes design inaccuracies, inadequate site investigations, and poor communication as leading factors for disputes. Molenaar (2000), using a structural equation model with data from actual projects, ascertained that owner/contractor management and project complexity as key driving factors for disputes.

It is notable from the previous studies that they attempted to understand the significance of the causes of disputes considering various measures, namely (1) the number of times that a particular cause had been discussed in previous studies/publications (2) the number of times that a particular cause had been identified in actual cases in construction projects and (3) the level of impact or the severity of a particular cause based on the industry experts. As explained in the previous paragraph, the research strategy and research limitation have also impacted the outcome of the study. The causes of disputes identified in this study are summarised in the figure 29. The studies by Jelodar et al. (2016) and Molenaar (2000) utilized court cases as one of their data source (not as the sole source of data) when investigating the significance of causes of disputes; hence, the causes of disputes identified by those researchers were based on a

mixture of distinct sources (opinions of industry practitioners and case studies) whereas the current study relied purely on actual legal cases in NZ. This study avoids the subjective aspect in the previous research by reporting and prioritising causes based on actual cases in NZ to obtain more realistic and informative insight. This study has identified (a) lack of understanding about the purpose of the clauses of the Act (b) payment schedule is not prepared properly and (c) poor quality of works as the causes with higher overall significance. Overall, the causes of disputes identified in the court case analysis of this study were relatively specific as compared to previous findings. However, the identification of “poor quality of works” as a significant cause of dispute is common to this study and as well as the studies by Naji et al. (2020) and Jelodar et al. (2016). It is also notable that the cause of dispute with the highest overall significance in this study (lack of understanding about the purpose of the clauses of the Act) has not been identified as a significant reason in any previous study.

Dependencies of causes of disputes

Tanriverdi et al., (2021) revealed that the causes of disputes are either result of a chain of preceding factors or are triggers for further ones. This finding reinforces that the occurrence of disputes does not only depend on individual causes; instead, these causes combine with a series of other factors for a dispute to occur. Hence, this sub-section discusses the dependencies among causes of disputes in this study compared to previous studies.

Tanriverdi et al., (2021) developed a map that illustrates linkages among the causes of disputes based on their study which focused on “design and build” contracts through the FIDIC Yellow Book. Tanriverdi’s study has analysed the available literature and opinions of industry experts and identified the number of relationships that link to and from causes of disputes (centrality of causes of disputes). According to their study, “changes and variations”, “errors in concept design and planning”, “unrealistic expectations of employer”, “delays by contractor” and

“prevention of progress by the employer” had more links with other attributes; therefore those attributes’ centrality measures were high. In contrast to Tanriverdi’s study, this study has investigated actual court cases in NZ to determine the dependencies among the causes. Even though Tanriverdi’s study has identified “changes and variations” as a “cause” with the highest number of disputes, this study perceived “changes and variations” as a type of dispute rather than a “cause”. Further, the current study has identified “over expectations of the employer” (comparable with “unrealistic expectations of employer” in Tanriverdi’s study) as a theme rather than an individual cause, which is comprised of seven causes with eight links recorded altogether.

Vishwanathan et al. (2020) aimed to develop a model to represent the interdependencies of causes of disputes and the hierarchical significance of causes of disputes relative to one another. Their study initially identified 14 causes of disputes from literature and questioned 82 industry experts about the interdependencies of those 14 causes with each other cause. Then, utilising a “matrix cross-reference multiplication applied to a classification” (MICMAC) analysis, a six level hierarchical model was developed, which identifies “ambiguous language of contract document” as the most underlying cause (level 1 in the hierarchy) and three causes namely “opportunistic behaviour”, “delayed response to decisions” and “unrealistic client expectations” as the second most underlying causes (level 2 in the hierarchy). This study has also ascertained two causes that are related to the most underlying cause of dispute in Vishwanathan’s study (“ambiguous language of contract document”), namely “badly written contract” and “different interpretations of contractual clauses” which were linked with three and two other causes respectively. When this study and Vishwanathan’s study is compared broadly, this study has not intended to find the most underlying cause (hierarchical significance) by enquiring into the dependencies of every cause of disputes from the industry

experts; instead, this study intended to capture the relationships among the causes based on actual legal cases in NZ.

Themes / Categories of causes of disputes

Given that there are a number of causes of disputes, previous studies in this research area attempted to group them with themes or categories considering the causes' commonalities. The main categories or themes developed by previous studies regarding the causes of construction-related disputes were generally varied. However, Kumaraswamy (1997), Cakmak and Cakmak (2013) and Naji et al. (2020) followed an identical and inherited categorization of causes of disputes, which consisted of main dispute-causing groups, namely owner-related, contractor-related, design-related, contract-related, human behaviour-related, project-related and external factor related. Another broad way of dispute causes categorization, comprised of people-related, project-related and process-related themes as proposed by Diekmann and Girard (1995) was followed by Molenaar et al. (2000) and Tanriverdi et al. (2021) as well. In general, all the categories of dispute causes proposed by previous researchers were predominantly derived from the contractual parties' perspectives (i.e: contractor, principal), whereas this study discerned five themes or categories of disputes based on the perspective of parties' misperceptions and malpractices in numerous aspects during the pre and post contract stages. Several themes identified in previous research, such as 'human behaviour-related causes' and 'process-related causes,' could be grouped under a broader theme identified in this study; 'poor contract practices.' Most categories in earlier studies emphasized stakeholder responsibilities and expectations, either wholly or in part. Similarly, this study identified two themes exclusively related to stakeholder expectations (over-expectations of principal and over-expectations of contractor). However, unlike several previous studies, 'causes related to external factors' were not identified as a theme in this study.

The categorisation of causes of disputes in this study is relatively self-explanatory, in other words, the five themes/categories are somewhat specific and adequate to understand the boundary of the theme to a certain extent only by looking at the theme. The themes or categories identified in several previous studies suggest a broad domain (e.g., owner-related, process-related) rather than an effective 'broad cause' of disputes—a theme or category capable of encompassing several related causes. Due to the self-explanatory nature of the five themes in this study, the questions raised during the subsequent stages (regarding dispute avoidance steps) were more intuitive and understandable without requiring much explanation on the boundary of theme/s.

9.4 Pre-contract dispute avoidance measures

A NZ study by Yiu et al. (2021) introduced a peer-review platform which allows both contractual parties to assess and comment on each other's performance in past contracts, including aspects like behaviour, good faith, and business style. This platform encourages transparency by allowing comments to be made publicly, with an option for anonymity, while also ensuring fairness through a verification process. Similarly, Ramachandra and Rotimi (2011) also pointed out the importance of investigating the financial stability of the other party before formalising the contract. This study has also emphasised the importance of investigating the other party's background before forming the contract. The importance of selecting both the contractor and the principal's representatives not only by considering the bid price or the consultancy fee but also by considering various other quality aspects and previous experiences have also been identified as important steps to be taken during the pre-contract stage aiming at avoiding potential disputes.

By introducing a concept called scope lock point, Yiu et al. (2021) recommended that the scope of a project should be defined as early as possible with regard to functionality, major deliverables, etc., and the best effort should be made to incorporate the concept of Scope Lock

Point into the detailed design, which means that no substantial change of scope should be made or expected past that point. While emphasising the importance of finalising the design as early as possible, this study highlights defining the scope clearly and establishing a robust change control procedure, as practically, designs are prone to change during the post-contract stage; therefore, it is important to establish a proper mechanism to manage changes from early pre-contract stage.

Senarath and Francis (2021) pointed out the importance of team building and improved relationships as an effective dispute avoidance stage to initiate during the briefing stage of a construction project. Hayati and Latief (2019) suggested risk management planning, a competent project team, detailed and accurate specifications, documentation system and record keeping as guidelines to prevent from disputes in the construction industry. The dispute avoidance measures stated by above two studies have also been highlighted by the current study as well. Moreover, a Nigerian Study by Ekhaton (2016) suggested that adequate contract documentation, engagement of experienced contractors & consultants and avoidance of ambiguous & unclear descriptions in bills of quantities as relatively more important dispute avoidance strategies. The current study has also identified the involvement of experienced contractors and consultants as relatively important avoidance steps as many respondents pointed out those measures. As dispute avoidance methods, McGeorge et al. (2007) emphasised collaborative partnerships and alliances which are designed to foster a non-adversarial atmosphere among various stakeholders as they establish an environment stakeholders are understanding and supportive of each other's objectives. Yiu et al. (2021) recommended that the overall NZ construction industry should encourage professionalism and accountability as these values are important to ensure a dispute-free environment. These studies by McGeorge and Yiu recommended entirely different contractual models and emphasised the values (professionalism and accountability) as strategies to minimise disputes. The values emphasised

by Yiu are already characterised in many of the dispute avoidance steps in the current study. Furthermore, McGeorge recommended opting for collaborative procurement models, but this study only focuses on projects that follow traditional procurement. Even though several studies have recommended/proposed collaborative procurement methods as a measure to avoid disputes, those collaborative procurement methods were minimally utilised in the NZ construction industry. Approximately 70% of the court cases examined in New Zealand involved traditional procurement methods. Therefore, this study focuses on traditionally procured projects to address the majority of disputes effectively. Furthermore, the identified pre-contract dispute avoidance steps are particularly relevant to the traditional procurement method, which is reportedly more prone to disputes.

9.5 Innovative solutions to avoid disputes during pre-contract stage

Besides several measures and recommendations indicated by previous studies, as explained in section 9.4, there has been minimal research that proposes a holistic and innovative approach to avoid construction-related disputes.

Previously, several studies attempted to propose dispute prediction models using various statistical methods. Diekmann and Girard (1994) employed a logistic regression model to create the Dispute Performance Index (DPI), which was able to predict dispute likelihood based on data from 159 projects. Moreover, Naji et al. (2020) introduced a model combining fuzzy logic with SEM to assess the probability of disputes in traditional construction projects. And Molenaar, Washington, and Diekmann (2000) developed another model to describe and quantify the key factors contributing to disputes. Although these studies proposed methods to predict disputes, they have not focused on providing a solution to avoid disputes.

Danuri et al. (2015) proposed a discussion and negotiation mechanism to the Malaysian construction industry by involving top management from both contractual parties and by

changing the ordinary attitude during a tense claim situation. This mechanism applies to the post-contract stage when a conflicting situation has already occurred or is about to occur, but the current study proposed an interactive toolkit applicable to the pre-contract stage. De Alwis et al. (2016) proposed a dispute forecasting session that applies to both the pre-contract and post-contract stage by considering factors such as risk allocation, quality of documentation and appropriateness of contractors and consultants. The pre-contract stage in the proposed dispute forecasting session considers factors applicable for the principal and consultant, whereas the current study provides dispute avoidance measures to the principal and consultants and potential contractors as well. Finnie (2021) developed a framework for two-stage ECI processes in NZ. Finnie's framework is mostly relevant to the post-contract stage, and projects intend to follow ECI process whereas this study focuses on the pre-contract stage of traditionally procured projects in NZ.

In summary, several studies focused on the area of dispute avoidance of the construction industry and among those studies, a considerable number of studies proposed lists or individual dispute avoidance steps (as explained in above section 9.4) mostly relevant to the post-contract stage. Although the explained dispute avoidance measures/steps by previous studies (in section 9.4) could be perceived as effective ways of preventing disputes, it is arguable whether those are (1) applicable to the pre-contract stage or (2) innovative wholistic solutions that configure dispute avoidance steps in a more interactive way. Moreover, the innovative dispute prediction methods developed by previous studies as explained in this subsection, cannot be directly considered as dispute avoidance measures as those prediction methods are primarily aimed at forecasting disputes by taking the current/available factors into account. This study has provided an innovative and user-friendly solution to the NZ construction industry by developing an interactive toolkit which is capable of producing dispute avoidance steps (including further explanations for those steps) based on the end-user preference on pre-

contract stage, contractual party, and theme. Further, it allows end users to configure the relationships between dispute avoidance steps and the causes of disputes.

9.6 Chapter Summary

This chapter explored how the overall research aim was achieved by integrating the insights from each chapter. The following chapter presents the conclusions of this research, along with suggestions for future research.

10 CONCLUSIONS AND FURTHER RESEARCH

10.1 Chapter introduction

This final chapter provides the conclusions made in each of the four research objectives. Then, the contributions to knowledge and the industry are presented. Limitations of the current study and future research opportunities are also presented at the end of this chapter.

10.2 Achievements of research objectives

10.2.1 Objective 1 : Review causes of disputes in NZ and international construction industries

From the background study, it has been identified that causes of construction-related disputes has been widely discussed internationally and in NZ construction industry as well. Firstly, a SLR was carried out focusing on previous studies on causes of disputes. This step aimed at producing an objective, all-inclusive list of causes of disputes based on almost all the previous findings on causes of disputes in construction industries of various geographical constraints. Considering the frequency of occurrence of causes of disputes in the previous studies, 29 causes were identified, and amongst them, eight causes were identified as mostly discussed by the previous studies, namely poor contractual arrangements, employer-initiated scope changes, unforeseen site changes, poor contract understanding & administration, contractor's quality of works, the inability of the contractor to achieve time targets, non or delayed payments, and poor quality of design. The list of 29 causes of disputes was produced based on a considerable number of previous publications and followed a systematic and objective method; therefore, those causes could be considered as a more summarised and all-inclusive list of causes of disputes in the construction industry. Researchers who are investigating the causes of disputes without limiting to a particular geography can utilize the produced list of causes of disputes.

Following the SLR, this study has narrowed down the causes of disputes specific to the NZ context by analyzing 35 court cases to uncover underlying reasons. Chapter 5 examines quantitative aspects, while chapter 6 explores qualitative factors, such as the characteristics of identified causes. Most disputes involved main contractors and principals, often arising in traditionally procured projects with lump-sum contracts. The study identified 35 dispute causes, with common issues including limited understanding of the Construction Contract Act clauses, improper payment schedules, and poor work quality. The study found that "minimal awareness of the Construction Contract Act clauses" was a significant issue in NZ court cases, despite being overlooked in prior research. The 35 identified causes of disputes, derived directly from NZ court cases, offer practitioners a reliable and relevant resource. The findings highlight the need for the NZ construction industry to address these causes and implement measures to reduce disputes.

10.2.2 Objective 2 : Understand the dynamics of causes (significances, relationships and underlying themes) of disputes in the NZ construction industry

The dynamics or characteristics namely significances, relationships and underlying themes of the causes of disputes in the NZ construction industry, were investigated by the analysis of court cases as explained in chapter 6. The development of disputes in most of the studied cases was not caused by individual cause, and those disputes were occurred due to multiple reasons. Hence, this study has developed an attribute analysis map that illustrates the relationships among the causes of disputes as identified in the court case analysis. "lack of understanding about the purpose of the CCA" and "different interpretations of contractual clauses" were identified as the two most centralised attributes or causes of disputes, which mostly affect other causes. Therefore, it can be concluded that minimal understanding and varied interpretations of the clauses of the Act and construction contract trigger several other causes of disputes as well.

Considering the commonalities of the identified causes from the court case analysis, five themes were discerned namely; poor contract understanding, poor contract practices, poor contractual arrangement, over expectations of contractor and over expectations of principal. This categorisation of disputes was based on parties' misperceptions and malpractices in numerous aspects during the pre and post-contract stages, whereas the categorisation proposed from the initial SLR was entirely based on the contractual parties' perspectives (employer-responsible causes, contractor-responsible causes, common causes and external causes). Five themes derived from the court case analysis will be worthwhile for the researchers as it provides a structured foundation for to explore specific areas of dispute causes in greater depth, also allows them to narrow their focus and target their studies more effectively.

Significances of each cause of disputes were recognized based on both level of centrality (how many dependant causes were triggered from a particular cause) and the frequency of occurrences of causes in the reviewed cases. Minimal awareness about the purpose of clauses in the Construction Contract Act of NZ, improper payment schedules, and poor quality of work were identified in relatively more cases and have shown many relationships to other attributes as well; therefore, they were identified as the most significant attributes. The reliability of the significance of the causes can be considered as high as they were derived based on two aspects into account and also based on actual court cases in the NZ construction industry. The identified significances of the 35 causes of disputes provide a clear insight to the industry of which areas or causes are more prevalent and impactful for any potential dispute/s. Moreover, the construction industry practitioners can pay more attention to the more significant causes of disputes and try to avoid them.

10.2.3 Objective 3 : Identify pre-contract measures to avoid potential disputes in NZ construction industry.

After identifying the causes of disputes from the court case analysis, the research has focused on pre-contract measures to avoid potential disputes. This has been achieved by conducting 14 semi-structured interviews with industry experts who had significant experience in construction contract management and/or construction disputes in the NZ context, as explained in chapter 7. Four pre-contract stages (briefing stage, concept design & spatial coordination stage, tendering stage and contract finalisation stage) and five themes of causes of disputes as explained in section 10.2.2 and chapter 6, were the data inquiry points. Further, those pre-contract stages and themes were used to analyse and present the dispute avoidance steps methodically and meaningfully.

Amongst the four pre-contract stages, experts proposed numerous pre-contract measures to avoid potential disputes. The majority of actions aimed at improving the overall understanding of the contract management are linked to the “contract finalisation stage”. Key areas where parties need to strengthen their understanding include the allocation of risks and responsibilities, the construction schedule, and construction processes. The clarity and detail of tender or contract documents were emphasized as critical factors influencing these areas. Additionally, knowledge and experience—whether from past projects or employees' skills—are crucial for effective contract management practices. Before signing a contract, it is crucial for the parties to discuss and establish clear information expectations and timing constraints to ensure smoother management during the post-contract stage. Experts emphasized that clearly documenting the project scope has positive effects on other dispute avoidance measures. Further, better management of tender errors, development of the design to a greater extent during the pre-contract stage, and clarity on pricing scopes were other recommendations for forming a contract properly, and those recommendations are applicable throughout the four

pre-contract stages. To avoid unrealistic expectations, it is advised that both the principal and contractor hold expectation management meetings, address concerns early, and avoid over-reliance on tender documents prepared by others.

The dispute avoidance steps presented in chapter 7 could be performed during the pre-contract stage of construction projects that follow the traditional procurement path. Relevant pre-contract stage/s and parties who are more appropriate for performing those measures were also indicated. Moreover, the number of times particular avoidance measures have been indicated by the respondents provides a hint to industry practitioners as to which avoidance steps should be more effective in avoiding potential disputes. The list of pre-contract dispute avoidance measures could be useful for industry practitioners from principal, contractor or consultant companies to pay attention to prior to signing the contract, which could assist in minimising post-contract disputes.

10.2.4 Objective 4 : Develop and validate a pre-contract dispute avoidance toolkit for the NZ construction industry

After identifying pre-contract dispute avoidance measures from the industry experts, researchers have focused on presenting the gathered information in an innovative and meaningful way, as explained in chapter 8. The identified dispute avoidance measures and causes/concerns of disputes (as identified by the court case analysis) were mapped, and avoidance measures were categorised according to the most practical pre-contract stage, responsible party and theme. All this information was mapped using a basic spreadsheet software and then the data tables were imported to Microsoft Power BI, which was used to model the data and to develop a user-friendly and interactive toolkit to avoid disputes, as further explained in chapter 8. This interactive toolkit allows to select pre-contract stage, contractual party and a theme to visualise relevant pre-contract dispute avoidance measures accordingly.

Users can navigate to detailed explanations of avoidance steps and also can visualise avoidable causes/concerns of disputes associated with the avoidance steps. Further, this toolkit allows multiple selection of criteria (to select more than one pre-contract stage, party or theme at once) to configure dispute avoidance steps and concerns/causes according to several pre-contract stages and parties at the same time. The toolkit is developed and published on an online platform, and it provides a more hassle-free method for interested users. Rather than just presenting a list of pre-contract measures to avoid potential disputes, this toolkit produces results interactively, allowing users to select criteria as required and even to see relationships among avoidance steps and concerns in a more understandable way. More importantly, the developed toolkit's content, structure and understandability is validated by 11 interviews and a focus group session with industry practitioners; hence, the quality of the toolkit can be considered as high. The users can utilize the interactive toolkit handily during the pre-contract stage by visualising dispute avoidance measures as applicable to pre-contract stages and parties with an expectation of minimising future disputes.

10.3 Contribution to Knowledge

The study makes a significant contribution to knowledge by producing a systematically derived list of 29 causes of disputes, which serves as an objective and comprehensive resource for researchers worldwide. Unlike previous studies, this list is not restricted by geographic, project type, or other specific limitations, making it broadly applicable. Additionally, the study identifies five well-defined themes of dispute causes that are self-explanatory and specific, allowing researchers to build upon them with ease. Although the themes of causes of disputes were derived based on actual court cases in NZ, broadly they can be utilised as overarching themes for any international research context as well. Further, when investigating the significance of causes of disputes in NZ, a novel methodological approach was introduced to

calculate the "overall significance" of causes, combining their dependency and frequency. This added a reliable index for academic purposes.

The study addresses a notable research gap by investigating pre-contract measures to avoid disputes in traditionally procured projects. It expands the understanding of pre-contract dispute avoidance by systematically linking pre-contract stages and responsible parties with specific measures with the expectation of avoiding potential post-contract disputes. The study bridges theoretical knowledge and practical application by leveraging insights from semi-structured interviews with industry experts, enriching academic discussions on dispute prevention strategies. The development of an interactive toolkit also encourages researchers to explore similar tools, applying innovative data visualization and management techniques to new contexts beyond this study. Especially the toolkit's data model and the user interface (selection mechanism and relational diagram) can be easily adoptable to present outcomes of any other "cause and measure" type research in more interactive way.

10.4 Contribution to Practise

For industry practitioners, the study provides a valuable and reliable list of dispute causes derived from actual NZ court cases. This list helps practitioners understand the areas where disputes commonly arise, enabling them to take proactive steps to address these issues and as well as to consider preventive measures. The inclusion of the "overall significance" index allows practitioners to prioritize highly significant causes of disputes, ensuring that the most critical causes of disputes are addressed.

The study also offers practical pre-contract dispute avoidance measures categorized by the responsible party and the relevant pre-contract stage, enabling clients, tenderers, and consultants to act appropriately during each stage to minimize potential conflicts. The developed interactive toolkit is particularly beneficial for practitioners, offering an accessible

and user-friendly way to efficiently identify pre-contract dispute avoidance measures and associated concerns/causes of disputes. The toolkit supports minimizing post-contract disputes in traditionally procured projects (which are reportedly more prone to disputes) by recommending effective and practical measures applicable to the pre-contract stage. The identified pre-contract measures could also be tested in other procurement types.

10.5 Research Limitations and Further Research

The main finding of this study (the interactive pre-contract dispute avoidance toolkit) is specifically applicable to traditionally procured projects. Further, some limitations may impact the generalizability and quality of its findings to a certain extent. Although this study included 35 court cases and 14 expert interviews, the conclusions are shaped by the specific contexts of these cases and participant opinions. Additionally, the effectiveness of the toolkit depends on project-specific constraints and the competencies of its users. Several further research options are derived considering the existing research limitations as well the current trends and requirements of the construction industry, as explained in the following paragraphs.

The five themes of causes of disputes, derived entirely from real court cases in NZ could be valuable for future researchers in NZ to explore any of the themes in greater depth. Furthermore, future research is recommended to examine ways to improve understanding of the purposes of the clauses of the New Zealand CCA, as it has been identified with the highest overall significance from the court case study.

Since this study focuses solely on New Zealand construction projects that use the traditional procurement method, further research could explore the applicability of the recommended avoidance steps to other procurement methods and other geographies. NZ is a common law country where the legal system is primarily based on judicial decisions (court judgments) and precedents rather than solely on written laws or codes. The legal framework, contract

management practices are more specific to a particular common law country itself. Therefore, the developed toolkit is more relevant to the NZ context and would be inappropriate to generalize as it is to another jurisdiction. However, the identified themes and the structure of the toolkit could be applicable to another jurisdiction without change/validation. But it is recommended to validate the contents of the toolkit (causes of disputes and dispute avoidance measures) prior to adopting it to a different jurisdiction. Moreover, the study highlights clear scope documentation as the most critical dispute avoidance measure based on the frequency of responses. Thus, a more detailed investigation into effective scope documentation would be valuable.

As the developed pre-contract dispute avoidance toolkit is limited to traditionally procured projects, its effectiveness could be evaluated in projects using other procurement methods, or an entirely new toolkit could be developed to provide pre-contract dispute avoidance measures for other procurement methods. Additionally, the toolkit's foundational elements, such as its data model and visualization process, could serve as a base for further development, incorporating a broader range of data to offer more detailed pre-contract dispute avoidance steps. With the rise of language models, there is also potential to use the toolkit's outcomes as input for training language models to generate more accurate and specific discussions on pre-contract dispute avoidance measures.

10.6 Chapter Summary

This study has made important conclusions with regard to the causes of disputes, dynamics of causes of disputes and pre-contract dispute avoidance methods. Further, the findings contribute to both the construction industry and academia as explained in this chapter. Research limitations and future research ideas have been provided to understand this particular study's boundary and further investigate potential research paths.

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<http://ezproxy.massey.ac.nz/login?url=http://www.emeraldinsight.com/doi/book/10.1108/9781787566958>

Appendix A - Ethics Approval



Dear: Weerasinghage Pramod Malaka Silva

Thank you for your notification which you have assessed as Low Risk.

Your project has been recorded in our database for inclusion in the Annual Report of the Massey University Human Ethics Committee.

The low risk notification for this project is valid for a maximum of three years.

If situations subsequently occur which cause you to reconsider your ethical analysis, please contact a Research Ethics Administrator.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

A reminder to include the following statement on all public documents:

"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Dr Brian Finch, Director - Ethics, telephone 06 3569099 ext 86015, email humanethics@massey.ac.nz."

Please note, if a sponsoring organisation, funding authority or a journal in which you wish to publish requires evidence of committee approval (with an approval number), you will have to complete the application form again, answering "yes" to the publication question to provide more information for one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

Yours sincerely

Dr Brian Finch Chair, Human Ethics Chairs' Committee and Director (Research Ethics)

Research Ethics Office, Research and Enterprise
Massey University, Private Bag 11 222, Palmerston North, 4442, New Zealand T 06 951 6841; 06 95106840
E humanethics@massey.ac.nz; animalethics@massey.ac.nz; gtc@massey.ac.nz

Appendix B – Expert Interview Guideline

OVERVIEW: A study based on legal cases in New Zealand (NZ) has identified several recurring causes of disputes in construction projects. **The majority of cases followed traditional procurement path.** Taking those identified causes into account, researchers are searching on how those identified causes can be avoided **during pre-contract stage (preparation and briefing, Concept Design, Spatial Coordination, Technical Design) to avoid potential disputes in post contract stage**

LIMITATION: This study has been limited to **construction projects in NZ** which followed the **traditional procurement path**

1) Poor Contract Understanding

The idea of Poor Contract Understanding is that Party/parties misunderstand the contractual clauses or misunderstand the ideal practice in construction projects

- 1.1) According to your experience, what are the key factors / causes that lead to disputes due to **poor contract understanding** in the projects you involved with ?
- 1.2) What actions do you recommend to construction teams to take **during the pre-contract stage** to avoid the aforesaid factors / causes related to **poor contract Understanding?**
- 1.3) When and whom should be involved to initiate those recommendations?

Pre-contract stage	Who is/are responsible?	Actions

2) Poor Contract Management / Practices

This refers to all the intentional and unintentional malpractices when managing the contract.

- 2.1) According to your experience, what are the key factors / causes that lead to disputes due to **poor contract management / practices** in the projects you involved with ?
- 2.2) What actions do you recommend to construction teams to take **during the pre-contract stage** to avoid the aforesaid factors / causes related to **poor contract management / practices ?**

2.3) When and whom should be involved to initiate those recommendations?

Pre-contract stage	Who is/are responsible?	Actions

3 Poor Contract Formation

Focus on how badly the parties have agreed and organized themselves until they reach an agreement. This includes how bad the parties shared their rights and obligations, shared their risks and how they have documented their agreement.

3.1) According to your experience, what are the key factors / causes that lead to disputes due to **poor contract formation** in the projects you involved with ?

3.2) What actions do you recommend to construction teams to take **during the pre-contract stage** to avoid the aforesaid factors / causes related to **poor contract arrangement** ?

3.3) When and whom should be involved to initiate those recommendations?

Pre-contract stage	Who is/are responsible?	Actions

4 Over Expectations of Contractor

This refers to high, unrealistic and/or unreasonable expectations of Contractor from the Employer or any other party who engaged with the construction

4.1) According to your experience, what are the key factors / causes that lead to disputes due to **over expectations of contractor** in the projects you involved with ?

4.2) What actions do you recommend to construction teams to take **during the pre-contract stage** to avoid the aforesaid factors / causes related to **over expectations of contractor** ?

4.3) When and whom should be involved to initiate those recommendations?

Pre-contract stage	Who is/are responsible?	Actions

5 Over Expectations of Principal

This refers to high, unrealistic and/or unreasonable expectations of the Principal from the Contractor or any other party who engaged with the construction

5.1) According to your experience, what are the key factors / causes that lead to disputes due to **over expectations of Principal** in the projects you involved with ?

5.2) What actions do you recommend to construction teams to take **during the pre-contract stage** to avoid the aforesaid factors / causes related to **over expectations of Principal?**

5.3) When and whom should be involved to initiate those recommendations?

Pre-contract stage	Who is/are responsible?	Actions

Appendix C – Interview/Focus group Guideline for Toolkit

Validation Stages

Link to the published toolkit >>

<https://app.powerbi.com/view?r=eyJrIjoiNmViMWZmZTYtYjYzYi00NzJiLTk3NTEtMTJiNGY4NGNmNzY5IiwidCI6IjM4ODcyOGUxLWJiZDAtNDM3OC05OGRjLWY4NjgyZTY0NDMwMCIslmMiOjEwfQ%3D%3D>

Participant Information

1. Your Profession (optional)

2. Years of Experience in the field (optional)

- Less than 5 years
- 6-10 years
- 11-15 years
- More than 15 years

Questions related to the contents of the toolkit

3. If you have any comment for the above **four pre-contract stages** please specify

4. If you have any comment for the above **five themes of causes of disputes** please specify

5. What is your opinion on the suitability of above dispute avoidance steps (under "**Poor Contract Understanding**" theme), as effective pre-contract measures to avoid potential disputes, please specify.

6. What is your opinion on the suitability of above dispute avoidance steps (under "**Poor Contract Practices**" theme), as effective pre-contract measures to avoid potential disputes, please specify

7. What is your opinion on the on the suitability of above dispute avoidance steps (under "**Poor Contract Formation**" theme), as effective pre-contract measures to avoid potential disputes, please specify

8. What is your opinion on the on the suitability of above dispute avoidance steps (under "**Over Expectations of Contractor**" theme), as effective pre-contract measures to avoid potential disputes, please specify ?

9. What is your opinion on the on the suitability of above dispute avoidance steps (under "**Over Expectations of Employer**" theme), as effective pre-contract measures to avoid potential disputes, please specify ?

Questions related to overall understanding of the toolkit

10. Is the toolkit's structure meaningful ? please comment

11. Is the way that the concerns/issues of disputes and avoidance steps are linked (relationship) is meaningful ? please comment

12. Overall, Is the toolkit user friendly ? please comment

13. Overall, Is the toolkit understandable ? please comment

14. If you have any recommendations to improve this toolkit, please mention

Appendix D – Followup Questionnaire for the toolkit validation stage

Questionnaire for Validating "Pre-contract Dispute avoidance toolkit"

Thank you for your participation in an interview / reviewing the toolkit. The below questions are based on the presented toolkit, and your feedback is highly appreciated to further validate and improve this framework.

Link to the published toolkit >>

<https://app.powerbi.com/view?r=eyJrIjoiNmViMWZmZTYtYjYzYi00NzJiLTk3NTEtMTJiNGY4NGNmNzY5IiwidCI6IjM4ODcyOGUxLWJiZDAfNDM3OC05OGRjLWY4NjgyZTY0NDMwMCIslmMiOjEwfQ%3D%3D>

* Required

Participant Information

1. Have you participated for an interview/focus group session that presented this toolkit / reviewed the toolkit?*

Yes

No

2. Your Profession (optional)

3. Years of Experience in the field (optional)

Less than 5 years

6-10 years

11-15 years

More than 15 years

Questions related to the contents of the toolkit

4. Please select one option from each of the following statement (Pre-contract stages and themes are shown below as well)*

Select the Pre-Contract Stage

1 - Preparation and Briefing	3 - Tendering Stage (Until the end of Tender Submission)
2 - Concept Design and Spatial Coordination	4 - Contract Finalization Stage (Until Sign the Con...

Select the Theme

Over Expectation of Contractor	Poor Contract Management / Pra...
Over Expectation of Principal	Poor Contract Understanding
Poor Contract Formation	

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The four pre-contract stages are suitable when presenting the dispute avoidance steps effectively	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The five themes effectively cover the causes/issues of disputes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. If you have any comment for the above **four pre-contract stages** please specify

6. If you have any comment for the above **five themes of causes of disputes** please specify

7. The suitability of avoidance steps generated under "**Poor Contract Understanding**" theme (Few avoidance steps under this theme are shown below as well)*

Dispute Avoidance Steps
Agreement to rates and EOT granting mechanisms in advance
Be clear on assumptions made by any party
Employer's awareness on releasing the contractor on its liability at the end of the construction
Engage consultants for design aspects rather than contractors as much as possible
Minimise unnecessary shared design responsibilities for certain works
Pass suitable portions of design responsibilities to Contractor
Robust communication up-front
Understand where Employer's design risk finishes and where Contractor's risk starts

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The avoidance steps generated under " Poor Contract Understanding " theme are suitable to avoid potential disputes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. If you have any comment/s on the suitability of above dispute avoidance steps (under "**Poor Contract Understanding**" theme), as effective pre-contract measures to avoid potential disputes, please specify.

9. The suitability of avoidance steps generated under "**Poor Contract Practices / Management**" theme (Few avoidance steps under this theme are shown below as well)*

Dispute Avoidance Steps
Agreeing on suitable communication channels and its limitations beforehand
Agreement on timeframes of when the information should be transferred
Bear in mind to Keep the site records well
Check the background of the other party beforehand
Clarifying details from the Engineer
Contractor should keep in mind to inform Employer and submit any claims timely manner
Establishing a robust Change control procedure
Establishing a robust risk management procedure
Involvement of Competent people to understand the contract administration well
Keep in mind to obtain approvals for variation prices beforehand
Obtain and save supplier's producer statements and warranties
Offering incentives for working collaboratively
Pass the precontract assumptions to the post contract team effectively within a company
Pre-Contract meeting on process of contract administration process

Strongly Disagree Disagree Neutral Agree Strongly Agree

The avoidance steps generated under "**Poor Contract Practice**" theme are suitable to avoid potential disputes

10. If you have any comment/s on the suitability of above dispute avoidance steps (under "**Poor Contract Practices**" theme), as effective pre-contract measures to avoid potential disputes, please specify

11. The suitability of avoidance steps generated under "**Poor Contract Formation**" theme (Few avoidance steps under this theme are shown below as well)*

Dispute Avoidance Steps
Collaborative Design Reviews
Get clear about the scope that Contractor quotes
Investigate whether the tender document includes even a minor design requirement.
Review and understand the contract well before signing
Review closely on the design developments whethar they actually results any cost implication
Tenderer should not overly expect design details from the Employer
Tenderer to inform the scope exclusions clearly to the Employer
Tenderer to roughly check the qtys calculated by employer in a BID
To hold expectation management meetings

Strongly Disagree Disagree Neutral Agree Strongly Agree

The avoidance steps generated under **“Poor Contract Formation”** theme are suitable to avoid potential disputes

12. If you have any comment/s on the suitability of above dispute avoidance steps (under **"Poor Contract Formation" theme**), as effective pre-contract measures to avoid potential disputes, please specify

13. The suitability of avoidance steps generated under **"Over Expectations of Contractor"** theme (Few avoidance steps under this theme are shown below as well)*

Dispute Avoidance Steps
Collaborative Contractual clauses
Contract to be drafted by an experienced person
Develop the design into a greater extent during pre-contract stage
Document and summarise pre-contract correspondances
Document the scope clearly
Employer's consultants' fees should be percentage based.
Engage a Contractor only when the designs are developed to a greater extent
Facilitate the Contractor with environment related information
Manage significant missing items, drastic qty variances & errors in a SOQ in a BID well
Not to include too much special conditions of contract
Pre-contract site investigations
Selecting competent Employer's representatives
Selecting the right contractors at the first place
Tenderer to Ask questions and get answers
Tenderes should be given sufficient time to price
To have a comprehensive set of rates
To have comprehensive set of preambles

Strongly Disagree Disagree Neutral Agree Strongly Agree

The avoidance steps generated under **“Over Expectations of Contractor”** theme are suitable to avoid potential disputes

14. If you have any comment/s on the suitability of above dispute avoidance steps (under **"Over Expectations of Contractor" theme**), as effective pre-contract measures to avoid potential disputes, please specify ?

15. The suitability of avoidance steps generated under "**Over Expectations of Principal**" theme (Few avoidance steps under this theme are shown below as well)*

Dispute Avoidance Steps
Agreement to rates and EOT granting mechanisms in advance
Be clear on assumptions made by any party
Employer's awareness on releasing the contractor on its liability at the end of the construction
Engage consultants for design aspects rather than contractors as much as possible
Minimise unnecessary shared design responsibilities for certain works
Pass suitable portions of design responsibilities to Contractor
Robust communication up-front
Understand where Employer's design risk finishes and where Contractor's risk starts

Strongly Disagree Disagree Neutral Agree Strongly Agree

The avoidance steps generated under "**Over Expectations of Employer**" theme are suitable to avoid potential disputes

16. If you have any comment/s on the suitability of above dispute avoidance steps (under "**Over Expectations of Employer**" theme), as effective pre-contract measures to avoid potential disputes, please specify ?

Questions related to overall understanding of the toolkit




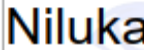
17. Please select one option in each of the following statement*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The structure of the toolkit is meaningful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The way that the concerns/issues of disputes and avoidance steps are linked (relationship) is meaningful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, the toolkit is user friendly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, the toolkit is understandable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I believe that this toolkit is useful during the pre-contract stage to avoid potential disputes in the NZ construction industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>


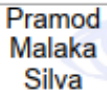
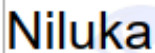
18. If you have any recommendations to improve this toolkit please mention

Appendix E – Statement of Contributions

Statement of Contribution – Chapter Three

 	
STATEMENT OF CONTRIBUTION DOCTORATE WITH PUBLICATIONS/MANUSCRIPTS	
<p>We, the student and the student's main supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the student's contribution as indicated below in the Statement of Originality.</p>	
Student name:	Weerasinghage Pramod Malaka Silva
Name and title of main supervisor:	Dr. Niluka Domingo
In which chapter is the manuscript/published work?	Chapter 3
<p>Describe the contribution that the student and members of the supervisory team have made to the manuscript/published work:¹</p> <p>The student has written the original draft of manuscript including background study, idea development, methodology, data collection, data analysis, data visualization, synthesizing findings and editing.</p> <p>The supervisory team has reviewed the student's work and provided structured feedback for improvement.</p>	
Please select one of the following three options:	
<input checked="" type="radio"/>	<p>The manuscript/published work is published or in press</p> <p>Please provide the full reference of the research output:</p> <p>Pramod Malaka Silva, Niluka Domingo, Noushad Ali Naseem Ameer Ali; Current knowledge on construction dispute management in New Zealand. AIP Conf. Proc. 5 October 2023; 2881 (1): 050023. https://doi.org/10.1063/5.0167894</p>
<input type="radio"/>	<p>The manuscript is currently under review for publication</p> <p>Please provide the name of the journal:</p>
<input type="radio"/>	<p>It is intended that the manuscript will be published, but it has not yet been submitted to a journal</p>
Student's signature:	<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">  <p><small>Digitally signed by Pramod Malaka Silva DN: cn=Pramod Malaka Silva, o=Massey University, New Zealand, email=pramod.malaka@massey.ac.nz, c=NZ Date: 2024.12.16 11:17:22 +1300</small></p> </div> <div style="text-align: center;">  <p><small>Digitally signed by Niluka Domingo DN: cn=Niluka Domingo, o=Massey University, ou=School of Built Environment, email=ni.d.domingo@massey.ac.nz, c=NZ Date: 2024.12.16 11:17:22 +1300</small></p> </div> </div>
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<p><small>1</small> Doctoral Research Committee May 2023</p>	


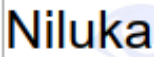
Statement of Contribution – Chapter Four

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STATEMENT OF CONTRIBUTION DOCTORATE WITH PUBLICATIONS/MANUSCRIPTS			
<p>We, the student and the student's main supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the student's contribution as indicated below in the Statement of Originality.</p>			
Student name:	Weerasinghage Pramod Malaka Silva		
Name and title of main supervisor:	Dr. Niluka Domingo		
In which chapter is the manuscript/published work?	Chapter 4		
<p>Describe the contribution that the student and members of the supervisory team have made to the manuscript/published work:¹</p> <p>The student has written the original draft of manuscript including background study, idea development, methodology, data collection, data analysis, data visualization, synthesizing findings and editing.</p> <p>The supervisory team has reviewed the student's work and provided structured feedback for improvement.</p>			
Please select one of the following three options:			
<input checked="" type="radio"/> The manuscript/published work is published or in press Please provide the full reference of the research output: Silva, P.M., Domingo, N. and Ameer Ali, N.A.N. (2024), "Causes of disputes in the construction industry – a systematic literature review", <i>Journal of Financial Management of Property and Construction</i> , Vol. 29 No. 2, pp. 193-210. https://doi.org/10.1108/JFMPC-03-2023-0012			
<input type="radio"/> The manuscript is currently under review for publication Please provide the name of the journal:			
<input type="radio"/> It is intended that the manuscript will be published, but it has not yet been submitted to a journal			
Student's signature:	 Pramod Malaka Silva <small>Digitally signed by Pramod Malaka Silva DN: cn=Pramod Malaka Silva, o=Massey University, ou=School of Built Environment, email=malaka.pramod@massey.ac.nz Date: 2024.12.16 11:17:58 +1300</small>	Main supervisor's signature:	 Niluka <small>Digitally signed by Niluka Domingo, cn=Niluka Domingo, o=Massey University, ou=School of Built Environment, email=niluka.domingo@massey.ac.nz Date: 2024.12.16 11:17:58 +1300</small>
<p><i>This form should be placed at the beginning of each relevant thesis chapter.</i></p>			
<p>¹ Refer to the Massey University Publishing and Authorship guidelines (OneMassey for staff, Stream for students) and/ or Contributor Roles Taxonomy (CRediT) guidelines for guidance.</p>			
		<small>Doctoral Research Committee May 2023</small>	

Statement of Contribution – Chapter Five

STATEMENT OF CONTRIBUTION DOCTORATE WITH PUBLICATIONS/MANUSCRIPTS



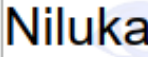
We, the student and the student's main supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the student's contribution as indicated below in the Statement of Originality.

Student name:	Weerasinghage Pramod Malaka Silva		
Name and title of main supervisor:	Dr. Niluka Domingo		
In which chapter is the manuscript/published work?	Chapter 5		
Describe the contribution that the student and members of the supervisory team have made to the manuscript/published work: ¹			
The student has written the original draft of manuscript including background study, idea development, methodology, data collection, data analysis, data visualization, synthesizing findings and editing.			
The supervisory team has reviewed the student's work and provided structured feedback for improvement.			
Please select one of the following three options:			
<input checked="" type="radio"/>	<p>The manuscript/published work is published or in press</p> <p>Please provide the full reference of the research output:</p> <p>Silva, P.M., Domingo, N. and Ali, N.A.N.A., 2023. Quantitative analysis of construction-related legal cases in New Zealand. In: Sandanayake, Y.G., Waidyasekara, K.G.A.S., Ramachandra, T. and Ranadewa, K.A.T.O. (eds). Proceedings of the 11th World Construction Symposium, 21-22 July 2023, Sri Lanka.[Online]. pp. 900-90</p>		
<input type="radio"/>	<p>The manuscript is currently under review for publication</p> <p>Please provide the name of the journal:</p>		
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Student's signature:	 <small>Digitally signed by Pramod Malaka Silva DN: cn=Pramod Malaka Silva, o=Massey University, New Zealand, ou=School of Built Environment, email=p.malaka@massey.ac.nz Date: 2024.12.16 11:50:13 +1300</small>	Main supervisor's signature:	 <small>Digitally signed by Niluka Domingo, cn=Niluka Domingo, o=Massey University, ou=School of Built Environment, email=n.domingo@massey.ac.nz Date: 2024.12.16 11:50:13 +1300</small>


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Statement of Contribution – Chapter Six

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STATEMENT OF CONTRIBUTION DOCTORATE WITH PUBLICATIONS/MANUSCRIPTS		
<p>We, the student and the student's main supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the student's contribution as indicated below in the Statement of Originality.</p>		
Student name:	Weerasinghage Pramod Malaka Silva	
Name and title of main supervisor:	Dr. Niluka Domingo	
In which chapter is the manuscript/published work?	Chapter 6	
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Please select one of the following three options:		
<input checked="" type="radio"/>	<p>The manuscript/published work is published or in press</p> <p>Please provide the full reference of the research output:</p> <p>Silva, P.M., Domingo, N. and Ameer Ali, N.A.N. (2024), "Attribute Analysis of Legal Cases in the Construction Industry", <i>Journal of Legal Affairs and Dispute Resolution in Engineering and Construction</i>, DOI: 10.1061/JLADAH/LADR-1194 (in Press)</p>	
<input type="radio"/>	<p>The manuscript is currently under review for publication</p> <p>Please provide the name of the journal:</p>	
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Student's signature:	 Pramod Malaka Silva <small>Digitally signed by Pramod Malaka Silva DN: cn=Pramod Malaka Silva, o=Massey University, New Zealand, ou=School of Built Environment, email=pramod.malaka@massey.ac.nz Date: 2024.12.16 15:10:27 +1300</small>	Main supervisor's signature:  Niluka <small>Digitally signed by Niluka Domingo, cn=Niluka Domingo, o=Massey University, ou=School of Built Environment, email=niluka.domingo@massey.ac.nz, Date: 2024.12.16 11:18:21 +1300</small>
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Statement of Contribution – Chapter Seven

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Student name:	Weerasinghage Pramod Malaka Silva	
Name and title of main supervisor:	Dr. Niluka Domingo	
In which chapter is the manuscript/published work?	Chapter 7	
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Please select one of the following three options:		
<input type="radio"/> The manuscript/published work is published or in press Please provide the full reference of the research output:		
<input checked="" type="radio"/> The manuscript is currently under review for publication Please provide the name of the journal: Journal of Construction Economics and Building		
<input type="radio"/> It is intended that the manuscript will be published, but it has not yet been submitted to a journal		
Student's signature:	Pramod Malaka Silva <small>Digitally signed by Pramod Malaka Silva DN: cn=Pramod Malaka Silva, o=Massey University, ou=School of Built Environment, email=p.malaka@massey.ac.nz Date: 2024.12.16 16:48:11Z</small>	Main supervisor's signature: Niluka <small>Digitally signed by Niluka Domingo DN: cn=Niluka Domingo, o=Massey University, ou=School of Built Environment, email=n.d.domingo@massey.ac.nz Date: 2024.12.16 11:58:45 +1300</small>
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Statement of Contribution – Chapter Eight

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Student name:	Weerasinghage Pramod Malaka Silva		
Name and title of main supervisor:	Dr. Niluka Domingo		
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<input type="radio"/> The manuscript/published work is published or in press Please provide the full reference of the research output:			
<input checked="" type="radio"/> The manuscript is currently under review for publication Please provide the name of the journal: Journal of Construction Innovation: Information, Process, Management.			
<input type="radio"/> It is intended that the manuscript will be published, but it has not yet been submitted to a journal			
Student's signature:	 Pramod Malaka Silva	Main supervisor's signature:	 Niluka
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