

**DISPUTES IN CONTRACT MANAGEMENT IN
INTERNATIONAL ENGINEERING, PROCUREMENT
AND CONSTRUCTION (EPC) PROJECTS: THE CASE
OF CHINESE CONTRACTORS**

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(179155N)

Degree of Master of Construction Law and Dispute Resolution

Department of Building Economics

University of Moratuwa

Sri Lanka

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ABSTRACT

With the encouragement of Chinese government and the implementation of “the Belt and Road Initiative” national proposal, more and more Chinese contractors involved in international projects. The majority of international projects executed by Chinese contractors are building construction, transportation and power engineering in developing countries, that the projects last long time and consist with high costs. Engineering, procurement, and construction (EPC) is a favored project delivery approach, which is increasingly adopted by both public and private organizations. However, Chinese contractors are struggling to make profit from those EPC projects due to the high risks therein. Disputes frequently generated between the contractual parties, especially when costs overrun, and time delay happened in projects. In turn, disputes impact the smooth execution of the projects and amicable cooperation with the Owner. Contract management is the core of contractor’s project management. Poor contract and poor contract management will lead to disputes in projects. In order to assist the Chinese contractors, gain success in international projects, this research aimed to investigate the disputes faced by the Chinese International Contractors in contract management reference to EPC projects.

The research adopted a qualitative research approach with case study strategy. Data was collected from literature review of current studies, document review and semi-structured interviews. Seven kinds of internal documents in the selected two cases were reviewed, and six interviews with the staffs in different management level were conducted. Data from the two cases were analyzed separately and cross case analyzed to find more information.

This research first introduced the Chinese contractors’ status in international construction market; the features of international projects, EPC projects; the claims and disputes; the contract management and common causes of claims and disputes caused by contracts. Then based on the data analysis, the findings presented the important conditions of contract; the contractual relationship; the organization of the contractor; the claims and disputes; problems in contract management and methods to avoid disputes.

This research helps readers to understand what the disputes in contract management are, how contract management is conducted. Moreover, this research provides the suggestions from contractor’s point of view on how to avoid disputes caused by contract management from three aspects, that is personal capability, organization capability and time.

Key Words: *Chinese Contractor, Claims and Disputes, Contract Management, International EPC Project,*

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LIST OF CONTENT

DECLARATION.....	i
ABSTRACT.....	ii
ACKNOWLEDGMENT	iii
LIST OF CONTENT.....	iv
LIST OF FIGURES.....	vii
LIST OF TABLES.....	viii
LIST OF ABBREVIATIONS.....	ix
LIST OF APPENDIX.....	x
CHAPTER 1	1
INTRODUCTION	1
1.1 Background.....	1
1.2 Research Problem Statement	3
1.3 Aim and Objectives	4
1.4 Methodology.....	5
1.5 Scope and Limitations	5
1.6 Chapter Breakdown	6
1.7 Chapter Summary	7
CHAPTER 2	8
LITERATURE REVIEW	8
2.1 Introduction	8
2.2 Current Status of Chinese Contractors in International Construction Market....	8
2.2.1 Business Arena.....	8
2.2.2 Business Regions	9
2.2.3 Market Share	10
2.3 International Construction Projects	11
2.3.1 Multi Knowledge	12
2.3.2 Transnationality and Multi-Stakeholders	12

2.3.3 Long Duration and High Value	12
2.3.4 Internationally Accepted Management	13
2.4 Engineering, Procurement and Construction (EPC) Project	13
2.5 Conflicts, Claims and Disputes in International Projects	16
2.5.1 What is Conflicts, Claims and Disputes.....	16
2.5.2 Relationship of Conflicts, Claims and Disputes.....	17
2.6 Contract Management.....	18
2.6.1 Contract.....	18
2.6.2 Contract Risks.....	19
2.6.3 FIDIC EPC/TURNKEY 2017.....	19
2.6.4 Contract Management.....	20
2.7 Common Causes of Claims and Disputes Caused by Contracts	22
2.8 Chapter Summary	22
CHAPTER 3	24
RESEARCH METHODOLOGY.....	24
3.1 Introduction	24
3.2 Research Design	24
3.3 Research Approach	25
3.4 Research Strategy	25
3.4.1 Research Strategy Adopted in This Research	26
3.4.2 Selection of Cases	27
3.5 Research Techniques	28
3.5.1 General Data Collection Methods in Qualitative study.....	28
3.5.2 Data collection techniques adopted in this Research	29
3.5.3 Data Analysis Methods	30
3.5.4 Content Analysis	31
3.5.5 Cross-Case Analysis.....	32
3.6 Research Reliability and Validity	32
3.7 Research Process	33
3.8 Chapter Summary	34

CHAPTER 4	35
DATA ANALYSIS AND RESEARCH FINDINGS	35
4.1 Introduction	35
4.2 Data Collection	36
4.3 Analysis of Case One.....	37
4.3.1 Introduction to the Project A.....	37
4.3.2 Contractual Relationship of Project A.....	39
4.3.3 Organization Chart of the Contractor.....	39
4.3.4 Claims and Disputes of Project A	42
4.3.5 Problems in Contract Management of Project A.....	46
4.3.6 Methods to Avoid Disputes in Contract Management of Project A	47
4.4 Case Two	48
4.4.1 Introduction of Project B	48
4.4.2 Contractual Relationship of Project B.....	50
4.4.3 Organization of the Contractor B.....	50
4.4.4 Claims and Disputes of Project B	53
4.4.5 Problems in Contract Management of Project B.....	56
4.4.6 Methods to Avoid Disputes in Contract Management.....	56
4.5 Cross Case Analysis.....	61
4.5.1 General Comparison of the Two Cases	61
4.5.2 Common Disputes due to Contract Management	63
4.5.3 Problems in Contract Management	63
4.5.4 Methods to Reduce Disputes in Contract Management	64
4.6 Chapter Summary	65
CHAPTER 5	66
5.1 Introduction	66
5.2 Research Overview.....	66
5.3 Implementation.....	69
5.4 Limitations.....	70
5.5 Recommendations for Further Research	70
REFERENCES.....	71
APPENDIX	79
Appendix –A: Case study interview guide	79
Appendix –B: Case Study Document Review Guide	82

LIST OF FIGURES

Figure 2.1: Business Areas of Chinese Contractors	9
Figure 2.2: Annual Revenue Proportion of Chinese International Contractor in TOP225/250	10
Figure 2.3: Market Share of Chinese International Contractor in TOP225/250	11
Figure. 2.4: Typical Contractual Relationship of EPC Project	14
Figure. 2.5: Typical Work Flow of EPC Project	14
Figure 2.6: Basic relationships between conflict, claims and disputes and potential outcomes	18
Figure 2.7: Risk, conflict, claim and dispute continuum model	18
Figure 2.8: The different Stages of the Whole Lifecycle of Construction Contract Management.....	21
Figure 3.2: Main Components of Case Study	27
Figure 3.3: Triangulation Analysis of Date Collection	30
Figure 3.4: Qualitative Data Analysis Process	31
Figure 4.1: Contractual Relationship of Project A	39
Figure 4.2: Organization Chart of the Contractor	40
Figure 4.3: Claims categories of Project A	43
Figure 4.4: Contractual Relationship of Project B	50
Figure 4.5: Organization Chart of the Contractor	51
Figure 4.6: Contract Management Structure.....	52
Figure 4.7: Contractual Information Dissemination in Project B	58

LIST OF TABLES

Table 2.1: Business Areas of Chinese Contractors.....	8
Table 2.2: Annual Revenue Proportion of Chinese International Contractor in TOP225/250	9
Table 2.3: Market Share of Chinese International Contractor in TOP225/250.....	10
Table 2.4: Features of FIDIC Silver Book	20
Table 3.1: Research Strategies	26
Table 3.2: Comparison of Different Kinds of Interview	28
Table 3.3: Validity of this Research	32
Table 4.1: Lists of Document Review	36
Table 4.2: Profile of Interviewees	37
Table 4.3: Contract Information of Project A.....	37
Table 4.4: Works Allocation of Contract Management Works in Project A	41
Table 4.5: Risks of Project A.....	42
Table 4.6: Contract Information of Project B.....	49
Table 4.8: Claims of Project B	54
Table 4.9: General Comparison of the Selected Cases	61
Table 4.10: Cross Analysis of the Problems and Methods.....	64

LIST OF ABBREVIATIONS

Abbreviation	Description
Admin.	Administration
DAB	Dispute Resolution Board
ENR	Engineering News Record
EPC	Engineering, procurement and construction
FIDIC	International Federation of Consulting Engineers
GOV.	Government
HSE	Health, Safety and Environment
QA/QC	Quality assurance and quality control
QS	Quantity surveyor

LIST OF APPENDIX

APPENDIX	Description	page
Appendix –A:	Case study interview guide	79
Appendix –B:	Case study document review guide	82

CHAPTER 1

INTRODUCTION

1.1 Background

Initially since 1950s, the Chinese government regularly commissioned its state-owned contractors to undertake overseas projects through aid construction (Luo , 2017). In recent decade, Chinese government continually encourages and supports domestic contractors to join in overseas market by participating international competitive bidding process (Liu, Zhao, & Yan, 2016). With “the Belt and Road Initiative” in 2013, more and more Chinese Contractors devote to go out (Luo , 2017).

According to the statistic published by Ministry of Commerce People's Republic of China, Chinese contractors completed the turnover of 97.98 billion US dollars and newly signed 6,944 contracts with 62 countries along the “Belt and Road”, with the value of US\$154.89 billion in 2019 ("GO OUT" Service Platform, 2020). According to the Engineering News-Record, there are 75 nos. Chinese contractors squeezed in to the top 250 International Contractor. More than 80% of the Chinese international contractor's business is concentrated in the developing and underdeveloped regions such as Asia and Africa (Zhang, 2019).

As depicted by Liu, Zhao, and Yan (2016), Chinese contractors benefited from the massive international projects, meanwhile they have to face more risks and challenges on the other. Due to culture and language differences, inflation and currency fluctuations, unfamiliar and unforeseeable conditions, limited resources and long transportation, there are much more risks in international projects (Gunhan, 2015).

Engineering, procurement and construction contract (“EPC contract”) is a favored construction project delivery approach which is increasingly adopted by both public and private organizations (Galloway, 2009). EPC approach is where a single entity takes responsibility for all elements of design (engineering), construction and procurement of the project, and normally the contract amount is in lump sum (Zhao,

2019). The clients preferred to select EPC project deliver for the reasons of reduced schedule, costs saving and contractors with higher qualification (Puerto et al., 2008). Zhao (2019) deems that EPC contract mode is an effective means for the clients to control engineering risks and ensure project benefits. While for the contractors in EPC projects, Du et al. (2015) contented that the contractor's risks come from a wide range of sources, and it is riskier in procurement, political, financial, Health/Safety/Environment (HSE), clients, and design compared to conventional domestic Design-Bid-Build projects.

Conflicts, claims, and disputes are major challenges in construction industry, which have negative effects to the project performance (LaBarre & El-adaway, 2013). Meanwhile, the cost involved in disputes is high and the duration of disputes resolution process is longer and longer (EC Harris Built Asset Consultancy, 2013). The occurrence of disputes represents a great loss for construction company (Choi & Kim, 2015).

The Chinese scholars are interested in study the claims and disputes in international projects. In 2006, Zhang, Wang and He classified the root causes of disputes, those are disputes in unclear work scope and contractual requirement, delay in construction, oppose of the claims, fault and ambiguity in contract documents, and contract termination. Shen et al. (2013) modeled and tested with survey, structural equation modeling and case studies for the causes of Chinese contractors' claims in international EPC construction projects, which is external risks, client organizational behavior and project definition in contract. Further in this study, it established the interdisciplinary linkages of contracting, risk management, organizational behavior and international EPC project delivery, which is helpful to develop proactive and effective strategies of risks, claims and disputes. By evaluating through Fish bone Diagrams, Pair-wise comparison method, non-comparison model, non-dimensional data technique, rank table and Pareto Analysis, Zhao (2019) discussed the root causes of claims and disputes in EPC projects (financial economical, construction technique related causes, contract related causes and management related causes), and he provide feasible alternatives (prevention, negotiation, standing neutral, non-binding solution, private

binding solution, litigation) to deal with them.

By means of FMEA method survey, Choi & Kim (2015) revealed that in the top 10 dispute risk factors through literature review and expert interviews, in which 5 is related to the contract. Contract is an agreement made between two or more parties, which defines each party's rights and obligations that can be enforceable by law (Murdoch & Hughes, 2008). Contract management is perceived as the most important factor determining the success or failure of overseas construction projects (Murdoch & Hughes, 2008). The proper contract management can significantly lower the factor of risk and uncertainty for the business and customer (Muhammada, Saoulab, Issac, & Ahmed, 2019). Since the parties involved in international project are from different culture and legal background, the contract normally adopts international accepted contract forms, and the project will be performed under international practice (Li, 2014).

The International Federation of Consulting Engineers (FIDIC) contract, and its developed templates have been widely used in international construction markets since it was firstly issued in 1957 (Choi & Kim, 2015). FIDIC Conditions of Contract for EPC/Turnkey Projects (1st 1999), or the silver book that is a recommended to be used where one entity takes responsibility for the design and execution of a project.

There are lots of studies on how to improve the contract management. Park (2017) finds out six capacities shall be obtained for international contractor in contract management. Wang (2017) ranked the top five for the improvement of government contract management. Moreover, Dai (2009) stated that contract management should be implemented throughout the project and that each stage of contract management has its specific tasks and priority. Liu (2014) introduced the concept of contract whole life-cycle management into the architecture construction contract management, which divided the whole life cycle into four stages: contract planning; contract signing; contract performance; and contract closure.

1.2 Research Problem Statement

As delineate in the background study, Chinese Contractors had occupied large share

of international construction market in developing countries, but they have difficulties to make profits in current international market (Liu, Zhao, & Yan, 2016). Even though Chinese Contractors are good at construction management with fast speed, they are short at contract management and dispute resolution capability (Luo , 2017). Therefore, it is necessary to conclude the lessons from the failure and to learn the advanced management experience from the success, so as to improve the contract management capability, including the capability for claims and disputes, and finally realize the project success (Muhammada, Saoulab, Issac, & Ahmed, 2019). Because, contract management is the soul and core of project management, the level of contract management largely determines the profitability of the project and even the success or failure of the project. Further, claim/disputes management is the core of contract management (Park & Kim, 2017)

Existing studies are mainly focused to identify the risks and causes of claims/disputes in construction projects from different aspects (Choi & Kim, 2015; Awwad, Barakat, & Menassa, 2016; Zhao , 2019). It also popular to explore the mechanism of dispute resolution, such as the alternative resolutions to litigation (EC Harris Built Asset Consultancy, 2013; Murdoch & Hughes, 2008; Li, 2014).

However, there are few studies on the problems, causes, and resolutions to avoid unnecessary disputes caused by contract management in international EPC projects. And also, few studies are available from the contractor's perspective.

1.3 Aim and Objectives

Therefore, the aim of this research is to investigate the disputes faced by the Chinese International Contractors due to contract management of international EPC projects. In order to achieve this aim, the following objectives are performed as milestone:

- To critically review the features of international construction projects, EPC projects, contract management, claims and disputes in EPC Projects.
- To investigate the claims and disputes faced by the Chinese International Contractors in EPC projects due to contract management
- To analyze the causes for disputes identified above due to contract

management of EPC projects.

- To suggest suitable methods to avoid the disputes caused due to contract management in international EPC Projects.

1.4 Methodology

In order to achieve the above aim and objectives, and considering the research problem, the research adopted qualitative approach and case study research strategy. The following works are carried out to collect the data which analyzed to fill the gap with those existing study.

- Literature review: a comprehensive literature review was carried out to identify the current studies on international construction projects, EPC projects, contract management and disputes in those projects.
- Document review: Documents such as claim and disputes register book, claim and dispute particulars, and project management regulations were reviewed in the selected cases. The purpose of using documents is to find the major causes of claims and disputes in international EPC Projects and to learn from the countermeasures and consequences.
- Semi-Structural Interviews: semi-structure interviews is a good way to gather qualitative data (Bryman and Bell, 2011). Therefore, semi structured interviews were carried out as the main data collection technique with the senior staffs of Chinese contractors in each case, in order to achieve research objectives

1.5 Scope and Limitations

This research focuses on study the problems of Chinese International Contractors. The cases are selected and studied from developing countries. The ultimate objective is to find out the resolutions for the Chinese contractors to solve disputes in contract management in international EPC Projects.

1.6 Chapter Breakdown

Chapter 01 Introduction	• Background to the study • Aim and objectives • Research methodology • Scope and limitations
Chapter 02 Literature Review	• To obtain the current research result in: • international project • EPC project • Conflicts, Claims and Disputes • Contract Management • Common claims and disputes caused by Contract
Chapter 03 Research Methodology	• Research Design • Research Approach • Research Strategy • Research Techniques • Research Process
Chapter 04 Data Analysis and Research Findings	• Introduce the basic information of selected cases • Find out the common disputes caused by contract management • Analyze the problems in contract management • Summarise the methods adopted in the cases to reduce the disputes
Chapter 05 Conclusions and Recommendations	• Summarizes the findings and provide recommendations and conclusions. • Address limitations and opportunities available for further researches.

Figure 1.1 : Chapter Breakdown

1.7 Chapter Summary

This chapter provides a brief introduction to the research by identifying the research problem through the background with brief literature review. Then, it emphasized the aim of the research and research objectives. It further describes the research methodology used for the research and highlights the chapter breakdown by the respective objectives and means to achieve them.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In order to investigate the disputes of contract management in international EPC projects, this chapter gives an overview of the relevant basic knowledge of international EPC project contracts. It introduces (1) the Chinese contractors' status in international construction market; (2) the international projects; (3) EPC projects; (4) Claims and disputes; (5) Contract management; (6) Common causes of claims and disputes caused by contracts. By knowing the above information, it will have a solid foundation to investigate the disputes caused by contract management in international EPC projects.

2.2 Current Status of Chinese Contractors in International Construction Market

2.2.1 Business Arena

Based on the records published by the China's Ministry of Commerce for newly signed contract amount by Chinese contractors in overseas market, the proportion of the 10 major business areas of international projects has not changed greatly ("GO OUT" Service Platform, 2020). Among them, building construction, transportation and power engineering have always been the three dominant business areas, which together account for around 70% of the total (Zhao Z. , 2017). Table 2.1 and Figure 2.1 present involvement of Chinese contractors' business areas from 2008 to 2017.

Table 2.1: Business Areas of Chinese Contractors

Business	2008	2009	2010	2011	2012	2013	2017
Building Construction	31%	19.7%	20.9%	19.5%	20.5%	18.0%	22.3%
Power Engineering	16%	18.4%	20.8%	22.3%	13.6%	15.9%	18.1%
Transportation	15%	23.6%	21.6%	19.0%	22.8%	21.9%	27.0%
Petrochemical Engineering	10%	13.6%	11.9%	12.3%	11.0%	13.3%	10.2%
Electromunication	7%	7.3%	8.4%	10.5%	11.3%	13.6%	7.2%
Industry Construction	7%	7.2%	5.7%	4.1%	6.0%	3.4%	4.9%
Hydraulic Engineering	4%	2.6%	4.0%	4.2%	4.7%	3.6%	2.8%
Others	10%	7.5%	6.7%	8.1%	10.1%	10.4%	7.5%
Total	100%	100%	100%	100%	100%	100%	100%

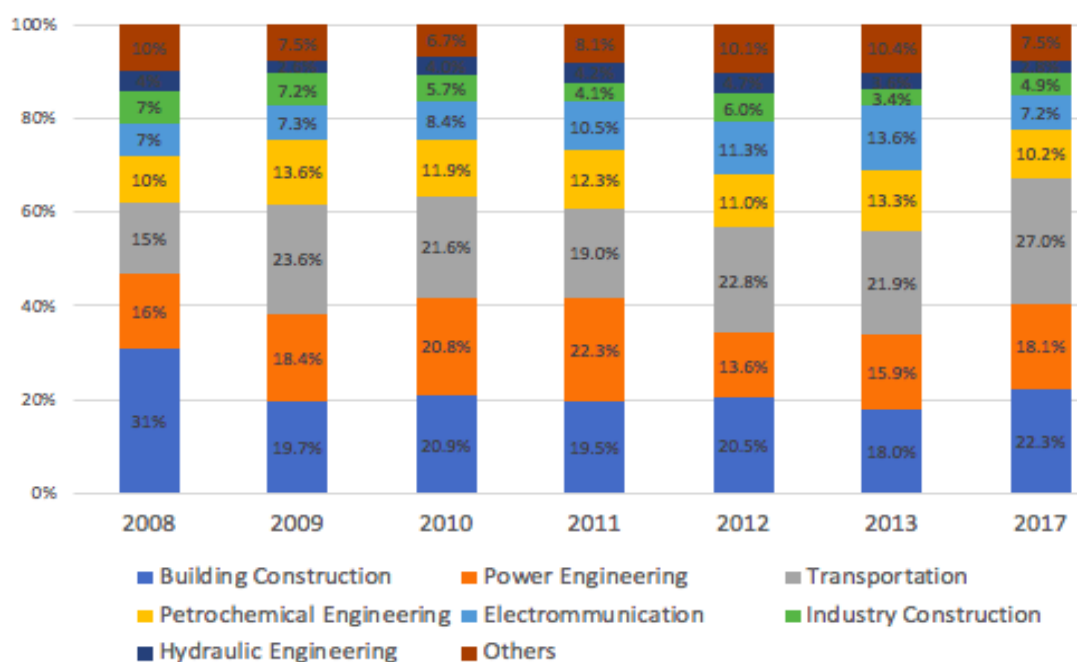


Figure 2.1: Business Areas of Chinese Contractors

Accordingly, involvement of Chinese contractors in building construction is comparatively high compared to other business areas.

2.2.2 Business Regions

According to the annual revenue statistics published by Engineering News-Record (ENR), the international projects of Chinese contractors are mainly concentrated in Asia, Africa and Middle East. In recent years, the contribution of Africa market decreased, while Asia market grows fast. Annual Revenue Proportion of Chinese International Contractor in TOP225/250 are presented in Table 2.2. and Figure 2.2

Table 2.2: Annual Revenue Proportion of Chinese International Contractor in TOP225/250

Area	2010	2011	2012	2013	2014	2015	2016	2017	2018
Africa	41.1%	37.2%	38.0%	38.4%	39.0%	37.8%	35.0%	32.7%	30.7%
Asia	30.5%	35.9%	35.8%	32.1%	31.5%	32.3%	38.8%	42.2%	43.7%
Middle East	17.5%	18.0%	13.9%	17.4%	16.9%	14.0%	13.6%	14.4%	14.4%
Latin America and Caribbean	5.9%	5.7%	9.0%	7.5%	7.7%	8.0%	7.8%	6.1%	6.1%
Europ	4.3%	2.3%	2.4%	3.1%	2.7%	2.6%	2.8%	2.6%	3.6%
America	0.7%	0.9%	0.9%	1.0%	2.0%	4.2%	2.0%	1.7%	1.4%
Canada	0.0%	0.0%	0.0%	0.4%	0.2%	0.2%	0.1%	0.3%	0.1%

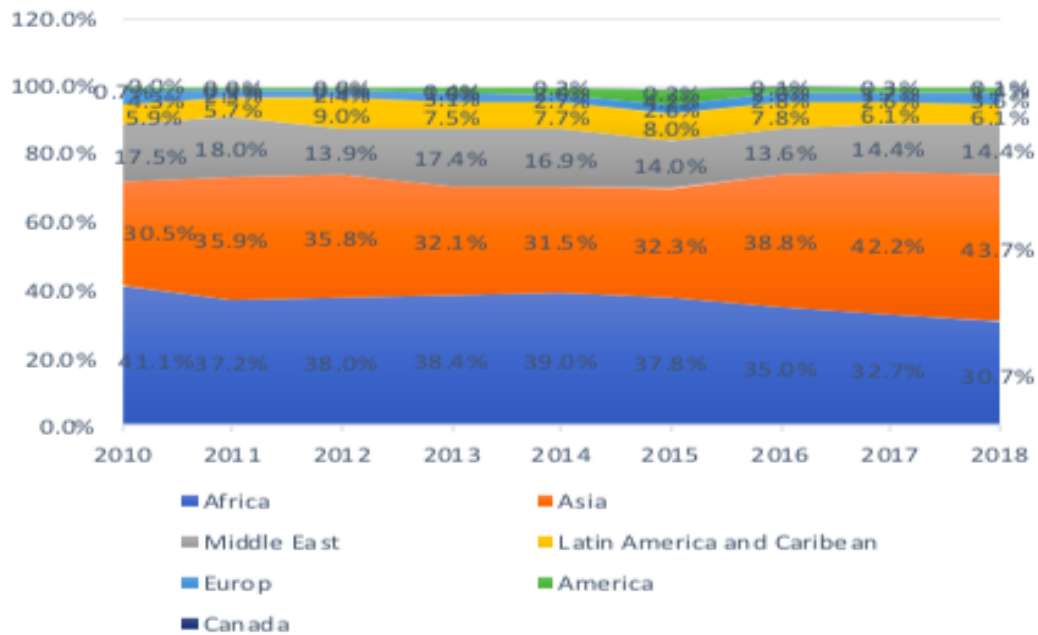


Figure 2.2: Annual Revenue Proportion of Chinese International Contractor in TOP225/250

2.2.3 Market Share

As for the market share recorded by Engineering News Record¹ (ENR), the Chinese contractors keep improving in all those regions. They have superior advantages in Africa and Asia, and they have large increase in Latin America and Middle East. However, they have few influence in developed countries in Europe and North America (Wu, Wang, & Liao et al., 2010). Table 2.3 presents Market Share of Chinese International Contractor and figures are graphically presneted in Figure 2.3.

Table 2.3: Market Share of Chinese International Contractor in TOP225/250

Area	2010	2011	2012	2013	2014	2015	2016	2017	2018
Africa	36.6%	38.7%	40.1%	44.8%	48.7%	49.4%	54.9%	59.8%	60.9%
Asia	24.9%	22.7%	20.1%	17.3%	17.3%	20.5%	25.0%	37.7%	40.8%
Middle East	10.8%	13.8%	13.6%	10.2%	16.4%	19.2%	17.1%	20.2%	21.2%
Latin America and Caribbean	5.0%	9.8%	8.7%	12.1%	10.5%	12.9%	13.7%	23.0%	24.3%
Europ	1.6%	2.6%	1.4%	1.6%	2.2%	2.5%	3.6%	2.9%	3.9%
America	0.5%	1.2%	1.5%	1.3%	1.6%	3.4%	7.3%	3.2%	2.7%
Canada	0.4%	0.0%	0.0%	0.0%	0.8%	0.7%	0.8%	2.2%	0.6%

¹ Engineering News-Record (widely known as ENR) is an American weekly magazine that provides news, analysis, data and opinion for the construction industry worldwide.

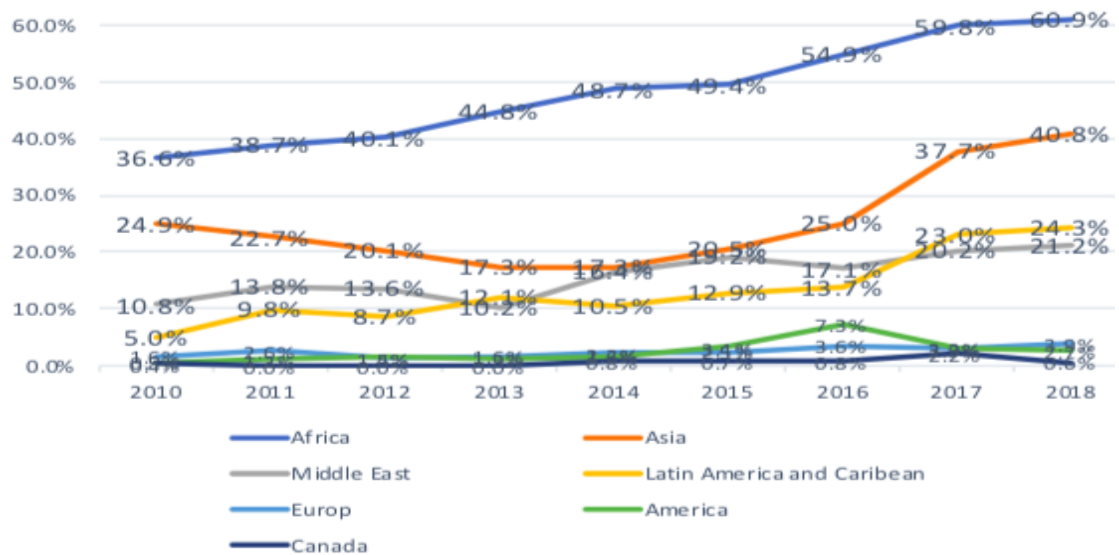


Figure 2.3: Market Share of Chinese International Contractor in TOP225/250

All of above, the major businesses for Chinese contractors in international market are in building construction, transportation and power engineering and most of the projects are in developing countries or underdeveloped countries.

2.3 International Construction Projects

Even though there is no recognized definition of international construction project, it can generally agree that international construction projects are carried out by the participants from more than one country, the works include feasibility study, design/engineering, financing, procurement, construction, commission, operation and maintenance, and transfer of an engineering project (Zhang , 2013). More importantly, the international project should be executed in accordance with the internationally accepted contract forms, technical standards and management methods (Zhang & Lv, 2015). In this research, it mainly focuses on that overseas projects participated by Chinese contractors out of Chinese mainland.

The international project shares the common attributes of construction project, as uniqueness, finite, goal oriented, complex, temporary organization, limited resources and high risks (Jaffar, Tharim, & Shuib, 2011). However, the international projects reflect some characteristics more obviously.

2.3.1 Multi Knowledge

International construction project is a complicated interdisciplinary integration, in which the professional knowledge involve investment, financing, law, technology, international trade, insurance, management, and many others (Gunhan & Arditi, 2005). As a result, there are numerous participants shall join and work together in the projects (Kathleen, 2003). As for the contractor, beside to perform the main responsibilities to the client, the contractor needs to corporate with professional consultant, subcontractors, suppliers, financing agent, insurance company, logistics and custom clear. Meanwhile, the contractor needs to coordinate with relevant government authority, stakeholders and third parties along the project site (Awwad, Barakat, & Menassa, 2016). Therefore, it is a huge challenge for those engaged in international project to manage the relationship between all parties (Fenn & Lowe, 1997). It also requires the staff to have qualified capacity and talents (Zhang & Lv, 2015).

2.3.2 Transnationality and Multi-Stakeholders

The participants involved in international projects come from more than one country. The people are of different nationality, and live in various political, economic, cultural, and religious backgrounds, and their languages and customs are also different (Shore & Cross, 2005). Moreover, the interests and goals of the participants are not the same with each other. Therefore, it adds more difficulties to communicate, understand, coordinate and corporate with each participant, which resulting in conflicts and disputes (Fenn & Lowe, 1997).

2.3.3 Long Duration and High Value

The contractor shall get involved in one international project for a long time, at least in bidding, negotiating and signing contract, engineering, construction, commission, maintenance and transfer, that's why it normally takes years as short or decades as long (Ofori, 2003). Under the current ever-changing environment, especially in most Asian and African countries, the political and economic situation is unstable, and the policies have changed frequently with the interferences of government change (Luo , 2017).

In such a long duration, the following risks can hardly to avoid, such as exchange rate fluctuations, price inflation, changes in laws and taxes, changes in natural conditions, and even, changes in construction environment (Ganbat, Chong, Liao, & Leroy, 2019). Besides, the value of international construction project is high, even a small change can result in a huge effect (EC Harris, 2013).

2.3.4 Internationally Accepted Management

Since the participants are coming from different backgrounds, it is fare for them to adopt internationally accepted procurement methods, contract forms and technical standards (Choi & Kim, 2015). Even the management method keeps continuing developing and innovating, the parties of international project shall carry out proper management when facing such a complicated task. With the proper management the parties can fulfill the obligations and exercise the rights, and finally the project goal can be reached (Zhao & Shen, 2008)

2.4 Engineering, Procurement and Construction (EPC) Project

EPC, the abbreviation of Engineering, Procurement and Construction, which is also called Turnkey, is originated in the U.S. petrochemical industry in the late 1970s, and then gradually spread throughout the world (Loots & Henchie, 2007). In this model, one contractor shall design, procure, construct, test, rectify defects and complete all the works, while the client will take over the facility, inserting the key in the lock, turning, and the facility is immediately operational (Wang et al., 2015). The typical contractual relationship in EPC project is as shown in Figure 2.4 (Píchaa, Tomek, & Löwitt, 2015).

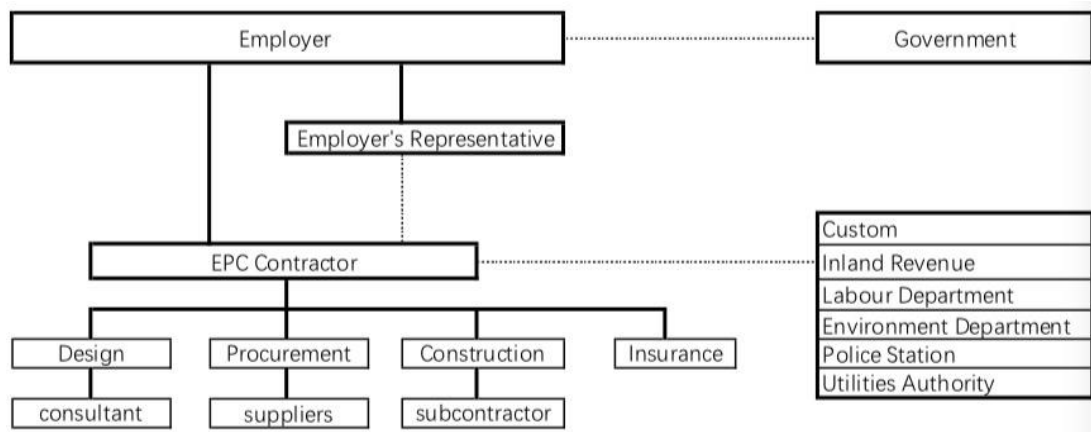


Figure. 2.4: Typical Contractual Relationship of EPC Project

Sourece: (Pichaa, Tomek, & Löwitt, 2015).

In EPC projects, the contractor shall take full responsibility for all the investigation studies, design, materials, workmanship, construction, testing and commissioning and maintenance of the entire works (Ding, 2014). Figure 2.5 illustrates the contractor's typical works in EPC projects in detail.

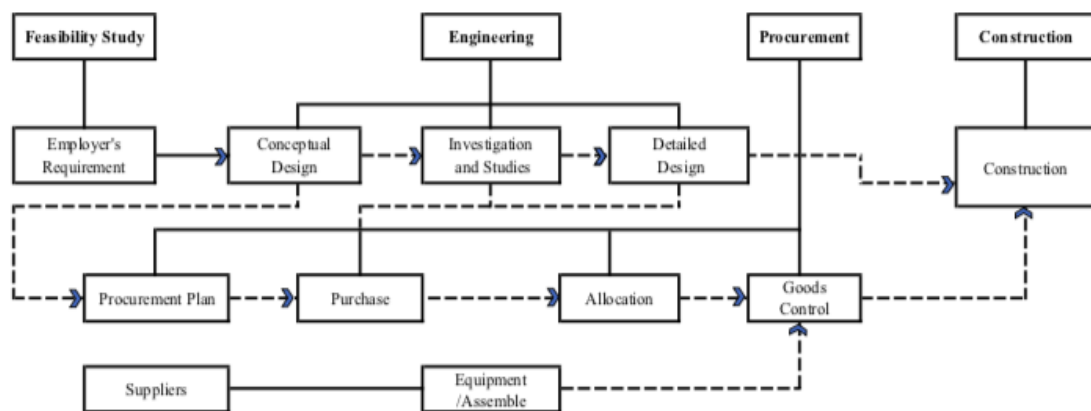


Figure. 2.5: Typical Work Flow of EPC Project

Besides in the book *International Construction Contract Management*, Klee (2018) introduced in detail the ECP transection, discussed the advantages/disadvantages of EPC approach, and the points should be paid attention in EPC projects. The characteristics of international EPC projects can be summerized in the following three points:

1. EPC Project realizes the integration of design and construction (Chen , 2014). The EPC contractor is a single point of responsibility who takes full responsibility for all the scope of work from the beginning to the end (Wang et al., 2015). So contractor's obligations are clear and there is few interference by others, it would reduce the disputes resulted from coordination and connection (Shen, et al., 2016). However, since the employer initiates the bidding in the early stage of a project, it is difficult to describe a clear and accurate work scope, work interface, and desired target in the contract document, which will result in disputes due to contract ambiguity and different understandings (Oztas & Okmen, 2003).
2. The risks allocation in EPC contract is unbalance, and most of risks are borne by the contractor (Chen , 2014). Therefore, the EPC project contractor shall have rich experience and high level capacity to well manage the risks (Zhang & Lv, 2015). At the mean time, it will result that the total investment to EPC project may be higher than that completed via conventional method (deisgn-bidding-build) (Du, et al., 2015).
3. EPC contract is normally a lump sum contract (Chen , 2014). The employer has the maximum price certainty before contractor start performing, as there are rare circumanstance allows price adjustment (Oztas & Okmen, 2003). In rational practice, the contractor shall fully understand the work scope and investigate the risks hidden in the project, and allow them in the bidding price to ensure the smooth implementation and profitability (Ganbat, Chong, Liao, & Leroy, 2019). Unfortunately, there are always some deficiency when they win bids due to the "Winner's Curse"², contractor only wins when his estimate cost happens to be the lowest among all bidders (Zhao & Shen, 2008).

² The winner's curse is a tendency for the winning bid in an auction to exceed the intrinsic value or true worth of an item. The gap in auctioned versus intrinsic value can typically be attributed to incomplete information, emotions, or a variety of other subjective factors that may influence bidders.

2.5 Conflicts, Claims and Disputes in International Projects

Conflicts, disputes and claims are terms frequently used by the literature when study the disputes in construction, and these terms are interrelated (Kumaraswamy, 1997).

2.5.1 What is Conflicts, Claims and Disputes

Conflicts

Conflict has been defined as “serious disagreement and argument about something important’ and also as ‘a serious difference between two or more beliefs, ideas or interests” (Conlin, Langford, & Kennedy, 1996). Since conflict is ‘inevitable in human relationships’ (Rhys Jones, 1994), ‘conflict’ is synonymous within the construction industry, and it can be considered unavoidable due to the complexity of construction contracts and high differences in interests among the participants to a construction project. (Kathleen, 2003)

Claim

In FIDIC Silver Book (2017), it states that:

“Claim means **a request or assertion** by one Party to the other Party **for an entitlement or relief** under any Clause of these Conditions or otherwise in connection with, or arising out of, the Contract or the execution of the Works”.

Based on the purpose, it can be defined as “When one party believes that the other party has not met the contractual obligations or expectations and that they deserve **monetary and/or time compensation**, they may submit a claim.” (Hadikusumo & Tobgay, 2015).

Beside to the above, the claims can be broadly classified according to the contractual basis (Chen & Zhang, 2008; Khekale & Futane, 2015):

- Contractual Claim: which arise out of the express provision in the particular contract.
- Extra Contractual Claims: also known as common law claims, which can be arise out of implied terms;

- Quasi Contractual Claims: quasi contract is an obligation create by order of a court;
- Quantum of Meruit Claims: to avoid unjust enrichment;
- Ex-gratia Claims (Actual amount of loss suffered/direct costs without profit).

Disputes

Dispute is a misunderstanding between two parties, either contractual or non-contractual (Oxford Dictionary). Colman (2019) made a definition that ‘dispute’ is two parties differ in the assertion of a contractual right which results in a contractual decision being given, which consequently becomes a formal dispute. The disputes discussed by Colman is in line with that of FIDIC Silver Book (2017). The event to be deemed as dispute under FIDIC norms shall have certain preconditions (FIDIC, 2017):

- “one Party makes a claim against the other Party...”;
- “the other Party ... rejects the claim in whole or in part; and
- “the first Party does not acquiesce..., provided however that a failure by the other Party to oppose or respond to the claim in whole or in part, ...”

2.5.2 Relationship of Conflicts, Claims and Disputes

According to Kumarswamy (1997), the causes of disputes are coming from conflicts and claims; Further, Acharya et al. (2006) lengthened the chain of problems leading to disputes by adding risk factors. They also indicate that if claims are not clearly resolved it may lead to a dispute. Conflicts can turn into claims and disputes if conflicts are not well managed; claim can be worsened to disputes if it is not well settled and resolved (Acharya, Dai Lee, & Man Im, 2006). According to the above, the disputes can be directly generated from unsettled conflicts and claims, also the poor management can result into disputes. Figure 2.6 illustrates basic relationships between conflict, claims and disputes and potential outcomes and Figure 2.7 shows risk, conflict, claim and dispute continuum model.

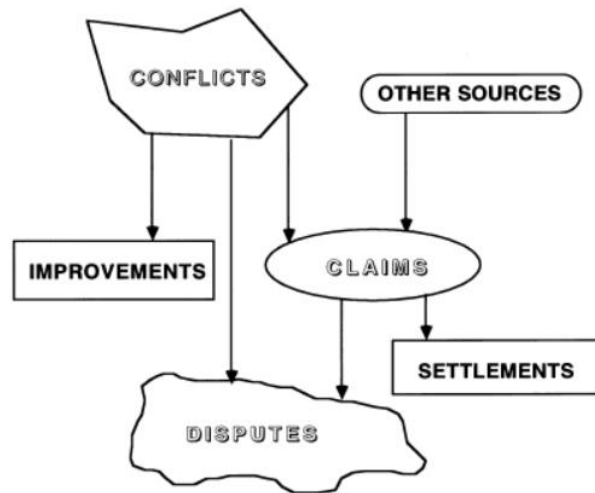


Figure 2.6: Basic relationships between conflict, claims and disputes and potential outcomes

Source : (Acharya, Dai Lee, & Man Im, 2006).



Figure 2.7: Risk, conflict, claim and dispute continuum model

2.6 Contract Management

2.6.1 Contract

Contract is an enforceable promise (Murdoch & Hughes, 2008). Based on FIDIC Silver Book (2017), “Contract means the Contract Agreement, any addenda referred to in the Contract Agreement, these Conditions, the Employer’s Requirements, the Schedules, the Tender, the JV Undertaking (if applicable) and the further documents (if any) which are listed in the Contract Agreement.”

Contract documents are the most important basis in the whole process of construction project, since the contract documents have the following functions (Chen & Zhang 2008; Liu, 2015):

- To assign the rights and obligations of the parties.
- To rationally allocate risks between the parties.
- To clarify the works, scope, contract price, duration, quality standards of the contract.
- To specify the goals and expectations of the contract parties.
- To set the claims and dispute resolution mechanism when encounters conflicts,
- To stipulate the punishment as the consequences when one party breach the contract or does not perform or partially perform the obligations.

2.6.2 Contract Risks

According to the Incomplete contract theory (Tirole, 1999), it believes that due to the bounded rationality of the individual, the complexity of the external environment, the asymmetry and incompleteness of information, and the fact that the parties in the contract cannot verify or observe all the facts, incomplete contracts generate. Therefore, contractual risks cannot be avoided. There is some way to improve the incomplete contracts, such as adopting standard contract norms, fully studying the contract in the early stage, several round negotiating, improving the contract wording, and abiding by the dispute resolution mechanism and arbitration procedures, but those would only supplement an imperfect contract into a more complete process (Jia, 2006)). The parties in the transaction prefers incomplete contracts as well, since to set precaution measures to low incidences is a cost waste. Until future risks arise, they will decide what they should do economically (Jia, 2006).

2.6.3 FIDIC EPC/TURNKEY 2017

To minimize the contractual risks to the greatest extent, standard form of contract is typically used in international projects. FIDIC international standard forms of contract for works are widely accepted and used in various international projects (Choi & Kim, 2015). The Second Edition of the Conditions of Contract for EPC/Turnkey Projects was published in 2017, which is called Silver Book as well (FIDIC, 2017). The distinguished features of Silver Book 2017 are presented in Table 2.4.

Table 2.4: Features of FIDIC Silver Book

(1)	Employer's Administration	The Employer will appoint Employer's representative to act on behalf of him under the contract. However, Employer's personnel shall not intend to supervise closely or control Contractor's work, or to review most of the construction drawings.
(2)	Contract Document	(a) The Contract Agreement (b) The Particular Conditions Part A -Contract Data (c) The Particular Conditions Part A -Special Provisions (d) These General Conditions (e) The Employer's Requirement (f) The Schedules (g) The Tender (h) The JV Undertaking (if the Contractor is a JV); and (i) Any other documents forming part of the Contract
(3)	Contract Price	It is Lump sum basis, and there is few of circumstances that can adjust the price.
(4)	Risk Allocation	The Contractor shall take most of the social risks, economical risks, natural risks, design risks, technology risks, and management risks. The Employer will take political risks, legal risks. The risks resulted from force majeure will be taken by both parties.

2.6.4 Contract Management

Contract management has been defined as “. . . the process which ensures that all parties to a contract fully understand their respective obligations enabling these to be fulfilled as efficiently and effectively as possible to provide even better value for money” (Lowe, 2007, p.). The works in contract management include the management of work scope, programme and cost, as well as the management of information documents, variations, risks, claims and disputes, etc. (Ding, 2014).

Various studies have explored the benefits through contract management, and proper contract management can significantly lower the factor of risk and uncertainty (Vidogah & Ndekugri, 1997; Lam, Wang, Lee, & Tsang, 2007; Chen S. , 2014; Guo, 2016). The contractor's capabilities to make proper contract management is important, which will ensure the success of reaching the project goal, as well as smoothly solve the claims and disputes.

The contractor can improve the contract management capabilities from three aspects (Park & Kim, 2017; Chen S. , 2014): Personal Capability, Organizational Capability and Time.

- Personal Capability: which includes communication, data collection and management, contract document interpretation, contract-related theories and knowledge, strategies and processes for contractual tasks.
- Organizational Capabilities: which include human resources management, system management.
- Time: Liu and Sun (2014) introduced whole lifecycle management of construction contract, which divided the contract management into four stages as illustrated in Figure 2.8.

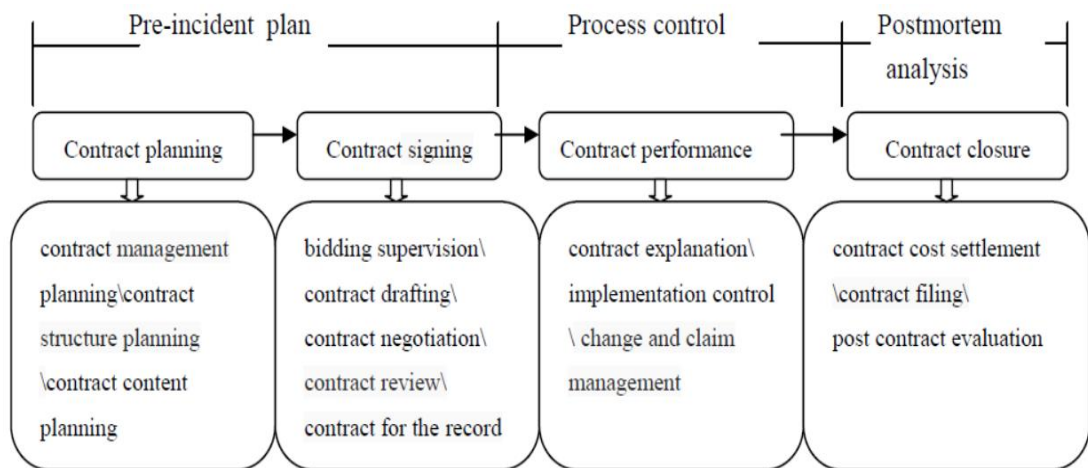


Figure 2.8: The different Stages of the Whole Lifecycle of Construction Contract Management

2.7 Common Causes of Claims and Disputes Caused by Contracts

There are numerous studies for the causing factors on the contractor's claims and disputes in EPC Projects. Shen, et al. (2016) categorized the factors in EPC Projects based on previous researches, and the authors found the unclear technical specification and unclear scope of works were the major factors in contract which caused claims and disputes.

Zhao and Shen (2008), EC Harris Built Asset Consultancy (2013) and Choi and Kim (2015) have the similar conclusions on the causes of disputes, in which the followings are related with contract management:

- Failure to examine contract conditions, relevant local laws, and information provided by the employer at the time of tender
- Failure to understand contract language and terms and/or comply with its contractual obligations
- Inadequate skills to recognize and handle claim-related clauses
- Failure to make interim awards on extensions of time and compensation, which lead to incomplete claims
- Failure to estimate the size of compensation for construction cost and time in case of claim, which lead to unsubstantiated claims;
- Failure to safe-keeping of evidence documents.

2.8 Chapter Summary

Through this chapter, it is known that Chinese contractors occupy a large share of the international construction market, but their projects are mainly concentrated in developing and underdeveloped countries such as Asia, Africa, and Latin America, where the political and economic stability is poor.

As the single responsible party for design, procurement, and construction, EPC contractor bear huge risks in international project, where accumulates numbers of participants from different cultural backgrounds and with different interests, and which

takes long period of time with expensive fixed price Furthermore, the risks allocation is unbalanced. Under the FIDIC contract concept, employer has less control over the process and only pays attention to whether the final result meets the prescribed requirements.

The high risks of international EPC Project will increase more claims and disputes. On the other hand, single responsibility party and result-oriented contract may decrease disputes in EPC approach. Under the influences of both sides, contract management is one of the biggest challenges in international construction projects

The current studies have explored the factors resulted in claims and disputes, also the scholars' endeavor to provide a complete dispute resolution mechanism. Anyhow, it will consume both parties' huge costs and takes long time to solve the disputes. To investigate the current status of disputes in contract management faced by the Chinese contractors, it is helpful to find out the means to prevent disputes occurrence, which is more economical to solve the problems.

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides an overview of the research methodology. Broadly speaking, methodology is the way in which a researcher conducts research step by step (Jonker & Pennink, 2010). In this chapter, it begins with a brief introduction of research design and outlined the processes of this research. Then it discusses the research approaches and the research strategies, as well as the considerations when made the choice. Then it presents the research techniques for data collection and analysis in detail. Finally, the research validity is stated.

3.2 Research Design

Research design refers to the overall strategy utilized to carry out research, which is a framework that has been created to find answers to research questions (Creswell, 2014). The followings are three popular research designs:

- **Descriptive research design:** It is a theory-based design method which is created by gathering, analyzing, and presenting collected data, it focuses on describing the situation or case under the research study. (Jonker & Pennink, 2010).
- **Experimental research design:** It establishes a relationship between the cause and effect of a situation. It is a causal design where one observes the impact caused by the independent variable on the dependent variable. (Creswell, 2014).
- **Case Study Design:** It is an in depth description and analysis of a bounded system (Mohdnoor, 2008). It is an empirical inquire that “investigate a contemporary phenomenon in-depth and within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident” (Yin, 2014).

3.3 Research Approach

The research approach can be classified into inductive logic qualitative methods, deductive logic quantitative methods and abductive logic which combined quantitative and qualitative methods (Creswell, 2014).

Quantitative method is a clear deductive approach, which collects factual data to establish, validate, or confirm relationships, and thereby contributes to the development of existing theories (Jonker & Pennink, 2010). It is mainly through gathering quantified information, processing and analysis of the data to get meaningful conclusions (Bryman & Bell, 2006).

Qualitative method tends to employ an inductive approach, which seeks to gain insights from individuals and to understand social phenomena from the viewpoints of participants (Jonker & Pennink, 2010). It is the study of the quality of objects, which takes generally recognized axioms, a set of inductive logic and a lot of historical facts as the basis of analysis to describe and explain the things studied (Kielmann, Cataldo, & Seeley, 2012).

In this study, the ultimate aim is to investigate the disputes due to contract management in international EPC Projects faced by Chinese contractors (Refer Section 1.3). Accordingly, the research questions can be further developed into “what are the most common claims and disputes in contract management in international EPC projects executed by Chinese contractors?”, “why those disputes happen?”, and “how to avoid and settle those disputes through contract management?”. Those questions are open questions, which is unclear in advance what actually needs to be examined (Jonker & Pennink, 2010). Works on the basis of open questions are the characteristics of qualitative research (Jonker & Pennink, 2010). Therefore, qualitative approach shall be adopted in this research.

3.4 Research Strategy

Research strategy is a set of clear rule and procedures for how a research is conducted to solve an inquiry problem (Mohdnoor, 2008). Different research approaches are

associated with different strategies, an overview of those strategies is shown in Table 3.1.

Table 3.1: Research Strategies

Type	Sub-type	Details
Quantitative Research Strategies	Experiment Research	Includes true experiments and quasi-experiments which is single-subject designs.
	Survey	Including cross-sectional and Longitudinal studies using questionnaires or structured interviews for data collection.
Qualitative Research Strategies	Case Study Research	Explores in depth a program, and event, and activity, a process, or one or more individuals.
	Ethnography Research	Studies an intact cultural group in a natural setting over a prolonged period of time.
	Grounded Theory Research	Derive a general, abstract theory of a process, action, or interaction grounded in the views of participants.
	Narrative Research	Studies the lives of individuals and asks one or more individuals to provide stories about their lives.
	Phenomenological Research	identifies the "essence" of human experiences concerning a phenomenon

3.4.1 Research Strategy Adopted in This Research

For how to decide on the specific research strategies, Yin (2014) argues that attention shall be paid on the research problems and objectives. The objectives of this research can be divided into two steps. Firstly, to identify the common causes and current status of the Chinese International Contractors in handling the disputes in international EPC projects caused by contract management. Secondly, to explain why the disputes generated and how to manage those disputes properly. As stated in Section 3.3 research approach, this research adopts a qualitative approach. According to the research aim, problem and considering features of research strategies, case study strategy shall be used in this research.

Case study focuses on an in-depth investigation of a single case or multiple cases, which use many sources of evidence. Case study strategy can associate with both qualitative and quantitative methods (Perry, 1998), which helps to gain a holistic view of a certain events (Mohdnoor, 2008). Yin (2014) suggested case study is good choice if the research is about contemporary sets of events, and over which the researcher has little or no control. Case study will give in-depth and extensive description on this regard.

In case study, it shall identify the “focus” or the “heart” of the study within its boundary (Yin, 2014). In this research, focus is “disputes caused by contract management”, and the boundary is “international EPC Projects executed by Chinese contractors”, as illustrated in Figure 3.2.

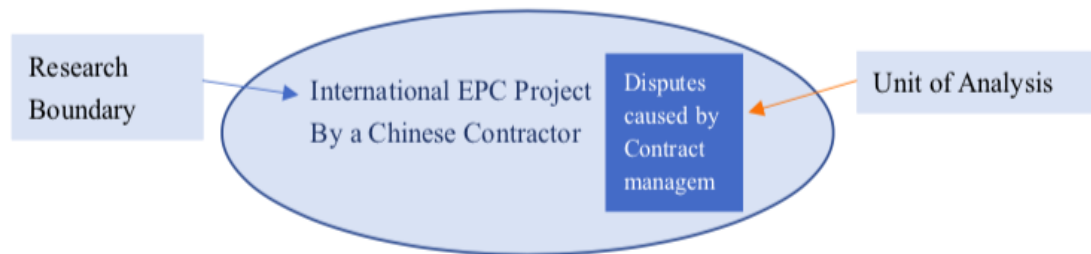


Figure 3.2: Main Components of Case Study

3.4.2 Selection of Cases

When conducting case study designs, there are the choice of single or multiple case designs, embedded or holistic designs (Yin, 2014). The factors such as availability of cost and time, accessible of data, ethical constrains, and natural occurrence must be considered. Based on the researcher’s limited resources, two cases are selected in this research for comparative purposes.

As discussed in Section 2.1, the major businesses for Chinese contractors in international market are in building construction, transportation and power engineering. And most of the project are in developing countries or underdeveloped countries. Accordingly, the researcher seeks the cases in the above area, one is in Sri Lanka and another is out of Sri Lanka.

3.5 Research Techniques

Choice of strategy determines the research techniques, by which data are collected and analyzed (Mante, 2014). Qualitative case study strategy seeks information from different sources and through the use of different techniques, such as observations, interviews and analysis of documents (Mohdnoor, 2008). The following introduce popular methods used for data collection and data analysis separately.

3.5.1 General Data Collection Methods in Qualitative study

Interview is the most widely used method for gathering data in qualitative research, which allows access to rich information. It is a process to obtain information from the interviewee's experiences regarding the phenomenon under study (Daniel & Harland, 2017). There are three types of interviews: structured, semi-structured, and unstructured (Kielmann, Cataldo, & Seeley, 2012). The types of interviews are compared in Table 3.2.

Table 3.2: Comparison of Different Kinds of Interview

	Unstructured	Semi-structured	Structured
Structure	Little or no. Start with an opening question and then progress upon the initial response.	Several key questions that help to define the areas to be explored. A series of open ended questions based on the topic areas.	Tightly structured. A list of predetermined questions, with little or no variation.
Ease of conducting	Difficult with little guidance, time consuming.	Moderate, flexible.	Quick and easy.
Appropriate situations	Where significant 'depth' is required. Nothing is known about the subject area. Different perspective of a known subject area is required.	Discovery new lines of inquiry. Elaboration of information.	Clarification of certain questions are required. Literacy or numeracy problems with the respondents.
Coverage	Few topics, in-detail	Flexible to go into details	Not able to go into details

Focus group is to obtain information from a group rather than individuals, which is similar to interviewing more than one interviewee (Kielmann, Cataldo, & Seeley, 2012). However, it is distinguished from interview as the researcher plays the role of facilitator rather than an interviewer. The participants in the group share some common characteristics important to the research, they could be a formed group, or existing group (Creswell, 2014). For focus group, it is recommended to include 6-8 participants,

which is small enough for all members to discuss, and yet large enough to create diverse opinions (Creswell, 2014).

Focus group are often used at the outset of research to explore an unknown area and to generate discussion around a concerned topic. It can obtain large amount of information in a comparatively short time, and in the process can observe the interactions among the participants (Kielmann, Cataldo, & Seeley, 2012). However, if the topic is only the researcher's concern, not the participant's concern, it cannot collect the desired data which helps to the research. And due to the group pressure, not everyone can freely and apparently express his/her idea.

Observation is used to understanding people's actions, roles and behaviors within a period of time and particularly in unfamiliar settings (Kielmann, Cataldo, & Seeley, 2012). Observation and interview are closely linked, as the researcher can also use interview to make sense of what is observed (Kielmann, Cataldo, & Seeley, 2012). Through observation, not only the people, but also the environment can be observed and record, which can provide a more reliable information, and can be helpful to the rest of research (Kielmann, Cataldo, & Seeley, 2012). But observation normally consumes long time and resources, and the records maybe misunderstood by the researcher, also people may change his behavior when he knows is being observed (Kielmann, Cataldo, & Seeley, 2012).

Document Review is an important source of data in qualitative research (Creswell, 2014). The documents may be legal nature such as case law, regulations; or others maybe archival records like past project reports; and it could be the internal documents within the organizations, such as memoranda and internal procedures (Creswell, 2014).

3.5.2 Data collection techniques adopted in this Research

Considering the research objectives, the research applied semi structured interviews and document review as data collection tools. There are large numbers of studies have been done to explore the causes of claims and disputes in construction projects. The researcher collected the basic information from literature review. Besides, the information extracted from existing studies, interviews and documents will form the

data triangulation, as shown in Figure 3.3.

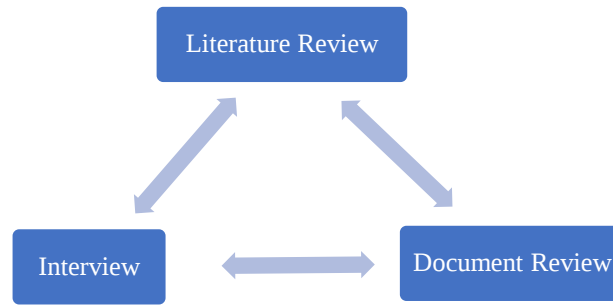


Figure 3.3: Triangulation Analysis of Data Collection

Even though interviews are time-consuming to conduct and they are prone to problems and biases (Creswell, 2014), it is a good choice under case study strategy, since the depth is more important than the breadth (Yin, 2014). In this study, Semi-structured interviews were used because they offered the opportunities for further exploration of interesting concepts and verification of ideas from previous interviews. Considering the time and budget constrain, three participants in key positions are invited from each selected case:

- Commercial Manager
- Quantity Surveyor
- Deputy Project Manager

The document review is convenient to be accessed at any time and it save the time for the researcher to transcription, though the confidentiality may hinder the accessibility of relevant documents (Creswell, 2014). In this study, the internal documents, such as organization chart, claim/disputes registration lists, dispute report regulations of contract management, are collected from selected cases, so as to find out the problems and suggestions accordingly.

3.5.3 Data Analysis Methods

The data collected from interviews, and documentation reviews were analyzed to identify the common claims and disputes, the management capacity in handling claims and disputes, and the counter measures to solve the problems. Two different cases are

compared to check the findings in different contractors and in different countries will vary or not.

3.5.4 Content Analysis

Qualitative data analysis essentially is to take the data apart, understand the content and the relationships to each other (Bryman & Burgess, 1994). There are different kinds of qualitative data analysis (Luo, 2019):

- Conceptual analysis: in which it establishes the existence and frequency of concepts;
- Relational analysis: which goes more deeper to examine the relationships among the concepts;
- Referential content analysis: which is used to analyze complexity of language in the production of meaning.

Content analysis is a technique for making inferences by objectively and systematically identifying specified characteristics of messages (Luo A. , 2019). No matter the different kinds of qualitative analysis method adopted, to identify the theme and coding is the most important works in qualitative data analysis. summarized the processes to conduct the content analysis, which is shown in Figure 3.4.

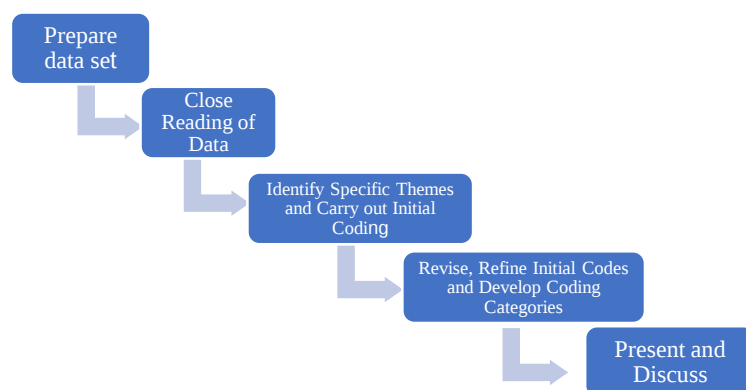


Figure 3.4: Qualitative Data Analysis Process

3.5.5 Cross-Case Analysis

Khan and VanWynsberghe (2008) deem cross-case analysis is a method to compare the commonalities and differences in the events, activities, and processes that are the units of analyses in case studies. Especially the “Most different design” in case-oriented approaches, which number of cases is generally low but no less than two, is used to extend the lessons learned in single cases to inform another case and to uncover similar processes in unexpected contexts (Khan & VanWynsberghe, 2008). Therefore, cross case analysis technique was used in this research, aiming to find out helpful conclusion to be broadly applicable to the international EPC projects executed by Chinese contractors.

3.6 Research Reliability and Validity

Golafshani (2003) deems that “Although reliability and validity are treated separately in quantitative studies, these terms are not viewed separately in qualitative research.” Reliability and validity are conceptualized as trustworthiness, rigor and quality in qualitative paradigm (Golafshani, 2003). In this research tested the validity from the following three aspects (Jonker & Pennink, 2010). The measures which used to as shown in Table 3.3.

Table 3.3: Validity of this Research

Risks to Validity	Description	Measures in this Research
Construct Validity (Jonker & Pennink, 2010)	Whether the adopted theoretical notions and concepts can provide an accurate representation?	The participants in interviews are professionals, who are not only familiar with the notions but also meaningful.
Internal Validity (Brink, 1993)	Whether research findings are a true reflection or representation of reality?	The research is conducted in a logic manner. The methods of data collection and analysis is suitable for this research. Triangulation adopted to cross check the conclusions and avoid bias.
External Validity (Brink, 1993)	Whether the conclusions can be generalized to a broader context?	To find out the most common causes in EPC projects, and two cases are studied to investigate the unit of analysis in different background.

3.7 Research Process

The logical arrangement of the research process, which contains under five major phases are illustrated in Figure 3.1.

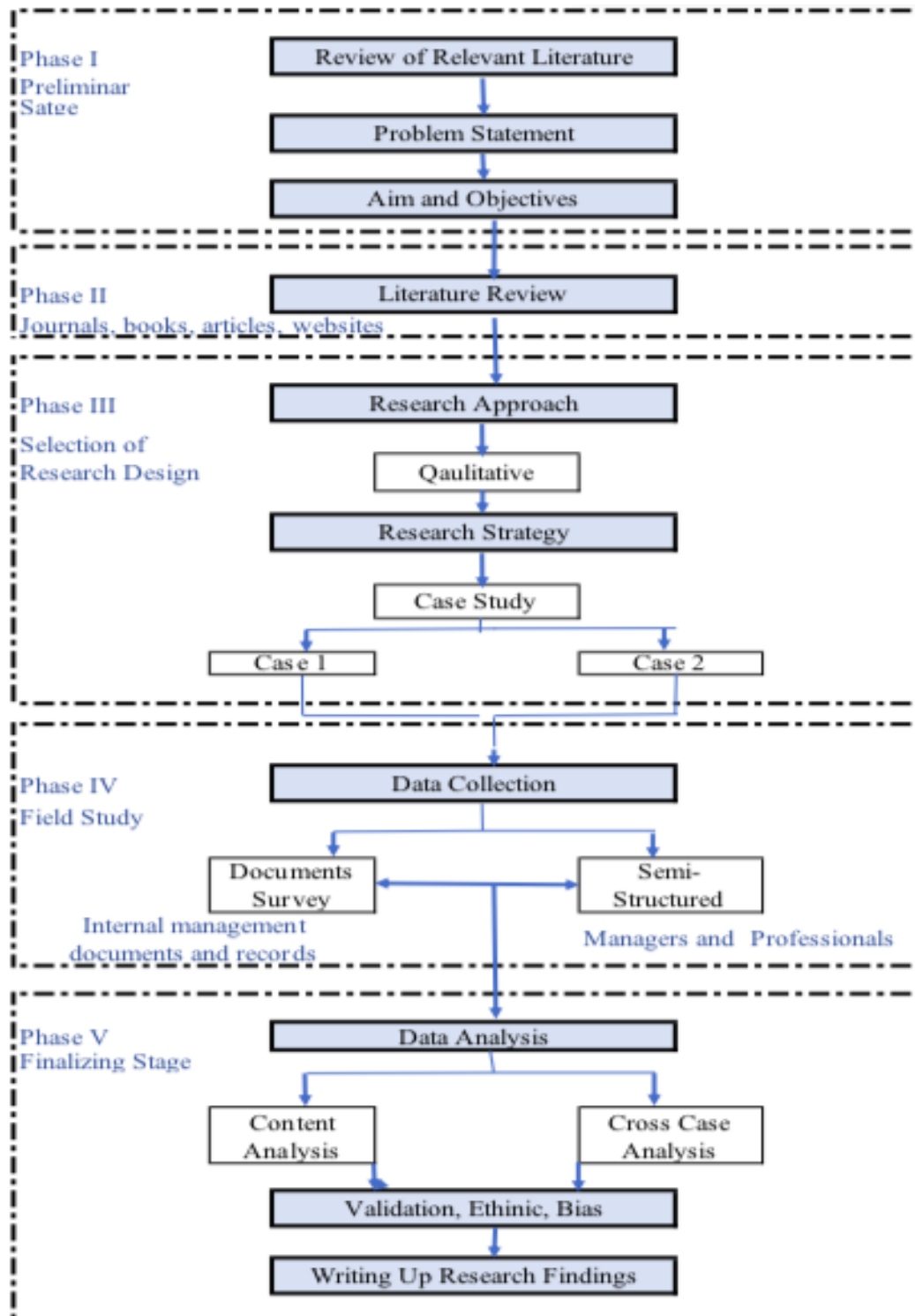


Figure 3.1: Research Processes

3.8 Chapter Summary

This chapter illustrated the research methodology which was carried out in the research. In order to attain the aim and objectives defined, qualitative research approach is proved the most suitable for this research study. Case study research strategy was implemented for this study with several justifications. Hence, the unit of analysis of this study was identified as ‘disputes caused by contract management’. Two cases were selected for the study, based on access, availability and time limitations. Semi-structured interviews were used as the primary data collection technique. Further, document review was carried out to obtain additional information. The cross-case and content analysis were used to analyze the data. To ensure the quality and reliability of this study, several measures of research validity were described in the last section of this chapter.

DATA ANALYSIS AND RESEARCH FINDINGS

4.1 Introduction

This chapter introduces the data collection processes and dedicates to analyze findings of the research study in a detailed manner as per the research methodology framework given in Chapter 3. The analysis is developed through both content analysis and cross case analysis in order to explore the problems in-depth and signify the differences between the two selected cases.

4.1.1 Case Selection

When conducting case study designs, there are the choice of single or multiple case designs, embedded or holistic designs (Yin, 2014). The factors such as availability of costs and time, accessible of data, ethical constrains, and natural occurrence must be considered. Based on the researcher's limited resources, two typical cases are selected in this research for comparative purposes.

As discussed in Section 2.1, the major businesses for Chinese contractors in international market are in building construction, transportation and power engineering. And most of the project are in developing countries or underdeveloped countries. Accordingly, the researcher selected two cases for the study due to the accessibility and time limitation on data collection. The two EPC Projects are selected for its typical and exemplify features of the EPC project executed by Chinese Contractors:

- (1) Both the contractors are ranked in the TOP 10 of the ENR TOP 250 International Contractors 2020, which represents the highest level of the Chinese contractors in international projects.
- (2) Both the projects are in developing countries, where most of the projects are distributed.

- (3) Project A is a complex industry building includes civil construction and equipment erection, which suffered serious costs overrun and time delay. The researcher pays attention to the find out the problems in contract management.
- (4) Project B is a traditional cross-sea bridge project, which successfully completed within the budget and time. The researcher focused to investigate the valuable experience in contract management to control and avoid disputes.

4.2 Data Collection

Data for the study were collected through document review and semi-structured interviews. Case study document review guide is attached in Appendix I, while List of documents referred during the data collection are presented in Table 4.1.

Table 4.1: Lists of Document Review

No	Document	Language
1	Contract Document	English
2	Organization Chart	English
3	Project Management Plan	Chinese
4	Contract Management Plan	Chinese
5	Risk management Plan	Chinese & English
6	Monthly Report	Chinese & English
7	Claim and Dispute Register List	Chinese & English
8	Typical Claim Report and Relevant Correspondence	English

Further, in order to evaluate the priority of disputes factors due to contract management, all together, six (06) semi-structured interviews were conducted representing senior managers and commercial experts. Interview guideline is attached in Appendix II. Profile of interview respondents are given in Table 4.2.

Table 4.2: Profile of Interviewees

ID	Job Position	Age	Experience in EPC Project	Years of Similar position	Years in international Project	Gender	Nationality
A 1	Deputy Project Manager	42	2	5	14	M	Chinese
A 2	Commercial Manager	33	1	5	10	M	Chinese
A 3	Claim Engineer	34	1	3	11	M	Sri Lankan
B 1	Project Director	54	3	20	26	M	Malaysian
B 2	Deputy Project Manager	34	1	5	10	M	Chinese
B 3	Commercial officer	27	1	1	5	M	Chinese

4.3 Analysis of Case One

4.3.1 Introduction to the Project A

The project was awarded in December 2017. The general contract information of Project A is illustrated in Table 4.3.

Table 4.3: Contract Information of Project A

No.	Items	Original	Current (Up to May 2021)
1	Type	Solid Waste Sanitary Landfill Disposal Facility	
2	Location (Country)	Sri Lanka	
3	Contract Type	Fixed Lump Sum, EPC	
4	Contract Form	FIDIC Silver Book 1999	
4.1	Performance Bond	10%	
4.2	Advance Payment	10%	

No.	Items	Original	Current (Up to May 2021)
4.3	Retention Money	10% of Each Payment, Max. 5%	
4.4	Liquidated Damages	0.1% Per Day, Max.10%	
5	Fund	Government Self-funding	
6	Currency	Sri Lanka Rupees + US Dollar	
7	Tendering & Negotiation Period	6 months	
8	Completion Period	18 Months Construction + 3 Months Operation + 24 Months Maintenance	48 Months Construction (Estimate)+ 3 Months Operation + 24 Months Maintenance
8.1	Commencement Date Completion Status	February 2018	91% completed
8.2	Extension of Time	Claimed > 1 year	Approval - Pending
9	Contract Amount	Around 100 Million US Dollar	
9.1	Additional Costs	Claimed >USD 20 Million	Approval - Pending
12	Work Description	Contractor is fully responsible to design, supply and installation/construction of Municipal Solid Waste Sanitary Landfill Disposal Facility, Main project scope is (a) 1200 ton/day Solid Waste transfer stations at two points; (b) Sanitary Landfill Volume 2,700,000 m ³ (or more) with daily capacity 1200 Ton/day; (c) Railway Connectivity lines at two points; (d) Office buildings; (e) Temporary works	
13	Employer	Sri Lanka Government	
14	Consultant	Sri Lanka State-owned Consultant	
15	Contractor	Chinese Contractor ranked in ENR Top 10 International Contractors	

4.3.2 Contractual Relationship of Project A

Under the EPC system, the employer entrusted the engineering design, procurement, construction and other works to the main contractor by signing the EPC contract documents. In order to implement the EPC project, the main contractor allocated the works to professional engineering branch companies (after called sub-contractors) through internal subcontracts. The top-down hierarchical contractual relationship is shown in Figure 4.1

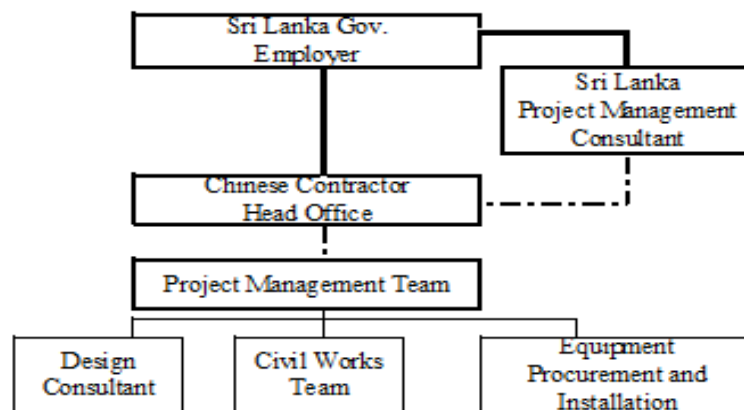


Figure 4.1: Contractual Relationship of Project A

4.3.3 Organization Chart of the Contractor

(1) Management Team in Project A

There are two hierarchy in managements. One level is the Main Contractor to the Employer. The second level is the Main Contractor to the sub-contractors. The organization chart of the contractor is shown in Figure 4.2.

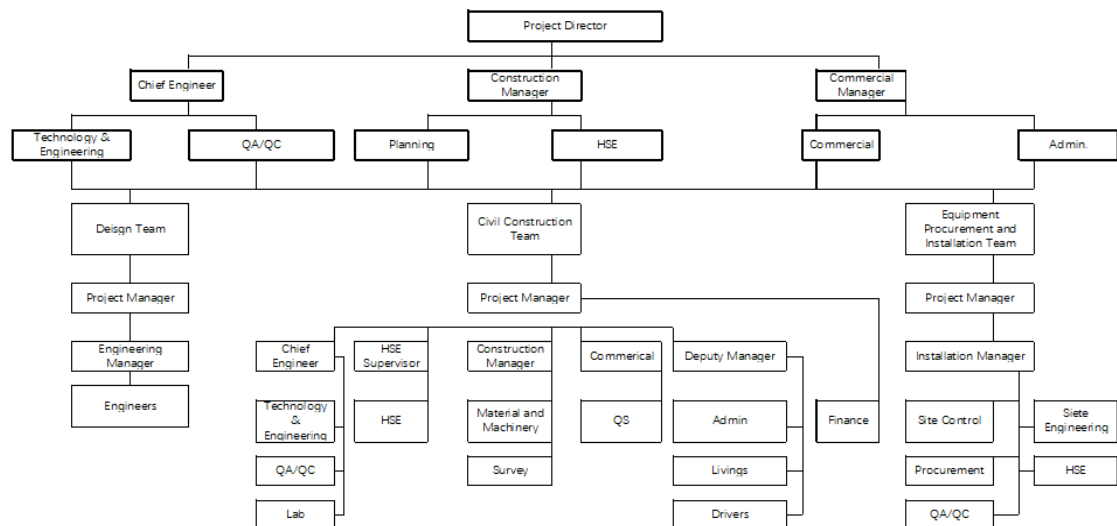


Figure 4.2: Organization Chart of the Contractor

In the preparation stage, the main contractor carried out the mobilization of management manpower and provide offices and accommodations. It handled with application for approvals and establishment of the project team. It formulated various management regulations and work procedure, reasonably breakdown the works and allocate risks of the main contract with those sub-contractors.

In the construction stage, the main contractor reviewed on the subcontractor's documents and submitted to the Employer; supervised and guided each department to work in compliance with the requirements in the Main Contract, and monitored the construction progress, the execution of QA/QC and HSE management. Those professional sub-contractors will be responsible to carry out the specific works, such as engineering calculation, planning and design, drawing; construction arrangements, resources mobilization and site construction, etc.

Another major work of the main contractor is to deal with the variations, claims and disputes. However, the subcontractors shall provide basic information on site and collect supporting documents to ascertain those variations, claims and disputes.

(2) Contract Management in Project A

The deputy manager (A1) and commercial manager (A2) introduced the contract

management works, which are generally divided into three levels. One is head office of the Contractor (normally in China); second is the project management team of the Main Contractor, it is the commercial department; the third level is the subcontractors. The works allocation from top to bottom is shown in Table 4.4.

Table 4.4: Works Allocation of Contract Management Works in Project A

Level	No.	Work Description
1. Head Office	1.1	Bidding and negotiation of main contract
	1.2	Hand over and clarify all contract information to project team
	1.3	Facilitated contract management regulations
2 Project Management Team	2.1	Based on head office requirements and the characteristics of the project itself, made the contract management implementation plan, and then organized and supervised the execution of the rules and regulations.
	2.2	Reviewed and evaluated contract terms and conditions, analyzed contract risks, and proposed preventive measures;
	2.3	Reasonably breakdown the contract works into parts; Conducted subcontract bidding, organized negotiations and signing of subcontracts;
	2.4	Responsible for project cost control, including calculating project budget and making timely adjustments according to the actual situations;
	2.6	Responsible for project cash flow management and supervised the subcontractor's cash flow.
	2.5	Responsible for payment application based on site progress. and confirm the final settlement amount.
2 Project Management Team	2.7	Organized, coordinated, tracked, and settle the variations, claims and disputes in the main contract and subcontracts.
	2.8	Responsible for project legal affairs disputes;
	2.9	Procurement of project insurances, various bonds and guarantees
3. Sub- contractors	Responsible for the sorting and filing of commercial documents;	

4.3.4 Claims and Disputes of Project A

(1) Risks of Project A

According to Kumarswamy (1997) and Acharya et al. (2006), if risks are not clearly assigned, conflicts will generate, and finally it can turn into claims and disputes if conflicts are not well managed.

It is noted that the project management predicted 9 major risks at the initial stage of the project (as shown in Table 4.5), which all became reality in the execution period and resulted in claims and disputes.

Table 4.5: Risks of Project A

NO	Risk Type	Description	Possibility	Severity
1	Construction period	The works cannot be completed on time	high	extremely severe
2	Untimely approval	The construction drawings and construction plans cannot be approved by the Employer and relevant authorities on time	high	extremely severe
3	Cost	The cost of this project may overrun due to insufficient consideration in bidding	medium	severe
4	Adverse weather	Adverse weather and Rainfall have great impact on the bentonite and ultimately impact to the construction progress	medium	severe
5	Delay payment by the employer	Employer cannot pay on time, resulting tight cash flow	medium	severe
6	Environmental aspects	Pollute the surrounding water during the construction process	medium	medium
7	Safety	There are many wild animals at sites, which threaten the safety of the persons on site	medium	medium

NO	Risk Type	Description	Possibility	Severity
8	Quality	Unfamiliarity with the construction standards, requirements and processes. The unsatisfied quality leads to rework or idling.	low	severe
9	Complaints from surrounding residents	This project may have an impact on surrounding residents and houses and face the risk of complaints from them	low	medium

(2) Claims and Disputes in Projects A

According to the claim manager (A3), at the time of interview, there are 58 cases of claims identified during the construction stage. A3 further mentioned out of 58 cases, 6 cases were submitted to Dispute Arbitration Board (DAB) to get DAB's determination for the disputes, and some events had to be forwarded to the international arbitration if either party dissatisfied with the DAB's determination. According to the respondents of Project A, based on the form of contract, the claims can be roughly classified as shown in Figure 4.3:

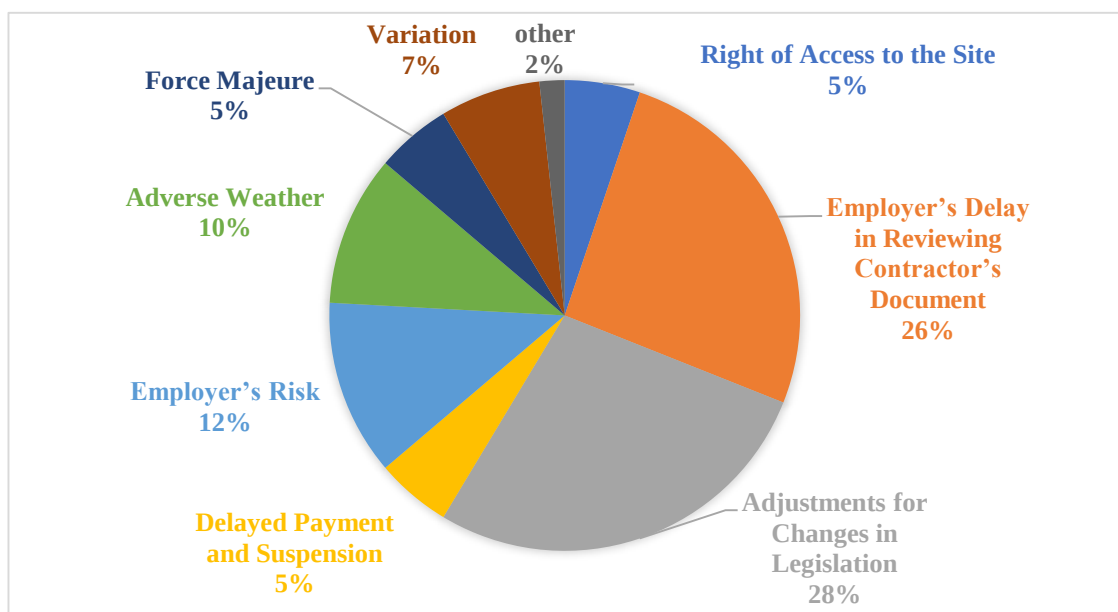


Figure 4.3: Claims categories of Project A

(1) Right of Access to the Site – Clause 2.1 of FIDIC Silver Book, 1999

The study revealed that, since Project A was commenced in a hurry, the Employer did not give full possession of the site to the contractor, and the Employer granted certain extension of time to the completion. Further, there are some mistakes/unclear provisions in contract document with regards to the land for storm water drainage system. Since the disputes on the land possession, the drainage system was not constructed when adverse weather came. Heavy water accumulated on site which caused serious damages to the contractor's properties and delayed the work. The disputes became more complicated and was forwarded to DAB.

(2) Employer's Delay in Reviewing Contractor's Document

A3 stated that, there are 14 claims issued under *Clause 5.2 Contractor's Document* (FIDIC Silver Book, 1999). In an EPC project, it is the Contractor who undertakes the responsibilities of design. All respondents mentioned that normally, the design processes should not be interfered by the Employer's approval in EPC Projects. But in Project A, Employer's holds the right to review and approve contractor's design. This action deviated the principle of EPC project that contractor shall fully take in charge of the design. A3 highlighted that finally, delay in reviewing and approval to contractor's document was one of the main causes resulted in claims and disputes.

(3) Adjustments for Changes in Legislation

Views of A2 and A3, there are 13 claims issued under *Clause 13.7 Adjustments for Changes in Legislation* (FIDIC Silver Book, 1999) which includes the changes in taxes and duties, the additional holidays, and the most influentially, the Acts and Gazettes related to control the epidemic of COVID -19.

(4) Delayed Payment and Suspension

Under *Clause 14.8 Delayed Payment* and *Clause 16.1 Contractor's Entitlement to Suspend Works* (FIDIC Silver Book, 1999), 3 claims were issued since large number of outstanding payments were due to the Contractor by the Employer.

(5) Employer's Risk

There are 7 claims issued under *Clause 17.3 (c) Employer's Risk* (FIDIC Silver Book, 1999). The Respondents stated that as analyzed in risks prediction, there were frequent protests by the surrounding villagers to stop the construction.

(6) Adverse Weather

There were 6 claim cases issued under *Clause 19.1 Force Majeure* (FIDIC Silver Book, 1999). It was revealed that those adverse weather incurred direct delay to the construction or indirect impact to the works.

(7) Force Majeure

Respondents highlighted that the outbreak and epidemic of COVID-19 was claimed under *Clause 19.4 Consequences of Force Majeure* (FIDIC Silver Book, 1999).

(8) Other

In project A, there was an unexpected explosion to part of the work which was used by the employer without issuing take-over certificate. Even though the direct losses were partially compensated by insurance company, the neglect made both parties have disputes on who shall be responsible to the delay and full compensation. Finally, it had already been referred to DAB's decision.

(9) Variations

It was revealed that, there were 25 variations applied by the Contractor. Seven variations were directly instructed by the Employer, both parties could easily settle them step by step. But the other variation applications generated disputes between the Contractor and the Employer. Both parties held different understandings to contractual requirements and work scopes due to the ambiguity of contract. Four cases had been submitted for DAB's determinations.

In the research period, Project A was still under construction. However, the project had already suffered serious delay and cost overrun. Along with the project processes, numerous claims and disputes contemporarily existed and had mutual effects to each

other, such as the suspension due to delay payment and suspension due to COVID-19 curfew, the delay in completion and material price sharply increased, which made those events too difficult to evaluate and resolve. All the interviewees expressed the opinion that both the contract itself and contract management are the factors would result in claims and disputes.

4.3.5 Problems in Contract Management of Project A

Even though there are complete system for the contract management in Project A, the execution is not as efficient as expected. According to the interviewees, the Contractor has the following problems in contract management which contributed to the disputes in Project A.

In bidding and negotiation Stage:

- The tender period was only two months. The bidder cannot prepare the design proposal, technical proposal, and commercial proposal in high quality within such a limited time. Since the absence of detailed geological investigation, additional quantities and extra works generated in contractor's detailed design in comparing with the bid's proposal, which made the costs overrun at the beginning. Since the accepted amount was low, the contractor had little profit margin to afford risks and cost overruns.
- Contractor did not take the chance in contract negotiation and post clarification. Some problems had been discovered, but they were not properly resolved in early stage. For example, the construction period and the milestone were too tight to complete. Further, the Employer insisted to review and approve Contractor's design before carried on site construction. All those risks became to disputes in the later construction process.
- The bidding team and project team of the Contractor were different. The project team cannot obtain comprehensive information which was not written into the contract document.

During the execution stage:

- A1 introduced that the subcontractors were particularly important to the costs, quantity, and quality of the whole project. Some sub-contractors did not designate full-time staff to handle with the contract management. They had weak awareness to claims/disputes, also they cannot collect useful evidence to support the claims and disputes.
- It lacked effective communication between subcontractors and departments when disputes appeared. The interests of each department are different, but the project management team cannot harmoniously handle the conflicts. For example, civil construction subcontractors bear heavy pressure on control of costs and progress, therefore requested to optimize design; however, design team preferred a costly proposal which was easy to get approval.
- There was a long management link in contractor's organization. The decisions of the management were hardly forwarded to the bottom level, the one who executed the site constructions.
- The risk management was incomprehensive. Those risks were identified, but the risk prevention measures are not useful, finally those risks happened and brought big losses.
- When disputes incurred, the parties did not solve it in time, more and more conflicts accumulated to severe divergences. There is no efficient mechanism to settle disputes.

4.3.6 Methods to Avoid Disputes in Contract Management of Project A

According to problems identified by the interviewees, they suggested the following methods to prevent disputes in contract management.

- **Bidding team.** Some key persons should involve in both bidding and project implementation.

- **Avoid Unreasonable Promise.** If the bidding period is tight and the bidder shall request for postpone the deadline for submission. It's important to have the full knowledge of bidding document, to know the risks and difficulties. Try to avoid to sign the contract with inherent shortages in a hurry.
- **Records for contract negotiation.** The contractor shall analyze the bidding documents and make proper records of potential risks, unclear provisions, harsh terms of conditions, and the situations that may be claimed in the construction stage, which are worth future reminder. Those records build the foundation to raise question for employer's clarifications, also guided the direction on contract negotiation.
- **Contract information dissemination.** The works were carried out by labors, and the conditions of contract was studied by commercial department. There should be a clear link to transfer the contractual requirements to the people who carry out the works on site.
- **Risk management.** Risk management controls the source of disputes (Acharya et al., 2006). In order to prevented disputes in advance, the contractor can identify risks and feasible solutions by means of group discuss and brainstorming, and the risk lists shall be regularly updated.
- **Timely settlement.** Since the longer the disputes are unsettled, the more disputes would generate. The management shall set up the deadline for each event, if the event is not going as expected, the management shall change a new way to go.
- **Detailed records.** Records are the important evidence to support the claims and disputes. There shall be a specific body to take the responsibility to record the site conditions, such as daily weather, ongoing works, completed works, abnormal situation and resources on site.

4.4 Case Two

4.4.1 Introduction of Project B

The Employer of project B and issued the bid documents in December 2013 and the bidding deadline is in June 2014. Through months of post-tender clarification and tender evaluation, the Chinese company finally won the bid in March 2015. Project B

has already completed on time and within the budget. The general contract information of Project B is illustrated in Table 4.6.

Table 4.6: Contract Information of Project B

No.	Items	Original	Final
1	Type	Bridge, Road and Utilities	
2	Location (Country)	Brunei Darussalam	
3	Contract Type	Lump Sum, Design and Build	
4	Contract Form	FIDIC Silver Book 1999	
4.1	Performance Bond	10%	
4.2	Advance Payment	10%	
4.3	Retention Money	10% of Each Payment, Max. 5%	
4.4	Liquidated Damages	0.1% Per Day, Max. 10%	
5	Fund	Government funding	
6	Currency	Brunei Dollar	
7	Tendering & Negotiation Period	14 Months	
8	Duration	36 Months Construction + 24 Months O&M	38 Months Construction + 30 Months O&M
8.1	Commencement/ Completion	2015.04	2018.05
8.2	Extension of Time	Claimed < 2 months	Approved < 2 months
9	Contract Amount	Around USD 210 Million	Around USD 210 Million
9.1	Additional Costs	Claimed < USD 1 Million	Approved < USD 1 Million
12	Work Description	Contractor is fully responsible to design, construct, complete, operate and maintain the works, which include: (a) oversea bridge with 2680 meters; (b) road infrastructure with 3235m ; (c) a water supply system including untreated/treated water; and (d) other utilities including electricity works, lighting system, telecommunication, and power substations. (e) The Works include the temporary transfer and relocation of any services affected by the Works.	
13	Employer	Brunei Government	Brunei state-owned enterprise

No.	Items	Original	Final
14	Consultant	Korea-Brunei JV Consultant	
15	Contractor	Chinese Contractor ranked in ENR Top 10 International Contractors	

4.4.2 Contractual Relationship of Project B

The Employer has contractual relationship with the Contractor and Consultant. Since the Employer is not familiar with construction works, Brunei government assigned two professional committees to supervise the project.

According to the contractual requirement, 49.5% of the contract amount shall be local component. Therefore, the main contractor, who has rich experiences in bridge construction, executed the structure works. And local subcontractors carried out road construction and utilities which highly demands coordinate with local authorities and residencies. The top-down contractual relationship is shown in Figure 4.4.

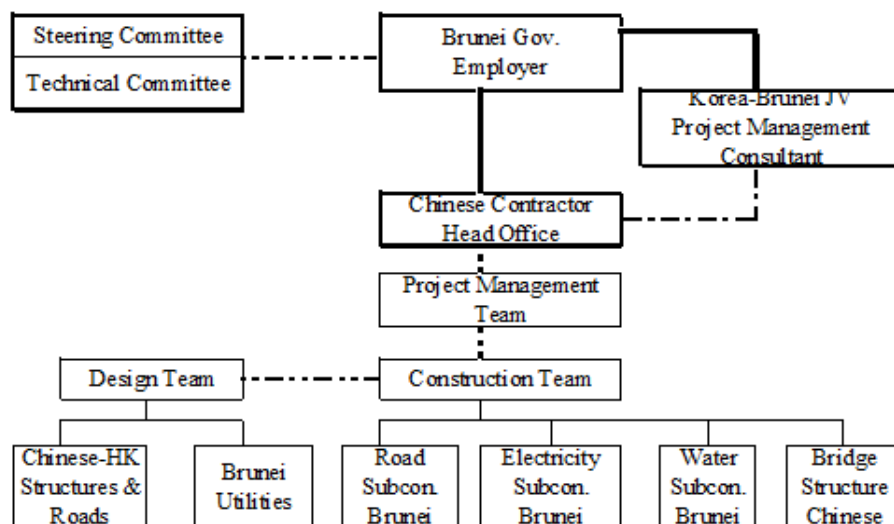


Figure 4.4: Contractual Relationship of Project B

4.4.3 Organization of the Contractor B

(1) Management Team of Project B

The Contractor directly executed the site construction works and perform the obligations under the main contract through each managerial department. The

organization chart of the contractor is shown in Figure 4.5.

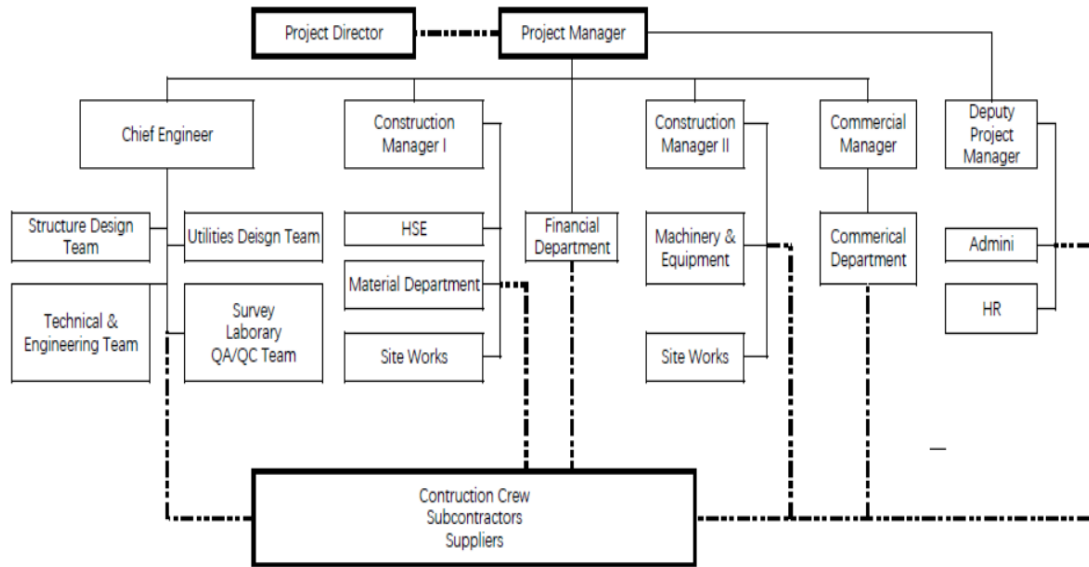


Figure 4.5: Organization Chart of the Contractor

In Project B, the management team of the main contractor directly executed the works until completion. The work allocation of the key persons is as below:

- Project Director: who is responsible for negotiation and coordination with external parties, such as Employer, consultants, and relevant government authorities of the project committee.
- Project Manager: who is responsible for project implementation and internal management, communication with the head office, external communication with client and consultant, and in charge of financial department.
- Chief Engineer: who is responsible for the technical methods and plans, overall management of QA/QC department, planning department, survey department, laboratory, and coordination with design and construction team.
- Deputy Project Manager: who is responsible for office administration, human resources, and HSE management.
- Construction Manager: there are three construction managers. One is fully responsible for the construction and production of the site. One takes in charge of material department, equipment department, and another is responsible for commercial department.

(2) Contract Management of Project B

In Project B, commercial department centralize contract management, while all the departments and staffs participated in the whole process. The major works of commercial department are in five areas: 1) management of main contracts and subcontracts, 2) management of variations, claims and disputes, 3) risk management, 4) cost control, and 5) measurement and payment. while the other departments also provide necessary cooperation to complete the contract management.

The contract management structure is shown in Figure 4.5.

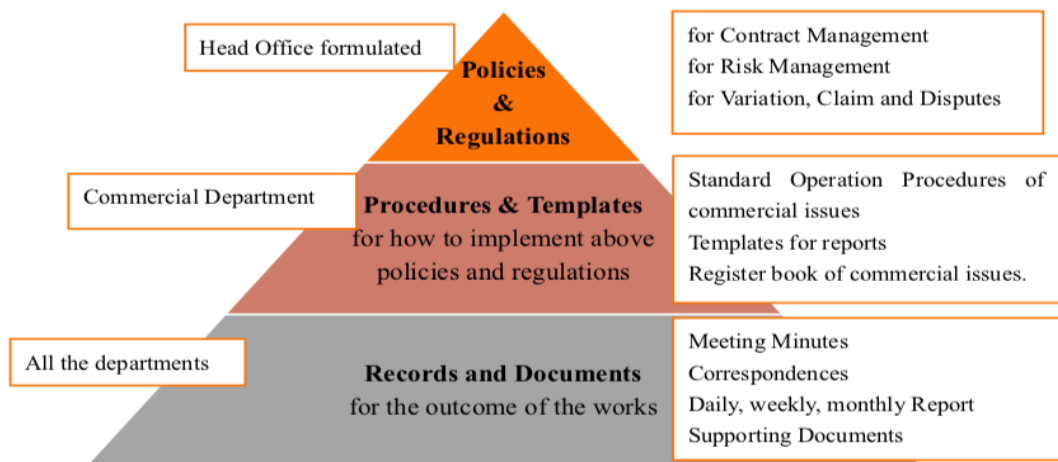


Figure 4.6: Contract Management Structure

(3) Management Strategies of Project B

In the initial stage of the project, the management team analyzed the aspects of costs, time and contractual conditions. Based on the interview findings, they set following key points as priority to ensure the success of the project.

- Based on cost estimation, the contract amount is sufficient to cover the costs if the works can be smoothly completed. Therefore, the most crucial target of the project is to be completed on time and within the budget. Monitoring the construction progress and control of costs shall take the most priority.
- Since it is a fixed-price contract, it is important to make clear the work scope and technical standards, so as to avoid additional works and extra

requirement. Before carrying out each site works, the commercial department shall clarify relevant contractual requirements to the responsible team/person.

- Most of the risks are allocated to the contractor, there is few chances to conduct claims. Thus, contractor would not rely on variations and claims to cover risks and make profits.
- Keep frank and smooth communication with the Employer, the Consultant and relevant government departments. Maintain the cooperation attitude and win-win principle.

4.4.4 Claims and Disputes of Project B

Interviewee B3 introduced that, before executing the site works, commercial department had carefully studied the conditions of contract and found there are only few situations the contractor's claim will be entertained. Therefore, the management team formulated the countermeasures of those situation, which helps to avoid claims and disputes in advance.

- **Variation:** when the Employer request to change the proposals, the Contractor reminded the potential effects in costs and time. Only when the Employer reconfirm the instruction, the works will be carried out.
- **Delay in land handover:** in construction schedule which accepted by the Employer, the deadlines for the land were marked, and the Contractor reminded to hand over the land before the deadline.
- **Additional test acceptance:** the list of all materials and engineering tests were submitted and agreed with the Consultant before the site work was carried out.
- **Occupation by the Employer:** the Contractor provided convenience and satisfied the demand of the Employer. For the occupation of completed parts which is not affect construction, the Contractor prepared the application for completion certificate. When the occupation hindered the contractor's construction, a notice of claim would be issued in time, and on-site contemporary records were kept until no further influence.

- Extreme weather: Contractor collected the local rainfall records in the past ten years and arranged the construction activities according to the climate characteristics. Daily weather was records on-site.
- When the project had been delayed, the contractor can optimize the construction method and mobilized more resources to catch up the schedule.

Finally, there were only 10 cases of claims issued by the Contractor to the Employer, and none of them turned into disputes. The summary of the claims is listed in Table 4.8.

Table 4.8: Claims of Project B

Qty.	Category	Description	Impact	Result
3 cases	Adverse Climate	Claim for adverse climate, such as heavy rain, lightening,	No impact	Only Notice of Claim, no report submitted
01 case	Unforeseeable underground situation	Claim for the gas emission during the borehole drilling	No impact	Only Notice of Claim, no report submitted
01 case	Third Party Interference	Claim for the collision accident caused by third party	Additional costs and delay	Costs covered from insurance. Delay caught up by Contractor
04 cases	Advance Occupation	Claim for the interference and damages caused by the Employer's personnel	Additional costs and delay	Approved by the Employer
01 Case	Variation	Claim for additional works requested by the Employer	Additional costs	Approved by the Employer

In Project B, even though there was no dispute referred to DAB, there were some conflicts due to the incomplete contract. Fortunately, most of them were amicably resolved through negotiation, and none of them were turned into disputes. There following two cases are typical cases due to contract which is common in EPC Projects.

(1) Ambiguity of Contract - Independent Design Checking

In the contractual document- *Employer's Requirement*, there was a requirement for contractor's independent design checking that "contractor's structure design should be checked by an organization different from that which has prepared the design". The Contractor held the point that the local Qualified Person, who was set according to local laws and proposed as part of the design team, could be the independent checker, as its responsibility was to endorse the design document for submission, and to support the Contractor to ensure full compliance with all relevant Laws, standards, and specifications. However, the Employer insisted that independent checker should be totally different from the one involved in design team.

Since the two parties have different understanding to the contract provisions, the contractor's design proposal was not approved for months, which caused the schedule was far behind. For the purpose to break the deadlock of design work and push the construction of permanent work forward as soon as possible, the Contractor finally agreed to invite a European consultant to do design checking and borne relevant costs around half million USD.

(2) Variations - Omission of Concrete Service Trench

There were utilities corridors shown in the typical cross section of tender drawing issued by the Employer. However, the Contractor cancel this concrete trench in detailed design. Therefore, the Employer requested to deduct relevant costs from the contract amount.

The Contractor firmly opposed to the deduction because in post tender clarification, the Contractor already informed there is no concrete trench in contractor's design, therefore no costs were considered in contractor's bid. Interviewee B1 explained that there is one important principle in EPC Project, which is the Contractor's obligation

is to meet the contractual requirement and make to the work “fit for purpose”, other than adopt as the Employer’s preference. Finally, the Employer accepted the Contractor’s design and gave up deducting any costs.

The contractor of Project B adhered the principle that to complete the works on time and within the costs as the highest priorities. Therefore, when conflicts happened, the contractor preferred to cooperate with the Employer, instead of competing. The proper contract management in each stage contributed to the successful control of claims and disputes.

4.4.5 Problems in Contract Management of Project B

The Interviewees did not mention significant problems in contract management. The contractor can improve the contract management capabilities from personal capability, organizational capability and time (Park & Kim, 2017; Chen S., 2014), and they appraised their performance in project B.

For personal capability, all the key persons in management staffs were from China and Malaysia who had rich experiences in similar international EPC projects. Meanwhile, head office assigned capable staff to the project to lead each department.

For organization capacity, the head office in China has established a sound organization system (discussed in section 4.4.3). There are regulations which had been implemented for years, including contract management, risk management system, variation/ claim/disputes regulations for overseas projects.

For the time, the contractor involved in the construction works in early stage and always prepares the works in advance.

4.4.6 Methods to Avoid Disputes in Contract Management

The interviewees believed that the effective contract management contributes to the successful control of claims and disputes in Project B. They shared the experiences in contract management in the whole lifecycle of the project.

(1) Tendering Stage

Marketing department in head office obtained basic information to check whether the project is worth to bid, such as surrounding environment location, construction difficulties, conditions of contract, employer's funds, and competitors. After analysis, head office finally decided to participate the bid in considering the advantages in bridge construction.

In order to make a competitive cost proposal, the contractor joined hands with the local subcontractors for construction in electricity, water supply and road, which also transferred partial risks. For the works done by the main contractor, they took the advantage of available resources and adopted the most suitable technology based on the characteristic of the project.

(2) Negotiation Stage

Upon the notice to be the first bid, the bidding team handed-over all the document to negotiation team which consisted with bidding team member from head office, the candidates of project director, project manager and chief engineer for project team.

It took 9 months for bid evaluation and post tender clarification. In such a long time, the negotiation team intensively read the bidding document, the employer's clarifications and amendments. The particular conditions of contract were analyzed one clause by one clause. With all the internal and external information, the team generated the negotiation strategy.

Since the contractor's price was 10% less than the second bidder, the contractor was relatively strong in negotiation. However, the contractor provided extra favorable conditions to the Employer, for example, it promised to assign experienced staff and mobilized brand new machinery and equipment to this project. Also, the contractor agreed to extensively cooperate with local enterprises and allocate 49.5% of the project to the local company.

(3) Performance Stage

1) Information Dissemination

The contract management of Project B was led by commercial department, while everyone in the project performed its own responsibility under the guide of commercial department. There was a clear information dissemination system in Project B, as shown in Figure 4.6.

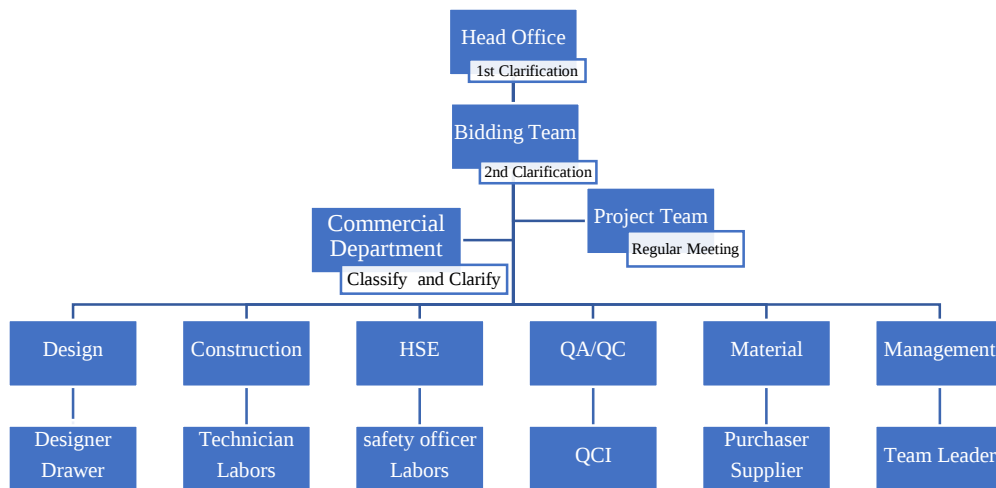


Figure 4.7: Contractual Information Dissemination in Project B

Head office arranged the first clarification meeting to bidding team, including the information such as the quotation strategy, costs composition, design consideration, construction method, risk reservation, and the records in bidding period. The bidding team handed over the full set contractual documents and records to the project team. The second clarification meeting was arranged to fully pass the project information. Before carried out any new works, commercial department classify the requirements and clarify to specific responsible department. Clarification meetings were regularly held to remind the staffs.

Finally, each department introduced that information to their staffs worked on site.

2) Timely Submission

The contractor timely submitted the engineering documents, including quality assurance plan, construction programme, and Health, Safety and Environment (HSE) plan, etc. It is not allowed to commence site works in absent of those documents. The most important is construction programme, it is the basis to analyze the time delay when incident affects on-site construction. Also, it was a reminder to the Employer to hand over the site and give approval to the designs.

3) Detailed records

In project B, project management paid attention to record writing document. The planning engineer was responsible to collect daily report, daily weather, QA/QC inspection records, material sampling and testing reports, and the records of on-site personnel, materials, equipment, etc. Special contemporary records were kept for the claim events as well.

4) Insurance

Insurance is a good means to transfer risks and it was a precondition to commence site works. Project B launched the procedure to purchase insurance early in advance of contract signing. Otherwise, if any accidents happened, the contractor can neither claim the compensation from insurance, nor from the Employer.

5) Costs control

Interviewee B1 held the point that if there were no costs overruns, less conflicts would be generated with the Employer. Therefore, comprehensive cost control is a useful method to reduce disputes. In project B, project manager leads a cost control team, which consisted with members from each department. Once the design work was roughly completed, the commercial department re-calculated the cost. Every quarter, commercial department divided the costs into quarterly budgets based on construction programme, and those budget target were distributed to each department. The control results of the previous quarter were assessed on quarterly basis, if the actual cost were beyond the budget more than 5%, the team would hold meeting to analyze the cause

and find out solutions.

6) Claim management

Claims management is the last defender to control disputes. Project B invited external contract experts to train the project personnel on related EPC project knowledge, so that all staff enhanced their awareness to identify claim opportunities. In compliance with the regulations for claim/disputes formulated by head office, a special work team which composed of the project leader and experienced personnel from each department was built. In order to reduce the claims and disputes, when abnormal events happen, team members got together to discuss the solutions and allocate the tasks.

According to Interviewee B3, the tasks include 1) analyze the terms of the contract, write a claim report, and negotiate with Employer; 2) provide calculations for costs claim and extension of time; 3) collect site photos, videos, correspondence, memos, meeting minutes, on-site instructions, etc. 4) keep proper registration of claims, remind the milestone to submit notice of claim and detailed claim reports, 5) finally, contractual experts or lawyer were invited to review the claim report to ensure the quality of the claim.

(4) Closure Stage

Interviewee B2 stated that even the site construction completed, it does not mean all the obligation has been fulfilled. The following three things should be paid attention:

- Timely request to issue completion certificate and performance certificate. The completion date is the base to confirm the project duration, also it is the start of defect liability period. Without the completion date, there is a risk of counter claim for delay damage and prolonged defect liability period.
- Timely terminate the advance payment bond, performance bond, and request to refund retention money. The Employer may not actively inform the bank, while the bank continued charging relevant costs. When disputes happen in this stage, it is difficult to be entertained by the Employer. As a result, such costs have to be

borne by the contractor.

- Timely reach agreement on the final statement. Normally the outstanding claims and disputes are settled in final statement. However, the longer those disputes unsolved, the less is the opportunity of amicable negotiation. When project team of the employer/consultant/contractor demobilized, the parties lost the interest to entertain the claims and disputes.

4.5 Cross Case Analysis

4.5.1 General Comparison of the Two Cases

The researcher made the comparison of the two cases in the aspects of contractual parties, the conditions of contract, the regulation/organization/human resources of contract management. The results were shown in Table 4.9.

Table 4.9: General Comparison of the Selected Cases

Items	Case One	Case Two	Comparison
Contractor	Top 10 International Contractors	Top 10 International Contractors	The Contractors in both cases were strong capacity, who can represent the highest level of Chinese international contractor.
Employer	Government	Government	The Employer in both cases were not professional in construction. In Case two, technical commitment was involved to guide the projects.
Consultant	State-owned Consultant	International- Local JV Consultant	The Consultant in case one was not involved in feasibility study, and only fitfully participated in the project. The Consultant in case two was more experienced in the contracted works and participated the project from the beginning to the end.

Items	Case One	Case Two	Comparison
Subcontractors	Internal subcontractors	Professional teams and local Subcontractors	The subcontractors participated in bidding stage of Case one did not join in construction. In Case two, the foreign subcontractors and local subcontractors were confirmed in bidding stage. The earlier the subcontractors were confirmed, the lower the uncertainty borne by the main contractor.
Tendering Period	6 months	14 months	The limited time for bidding and evaluation laid hidden problems for later stage.
Conditions of Contract	FIDIC	FIDIC	Conditions which the contractor can claims were almost the same in both cases.
Completion Period	Very Tight	Reasonable	Since the construction period was very tight, any small effects would lead to delay.
Contract Management Regulations	Sound Establishment	Sound Establishment	The regulations and rules formulated by head office in both cases were completed. However, the performance of the regulations was different due to the organization, management and personal capacities.
Contract Amount	Low Profits	Low Profits	The competition for both cases was fierce. The profit margin was low in both of the project. When initial design completed, updated cost estimation of Case one increased due to the insufficient consideration in bid design proposal. However, in Case two, the costs decreased after a series of design optimizations.
Contract Management	Commercial Department	Commercial Department	The main contractor in both cases placed contract management in an important place. Independent department were set up

Items	Case One	Case Two	Comparison
			for contract management works. However, there are two management levels in Case one. While in Case two, there was an integrity management.
Human Resources	Sufficient high qualified staffs	Sufficient high qualified staffs	Both projects assigned with sufficient staffs to carry out contract management works. However, in Case one, the key persons participated in the project after contract awarded. In Case two, some key persons involved since from the beginning of bidding.

4.5.2 Common Disputes due to Contract Management

As discussed in Section 4.3.4 and Section 4.4.4 of Chapter 4, the claims were similar in the two cases. The overlapping reasons includes adverse weather, third party interference, employer's advance occupation and variations. While in Case one, the employer's delay, such as land handover, document review and payment are main source of claims. Also force majeure, such as Covid 19, may significantly impacts the projects.

However, the disputes caused due to contract management are mostly generated from two sides. One is the ambiguity of contract; the contractual parties prefer to explain the ambiguity in favor of themselves but fails to pursue the other party. Another is the poor implementation of contract management; the contractual parties cannot properly control claims in early stage and indulge small conflicts become serious outcomes.

4.5.3 Problems in Contract Management

Now the management team of Chinses international contractors have well awareness of the importance of contract management. They are willing to provide sufficient resources to deal with those works, and they can identify the claim chance, proceed with procedures specified in the contract. However, the subcontractors and labors may not understand and/or obey the instructions issued by management team. It is difficult

for the management team to pass the contractual requirement and project situation to the people from the top to the bottom.

The contractor ignored the contract management in the bidding and negotiation stage, that is the best time to control the disputes in early conditions. While in construction stage, the contractors are incapable to analyze the effects and verify the costs and delay with useful supporting documents, which lagged the settlement of claims/disputes. When more and more disputes accumulated, it is complicate to solve it soon. And further, the obligations in closure stage were not paid attention, that the disputes in this period are difficult to be entertained by Employer.

4.5.4 Methods to Reduce Disputes in Contract Management

As cross analyzed in Section 4.3.5 and Section 4.4.5 *Problems in Contract Management*, Section 4.3.6 and Section 4.4.6 *Methods to Avoid Disputes in Contract Management*, it found that those methods are applicable to those problems incurred in different stages of EPC projects.

Table 4.10: Cross Analysis of the Problems and Methods

No.	Reference	Problems	Reference	Methods
1	4.3.5 (1)	Low quality in contractor's bidding documents	4.3.6 (1) 4.4.6 (1)	☐ Select the project ☐ Corporate with local subcontractors
2	4.3.5 (2)	Failed to get favorable conditions through negotiation	4.3.6 (2) 4.3.6 (3) 4.4.6 (2)	☐ Team build for negotiation; ☐ Detail study of contractual documents, and make proper records
3	4.3.5 (3) 4.3.5 (4) 3)	☐ Team members are inconsistent	4.3.6 (4) 4.6 (3) 1)	☐ Information dissemination

		☐ Inefficient communication		
4	4.3.5 (4) 1) 4.3.5 (4) 2)	☐ Subcontractors are incapable to manage claims and disputes ☐ Interest conflicts among departments	4.4.6(3) 6)	☐ Build Team to manage the claims and disputes; ☐ Properly allocate works
5	4.3.5 (5)	☐ cannot solve the disputes in time	4.3.6 (6)	☐ Set the deadline and give compromise

Beside to the above, in both case, the Interviewees mentioned the importance of detailed records (in 4.3.6 (7) and 4.4.6 (3) 3)). Those methods 4.3.6(5) the risks management, 4.3.6 (6) timely settlement, 4.4.6 (3) 4) insurance, 4.4.6 (3) 5) costs control, and that in 4.4.6 (4) in closure stage can mutually supplement the problems in EPC projects as well.

4.6 Chapter Summary

In this chapter, it explained the processes of data collection and analysis of those data. Two cases were studied, the researcher introduced the important information of the case, in aspects of contract conditions, contractual relationships, contractor's organization. Further, based on the aim and objective of the report, the claims and disputes, the problems in contract management, and the methods to avoid disputes in contract management were discussed in depth. Finally, the two cases were cross analyzed to find the similarity and differences.

CHAPTER 5

CONCLUSIONS

5.1 Introduction

The previous chapter analyzed the findings of the research. In this chapter section 5.2, it presents a brief overview of the study and how the objectives of the research have been met. Then it is followed by a summary of the findings in line with the objectives in section 5.3. In section 5.4 and 5.5 discussed the implications of the research findings and limits of the research. Finally, recommendations for further research are highlighted.

5.2 Research Overview

When explore how to gain the success in international EPC projects executed by Chinese contractors, it is found there are few studies noticed to avoid unnecessary disputes caused by contract management. The first chapter introduces the background, the research gap in comparison of the current studies through literature review, and emphasized the aim, objectives, and research methodology.

In order to achieve the research objectives, the methodology is formulated in Chapter Three. Qualitative approach by means of case study is adopted for this research. The focus of the research is the “disputes caused by contract management” and the research boundary is “in international EPC Projects executed by Chinese contractors”.

Data is collected by tools of document review and semi-structural interviews. Based on the information obtained from literature review, semi-structured questionnaire and document review guide were prepared to conduct data collection process. The data collected from document survey presents ideal conditions of the project management and the result of the event. The data collected from interviews verifies the real performance and provides information in process, such as contractor’s considerations, amicable negotiation and strategies. Data from the two methods were crossed checked and supplemented with each other. All the data was analyzed and the findings are

presented in Chapter 4. Along with the completion of all four objectives, the aim of the research accomplished.

5.3. Achieving Research objectives

The **first objective** is to critically review the features of international construction projects, EPC projects, contract management, claims and disputes in EPC Projects. The findings are presented in Chapter Two through the comprehensive literature review. Accordingly,

- The majority of international projects executed by Chinese contractors are building construction, transportation and power engineering in developing area.
- The international projects have features of multi knowledge, transnationality, multi-stakeholders, long duration and high value.
- Further, as the single responsible party for design, procurement, and construction, EPC contractors bear huge risks which are unbalance allocated. According to Acharya et al. (2006), risks are the original sources of disputes if they are not well assigned, managed, and resolved (refer to Section 2.5.2).
- Even though internationally accepted forms of contracts, such as FIDIC, are applied in international projects, the human is unable to observe and verify all the real facts in contract, which will arise disputes from contract itself.

In terms of the **second objective** to investigate the claims and disputes, preliminary survey in document helped to obtain the information of contract details, how the project organized, how the contract management works operated. And the most importantly, it contributes to analyze the causes and consequences of the claims and dispute. The findings from the case studies verified the existing studies in literature review, the claims in EPC projects can be summarized to:

- financial economical casues, such as delay payment and price fluctuation;
- Construction technique related causes, such as variations;

- Contract related causes, such as unclear provisions, ambiguity, and fault in contract;
- Management related causes, such as third-party interference, employer's advance occupation, employer's delay in approval, and delay in site access.

For the **third objective** to analyze the causes for disputes caused due to contract management in international EPC Projects, semi structured interviews were carried out to obtain opinions on listed questions and recommendations on new areas. The interviewees shared the information regarding to the problems in contract management and the conflicts which were not turned into disputes. The following points are worth to be paid attention.

- The contractor may ignore the works in bid planning to fully understand and properly record important contract requirements. The contractor may give the change to get favorable conditions of contract through bid negotiation. And the team members in bidding and contract execution are totally different.
- In execution stage, there is no fluent communication within the contractor's personnel. Subcontractors are weak in contract awareness and management. Contractors cannot identify and monitor the risks and countermeasures in whole project lifecycle. And contractor is incapable to settle disputes in time.
- Besides, the contractor may also ignore the works in contract closure stage, such as request to issue completion certificate and performance certificate, forget to terminate the bank bonds and refund of retention money, and contractor takes long time to reach agreement on final payment.

Meanwhile, valuable experiences and recommendations in contract management were gathered from the interviewers as well, which realize the **ultimate objective** of this study. As referred to Section 4.3.6 and Section 4.4.6, Methods to Avoid Disputes in Contract Management, the following points are highly recommended to the industrial practitioners, which help to improve the contract management capabilities and avoid disputes.

- Personal Capability
 - Key persons shall involve since from bidding, execution and completion, that the verbal decision can be carried forward.
 - Working groups can be built for specific works, which includes sufficient and capable members to handle with that work, such as working team for variation/claim/ dispute.
- Organizational Capability
 - Information shall be effectively and efficiently transferred from the top to the bottom of the project, to avoid misunderstanding or omission in contractual documents.
 - Detailed written records shall be kept, in case of any discrepancies appeared with the counter parties record. Regular clarification meeting, the contractor shall have smooth internal communication. The works shall be assigned to pointed person.
- Time
 - The contractor shall carry out contract management in the whole life cycle. The bidding/negotiation stage and closure stage are neglected. However, in bidding stage, disputes may generate due to insufficient contract and unreasonable promise. In closure time, contractors hold little bargain chip.
 - Contractor shall timely submit those required document and actively prompt the amicable negotiation. Risk, conflicts, claims and dispute shall be settled as earlier as better.

5.3 Implementation

This research contributes to understand of disputes in contract management and to investigate the methods to avoid them accordingly in the context of international EPC projects executed by Chinese contractors. The industrial practitioners can refer the findings of the research in the following aspects:

- To make good preparation to events which frequently lead to claims and disputes.
- To prevent the problems in the contract management.

- To apply the experiences to improve contract management capacity from the aspects of personnel, organization, and time.

5.4 Limitations

This research has focused on the disputes caused by contract management based on qualitative data from the selected cases and within the contractor's management perspective. However, some important actors relevant to the disputes and contract management are not included in this study due to accessibility of the other contractual parties, such as sub-contractors, construction crews, and Employers. Gathering qualitative data from these actors would give a better understating of the dispute causes, also provided better knowledge of how the disputes can be avoided and managed. The time and scope restrictions of the research further set some limits. If the research takes a longer period of time, it is possible to analyze each of the claims, disputes, even the conflicts in the cases, so as to investigate more deeply and obtain more knowledge from relevant documents and interviewees.

5.5 Recommendations for Further Research

This qualitative research mainly investigates the causes and methods to avoid disputes in contract management. Some methods of how this is to be achieved still needs to be explored in further studies. These include the following:

- How the activities of other contractual parties affected the disputes resolution in contract management.
- Quantitative research can be carried out to verify the connection of the problems in contract management and the disputes, such as the sensitivity and severity between the problems and disputes.
- Moreover, contract management includes many branches, such as cost control, risk management, insurance, etc.. Those works are worth to be studied separately in depth to find out the methods to avoid or settle the disputes.

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APPENDIX

Appendix –A: Case study interview guide

Disputes in Contract Management in International Engineering, Procurement and Construction (EPC) Projects: The Case of Chinese Contractors

Dear Participants

I would like to invite you to participate in this research which I am doing for my master degree at University of Moratuwa.

The aim of this research is to investigate the claims and disputes faced by the Chinese International Contractors due to contract management of international EPC projects, which includes the following objectives:

- To critically review the features of international construction projects, EPC projects, contract management, claims and disputes in EPC Projects.
- To investigate the claims and disputes faced by the Chinese International Contractors in EPC projects due to contract management.
- To analyze the causes for disputes identified above due to contract management of EPC projects.
- To suggest suitable methods to avoid the disputes caused due to contract management in international EPC Projects.

Your site is identified as one that could provide valuable input into this research. This interview will take Maximum 2 hour to complete. If you agree to participate, your privacy and confidentiality will be strictly maintained.

If you need any further clarification or information, please feel free to contact the researcher. The findings of this research will be disclosed to you upon your request. The outcomes of this research/survey would be used for my dissertation and research publications in journals and conferences.

Your participation in this survey is highly appreciated.

Thank you

Researcher: Chen Cheng

Contract Details : 0094-774642668; cemorechen@gmail.com

THANK YOU FOR AGREEING TO TAKE PART IN THIS RESEARCH

CASE STUDY INTERVIEW GUIDE

Disputes in Contract Management in International Engineering, Procurement and Construction (EPC) Projects: The Case of Chinese Contractors

Target Group:

- Commercial Manager
- Senior Officer in Commercial Department – Both Chinese and Local Staff
- Project Manager
- Other senior officers if necessary

Section 1: Background Information

- How many years have you been working in the construction industry? And in international projects, or EPC projects?
- What's your position in this project?

Section 2: Contractual Parties of This Project

- Can you simply introduce the contractor's experiences in international EPC projects?
- To your knowledge, how does the Employer and Employer's representative of projects? Are they experienced and professional?
- How about the cooperation between the Contractor and Employer?

Section 3: Organization of the Contractor

- Please introduce the organization of the project.
- Please introduce the works of you and your department?
- Do you think the staffs are capable to perform the contract and to handle the works?
- How about the corporation between the departments in this project? Do you think the corporation between the department is important?

Section 4: Claims /Disputes of the Project

- Is the Contractor suffered costs overrun and delay in completion in this project? What's the reasons caused?
- If such situation happened, whether the Employer and Contractor have disputes in Contractor's claim or granting compensation?
- In EPC projects, what's the claims and disputes in contract management?
- For the claims and disputes which caused by contract documents itself, can you give some examples?
- For the claims and disputes which caused by contract management, can you give some examples?
- Beside those reasons, any other problems in contract management resulted in claims and disputes in the project?

Section 5: Contract Management of the Project

- Do the project management and staffs treat contract management as important job?
- Is there any document, guidelines or regulations, which conduct the Contractor's staff to carry out contract management works?
- How is the implementation of those guidelines and regulation? What's the key works and problems?

Section 6: Suggestions

- What's your suggestion for the Contractor to avoid or reduce the claims and disputes caused by contracts and/or contract management in international EPC Projects?
- Is there any other suggestions for the Contractor to successfully execute international EPC Projects? If so, please continue.

THANK YOU

Appendix –B: Case Study Document Review Guide

Disputes in Contract Management in International Engineering, Procurement and Construction (EPC) Projects: The Case of Chinese Contractors

Dear Project Management:

I am doing for my master degree at University of Moratuwa. The aim of this research is to investigate the claims and disputes due to contract management of international EPC projects faced by the Chinese International Contractors, which includes the following objectives:

- To critically review the features of international construction projects, EPC projects, contract management, claims and disputes in EPC Projects.
- To investigate the claims and disputes faced by the Chinese International Contractors in EPC projects due to contract management.
- To analyze the causes for disputes identified above due to contract management of EPC projects.
- To suggest suitable methods to avoid the disputes caused due to contract management in international EPC Projects.

Your project is identified as one that could provide valuable input into this research. In order to carry out the research, I kindly request to collect some internal documents from your project. If the documents are agreed to copy to me, the privacy and confidential information will be strictly protected and maintained.

If you need any further clarification or information, please feel free to contact the researcher. The findings of this research will be disclosed to you upon your request. The outcomes of this research/survey would be used for my dissertation and research publications in journals and conferences.

Your cooperation and assistance on this regard is highly appreciated.

Thank you

Researcher: Chen Cheng

Contract Details : 0094-774642668; cemorechen@gmail.com

THANK YOU FOR THE HELPS IN THIS RESEARCH.

CASE STUDY DOCUMENT REVIEW GUIDE

Disputes in Contract Management in International Engineering, Procurement and Construction (EPC) Projects: The Case of Chinese Contractors

Project A	Project A is a project which suffered serious delay and costs overrun, and contractor issued lots of claims. In this project, the researcher will pay attention to the find the reasons why the situation happens, and how they solved those problems.		
Project B	Project B is a successful project which completed on time and the final profits is higher than expectation. The Contractor did not issue many claims, and there was no disputes forwarded to DAB. Therefore, the researcher will pay more attention to investigate how the project conducted contract management, and how to settle the problems and controlled the claims and disputes.		
	The following documents are going to collected and studied.		
No	Document	Information Collection	Language
1	Contract Document	Basic information of the project, ie the contractual parties, the contract value, construction periods, the work scope, etc.	English
		Important conditions of contract, such as advance payment, performance bond, retention money, and clauses related to extension of time, claims and disputes.	
2	Organization Chart	The parties of the project and the relationship	English
		The responsibilities of each party	
		The contract management team	
3	Contract Management Plan	The responsibilities of involved parties	Chinese
		The procedures and works in each stage	
		The procedures to handle with claims and disputes	
4	Risk management Plan	Risks assessment	Chinese & English
		Risk management methods	
5	Monthly Report	The contractor's performance	Chinese & English
		The causes which resulted delay and additional cost to the contractor	
6	Claim and Dispute Register List	The causes of claims	Chinese & English
		Result of the claims	
7	Typical Claim Report and Relevant Correspondence	The successful cases	English
		The failed claims which were rejected	
		The failed claims which resulted in disputes	