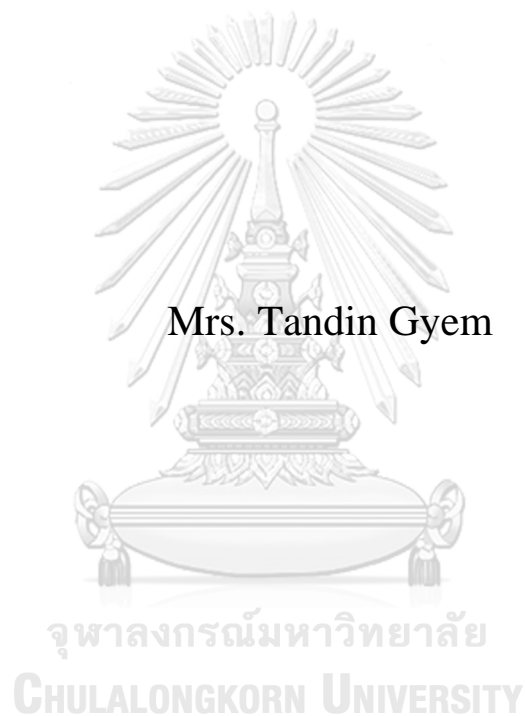


IDENTIFYING, ANALYZING, AND MANAGING  
CHALLENGES IN ADMINISTERING CONSTRUCTION  
CONTRACTS OF LARGE PUBLIC PROJECTS IN BHUTAN



Mrs. Tandin Gyem

A Thesis Submitted in Partial Fulfillment of the Requirements  
for the Degree of Master of Engineering in Civil Engineering  
Department of Civil Engineering  
FACULTY OF ENGINEERING  
Chulalongkorn University  
Academic Year 2020  
Copyright of Chulalongkorn University

การระบุ วิเคราะห์  
และจัดการปัญหาในการบริหารสัญญาจ้างก่อสร้างของโครงการภาครัฐขนาดใหญ่ในประเทศภูฏาน



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิศวกรรมศาสตรมหาบัณฑิต  
สาขาวิชาวิศวกรรมโยธา ภาควิชาวิศวกรรมโยธา  
คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย  
ปีการศึกษา 2563  
ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

Thesis Title                    IDENTIFYING, ANALYZING, AND  
MANAGING CHALLENGES IN  
ADMINISTERING CONSTRUCTION  
CONTRACTS OF LARGE PUBLIC  
PROJECTS IN BHUTAN

By                                    Mrs. Tandin Gyem

Field of Study                    Civil Engineering

Thesis Advisor                   Associate Professor VEERASAK  
LIKHITRUANGSILP, Ph.D.

---

Accepted by the FACULTY OF ENGINEERING, Chulalongkorn  
University in Partial Fulfillment of the Requirement for the Master of  
Engineering

..... Dean of the FACULTY OF  
ENGINEERING  
(Professor SUPOT TEACHAVORASINSKUN,  
Ph.D.)

THESIS COMMITTEE

..... Chairman  
(Associate Professor Nakhon Kokkaew, Ph.D.)

..... Thesis Advisor  
(Associate Professor VEERASAK  
LIKHITRUANGSILP, Ph.D.)

..... External Examiner  
(Associate Professor Wannawit Taemthong,  
Ph.D.)

ทานดิน ยิน : การระบุ วิเคราะห์

และจัดการปัญหาในการบริหารสัญญาจ้างก่อสร้างของโครงการภาครัฐขนาดใหญ่ในประเทศภูฏาน

น. ( IDENTIFYING, ANALYZING, AND MANAGING CHALLENGES IN ADMINISTERING CONSTRUCTION CONTRACTS OF LARGE PUBLIC PROJECTS IN BHUTAN) อ.ที่ปรึกษาหลัก : วีระศักดิ์ ลิขิตเรืองศิลป์

โครงการก่อสร้างประกอบด้วย 3 ช่วงหลัก คือ ก่อนก่อสร้าง ระหว่างก่อสร้าง และหลังก่อสร้าง ถึงแม้ว่าปัญหาอันหลากหลายไม่อาจหลีกเลี่ยงได้ในทุกช่วงของโครงการก่อสร้าง ปัญหาส่วนใหญ่ มักจะเกิดขึ้น ระหว่างการก่อสร้าง แต่สามารถลดได้โดยการใช้สัญญาจ้างก่อสร้างที่ดีในการจัดการโครงการ สัญญาจ้างก่อสร้างเป็นข้อตกลงที่เป็นทางการระหว่างเจ้าของโครงการและผู้รับจ้างก่อสร้าง เอกสารสำคัญคือเงื่อนไขของสัญญาซึ่งประกอบด้วย กฎและระเบียบเพื่อบริหารสัญญา ในประเทศภูฏานโครงการก่อสร้างของรัฐทั้งหมดถูกกำหนดให้ใช้เอกสาร the Bhutan Standard Bidding Documents for Procurement of Works 2019 และแบบฟอร์ม General Conditions of Contract (GCC) เอกสารทั้งสองถือเป็นแบบฟอร์มมาตรฐานสัญญาจ้างก่อสร้างของประเทศ แม้ว่าเอกสารเหล่านี้จะไม่ได้รับประกันการปรับปรุงอยู่เสมอ แต่การนำพวกมันไปใช้ในโครงการก่อสร้างมักจะเผชิญกับความท้าทายมากมาย งานวิจัยนี้ต้องการระบุความท้าทายหลักซึ่งเกี่ยวข้องกับการบริหารสัญญาในโครงการก่อสร้างภาครัฐของประเทศภูฏาน ในการระบุความท้าทายเหล่านี้ เราทำการสัมภาษณ์เชิงลึกกลุ่มของผู้รับผิดชอบการจัดซื้อจัดจ้างในประเทศภูฏาน วิศวกรของรัฐบาล และผู้รับจ้าง จากการสัมภาษณ์ เราสามารถระบุ 26 ปัจจัยซึ่งนำไปสู่ความท้าทายต่างๆ ในโครงการก่อสร้างภาครัฐในประเทศภูฏาน ในปัจจัยเหล่านี้ 15 ปัจจัยเกี่ยวข้องกับความท้าทายในการบริหารสัญญาโครงการภาครัฐขนาดใหญ่ของประเทศภูฏาน ปัจจัยเหล่านี้ได้ถูกวิเคราะห์ต่อไปเพื่อหาระดับความสำคัญโดยใช้เมทริกซ์โอกาสการเกิดและผลกระทบด้านเวลาและต้นทุน นอกจากนี้งานวิจัยยังได้เสนอข้อเสนอแนะเพื่อจัดการกับความท้าทายอันเกิดจากปัจจัยเหล่านี้โดยพิจารณาแบบมาตรฐาน สัญญาจ้างก่อสร้างของ FIDIC และความเห็นของผู้เชี่ยวชาญ ความท้าทายที่เราระบุและข้อเสนอแนะที่เราเสนอสามารถช่วยให้หน่วยงานที่เกี่ยวข้องสามารถตัดสินใจได้อย่างสมเหตุสมผลและเพิ่มประสิทธิภาพของแบบมาตรฐานของสัญญาจ้างก่อสร้างที่มีอยู่ของประเทศภูฏาน

สาขาวิชา วิศวกรรมโยธา

ลายมือชื่อนิติ

ปีการศึกษา 2563

ลายมือชื่อ อ.ที่ปรึกษาหลัก

# # 6270103921 : MAJOR CIVIL ENGINEERING

KEYWORD Bhutan Construction Industry / Construction Contract / Conditions of  
D: Contract / Large Public Projects / Standard Form of Construction  
Contract

Tandin Gyem : IDENTIFYING, ANALYZING, AND MANAGING  
CHALLENGES IN ADMINISTERING CONSTRUCTION  
CONTRACTS OF LARGE PUBLIC PROJECTS IN BHUTAN. Advisor:  
Assoc. Prof. VEERASAK LIKHITRUANGSILP, Ph.D.

Construction projects encompass three major phases: pre-construction, construction, and post-construction. Although various problems are inevitable in every phase, most of them occur during construction and can be mitigated by adopting a good construction contract for project management. A construction contract is a formal agreement between the project owner and the construction contractor. An important contract document is the conditions of contract (COC), which encompass the rules and regulations for administering the contract. In Bhutan, all public construction projects are mandated to follow *the Bhutan Standard Bidding Documents for Procurement of Works 2019* and the form of *General Conditions of Contract (GCC)*. Both documents are considered the nation's standard form of construction contract. Although these documents are updated regularly, implementing them in construction projects is often faced with various challenges. This research identifies major challenges associated with contract administration in the public projects in Bhutan. To identify these challenges, we conducted an in-depth interview with a group of local procurement professionals, government engineers, and contractors. Among the 26 factors contributing to the challenges identified from the interview, it was found that 15 factors were associated with the challenges in contract administration of the large public projects in Bhutan. These factors were further analyzed to determine the priority level using a likelihood of occurrence and time/cost impact matrix. We then proposed the recommendations to address the challenges caused by these factors by considering the standard form of construction contract by the International Federation of Consulting Engineers (FIDIC) and the experts' opinions. The identified challenges and the proposed recommendations can help the relevant authorities make rational decisions and enhance the efficiency of the existing standard form of construction contract in Bhutan.

Field of Study: Civil Engineering

Student's Signature

Academic Year: 2020

.....  
Advisor's Signature

Year:

.....

## ACKNOWLEDGEMENTS

First, I would like to express my sincere gratitude to my advisor, Associate Professor Veerasak Likhitruangsilp for the continuous support and the patience. This research could not have been possible without his guidance and the expertise. I shall remain forever indebted to my advisor for having faith in me and providing an opportunity to work under his guidance, and imparting knowledge throughout this study period.

I am grateful to Faculty of Engineering of Chulalongkorn University for allowing me to be a part of one of the esteemed universities in the world and many thanks to all the professors for enlightening us with the knowledge of various field of civil engineering.

I would like to acknowledge and thank Thailand International Cooperation Agency (TICA) and the Royal Government of Bhutan (RGOB) for awarding this scholarship to me and providing generous financial support to complete this course successfully.

I would also like to extend my gratitude to all the respondents who participated in this research during the data collection process. Without their cooperation, it would not have been possible for me to prove the validity of this research.

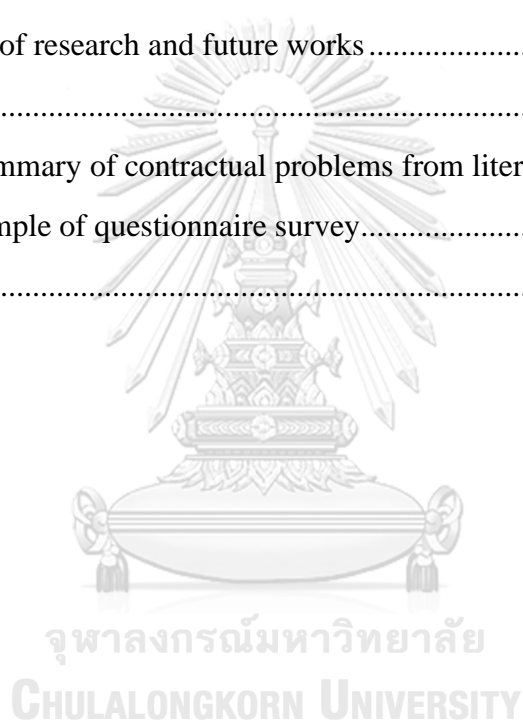
Last, I would like to thank my family and friends for all the love and support always, especially during my study period here, when I needed it the most.

Tandin Gyem

# TABLE OF CONTENTS

	<b>Page</b>
ABSTRACT (THAI) .....	iii
ABSTRACT (ENGLISH).....	iv
ACKNOWLEDGEMENTS .....	v
TABLE OF CONTENTS.....	vi
LIST OF TABLES .....	1
LIST OF FIGURES .....	3
CHAPTER 1: INTRODUCTION.....	4
1.1 Background.....	4
1.2 Problem statement .....	6
1.3 Research objective.....	8
1.4 Scope of research.....	8
CHAPTER 2: LITERATURE REVIEW.....	9
2.1 Construction contracts .....	9
2.2 Standard forms of construction contracts .....	13
2.3 Challenges in administering construction contracts .....	14
2.4 Probability-Impact matrix .....	21
2.5 Conclusion.....	22
CHAPTER 3: RESEARCH METHODOLOGY .....	24
3.1 Research framework.....	24
3.2 Data collection.....	32
CHAPTER 4: CHALLENGES IN CONTRACT ADMINISTRATION .....	36
4.1 Identification of the factors contributing to the challenges associated with contract during construction .....	36
4.2 Analysis of the identified factors.....	43
4.3 Conclusion.....	50
CHAPTER 5: RECOMMENDATIONS TO ADDRESS THE CHALLENGES .....	51

5.1 Identification of clauses in the GCC, SBD 2019, Bhutan .....	51
5.2 Preparation of recommendation .....	53
5.3 Verification of the proposed recommendations .....	70
5.4 Summary of final recommendations .....	72
CHAPTER 6: SUMMARY AND CONCLUSION .....	74
6.1 Summary.....	74
6.2 Conclusion.....	78
6.3 Research contributions .....	79
6.4 Limitations of research and future works .....	79
REFERENCES .....	81
APPENDIX A Summary of contractual problems from literature review .....	87
APPENDIX B Sample of questionnaire survey.....	92
VITA.....	99





## LIST OF TABLES

<i>Table 1.1. Schedule delays and cost overruns in Bhutan</i> .....	8
<i>Table 3.1 Types of Standard Bidding Document (SBD)</i> .....	26
<i>Table 3.2 Likelihood of occurrence</i> .....	29
<i>Table 3.3 Impact on time</i> .....	29
<i>Table 3.4 Impact on cost</i> .....	29
<i>Table 3.5 Number of respondents for the in-depth interview</i> .....	33
<i>Table 4.1 Details of the participants of the in-depth interview</i> .....	37
<i>Table 4.2 Result of the in-depth interview</i> .....	38
<i>Table 4.3 Factors causing challenges associated with the contract during construction</i> .....	39
<i>Table 4.4 Categories of the factors contributing to the challenges</i> .....	43
<i>Table 4.5 Details of the survey respondents</i> .....	45
<i>Table 4.6 Priority level based on the likelihood of occurrence and time impact</i> .....	47
<i>Table 4.7 Priority level based on the likelihood of occurrence and the cost impact</i> ...	49
<i>Table 5.1 Identification of the clauses in the GCC, SBD 2019, Bhutan</i> .....	52
<i>Table 5.2 Comparison of provisions on contractor's resource</i> .....	54
<i>Table 5.3 Comparison of provisions on material procurement</i> .....	55
<i>Table 5.4 Comparison of provisions on mobilization advance</i> .....	56
<i>Table 5.5 Provisions on value engineering</i> .....	58
<i>Table 5.6 Comparison of provisions on temporary utilities</i> .....	59
<i>Table 5.7 Comparison of provisions on insurance</i> .....	60
<i>Table 5.8 Comparison of provisions on variation</i> .....	62
<i>Table 5.9 Comparison of provisions on PS</i> .....	63
<i>Table 5.10 Comparison of provisions on progress payment</i> .....	64
<i>Table 5.11 Comparison of provisions on taking over the completed work</i> .....	65

<i>Table 5.12 Provisions on performance rating of the contractor .....</i>	<i>66</i>
<i>Table 5.13 Comparison of provision on extreme weather effect .....</i>	<i>68</i>
<i>Table 5.14 Comparison of provisions on delay due to disputes .....</i>	<i>69</i>
<i>Table 5.15 Comparison of provisions on compensation event .....</i>	<i>70</i>
<i>Table 5.16 Summary of proposed recommendations .....</i>	<i>73</i>



## LIST OF FIGURES

<i>Figure 2.1 Parties involved in construction contracts and their roles (Bowmans 2016)</i> .....	11
<i>Figure 2.2 Selecting the type of contract (Turner and Simister as cited in Lowe, 2004)</i> .....	13
<i>Figure 2.3 Probability-Impact Matrix (Botha and Badenhorst-Weiss 2019)</i> .....	22
<i>Figure 3.1 Research Framework</i> .....	25
<i>Figure 3. 2 Likelihood-Impact matrix</i> .....	30
<i>Figure 4.1 Work categories of the contractors</i> .....	46
<i>Figure 4.2 Likelihood of occurrence and time impact matrix</i> .....	48
<i>Figure 4.3 Likelihood-Impact on cost matrix</i> .....	50

## CHAPTER 1: INTRODUCTION

### 1.1 Background

The construction industry is generally riskier than any other industries because of its complexity in coordinating various activities with multiple parties. Each construction project is unique and applies different engineering and managerial means, methods, techniques, and procedures (Surahyo 2018). Construction contracts play an important role in project management and usually consist of several documents, including agreements, conditions of contract (COC), specifications, drawings, and bill of quantity (BOQs). When unexpected and unforeseen problems arise, the COC are often used to determine which party shall bear certain consequences (Surahyo 2018). For example, the current Covid-19 pandemic has been affecting every industry around the world, especially the construction sector. The construction projects in many countries have been delayed or suspended. In this scenario, the force majeure clause in the COC is an important provision to which project participants often refer. The COC is considered rules and regulations (Levy 2010), which outline the rights and responsibilities of the parties to the contract, present the requirements governing their business and legal relationships, and provide guidelines for administering the contract (Goldbloom 1989).

Several professional organizations produce standard forms of construction contracts through the accumulation of knowledge from their experience in using them. Examples of standard forms of construction contracts are the International Federation of Consulting Engineers (FIDIC), the New Engineering Contracts (NEC) forms, the German Construction Contract Procedures (VOB/B) form, and the English Joint Contracts Tribunal (JCT) or the Institution of Civil Engineers (ICE) forms. These standard forms of contract are widely accepted for producing tested and balanced risk allocation and less bargaining contracts (Herzberg 2019). They are widely used around the world, but are often modified to accommodate individual requirements. A survey carried out in Australia between December 2013 and February 2014 revealed that 68% of the reported contracts used standard forms. Among these, 84% were amended from the original standard form (AM et al. 2014). In order to manage the

projects efficiently and reduce potential conflicts that may arise, it is necessary for the project owner to rely on established standard contracts to formulate their own contract documents well.

Disputes have long been endemic to the construction industry (Robinson 2011). Producing a contract document that can satisfy all the parties is difficult due to different interests of the parties entering into the contract. Inconsistencies and discrepancies in existing contracts are beyond the control of contract drafters (Iyer et al. 2008). For example, while the project owner focuses on completing the project at minimum cost with quality, the contractor may be interested in maximizing the financial benefits from the project. As a result, construction contracts are often subject to conflicts which are unavoidable in construction projects. Project delays and cost overrun are common challenges for the contracting parties in many parts of the world. In Saudi Arabia, public projects have been using the national standard construction contract document since its institution in the late 1980s. Yet, the contractors still argued about its lack of equitability (Ibn-Homaid 2006). In the Philippines, the Government Procurement and Policy Board (GPPB) has formulated the rules and regulations and corresponding standard bidding forms for the public procurement. The standard documents of the Philippines have been questioned on their objectivity, particularly in risk allocation, due to the lack of consultation with contractors during their formulation (Reyes 2012). The Ministry of Communication, Transport, Post and Construction (MCTP) in Laos appointed professional teams to provide technical assistance for preparing tender documents. Thus, there were guidelines, working papers, and standard bidding documents developed by consultants. However, there were shortcomings of owners in contract monitoring and administration, which led to delays, poor quality, and cost overruns (Ogunlana et al. 2000). A survey carried out in Ghana on 40 respondents from construction projects in 2012 found that none of the projects was completed on time (Gomelesio 2013). The situation of the construction industry in Bhutan is not much different from the rest of the world. Construction projects, especially the public projects, usually experience delays, and the actual project cost often exceeds the budget. The annual report published by the Construction Development Board (CDB) in 2019 revealed that more than 50% of

projects completed in the year 2018-2019 were delayed, and around 65% of the projects exceeded the initial contract amount (Construction Development Board 2019).

Many factors contribute to the successful completion of construction projects but most of them are associated with the construction stage of the project. For instance, the disputes in the public construction projects in Turkey were examined in two main phases, namely, the tender process and the execution of the contract in the construction phase. It was found that the contract related disputes are generally the most common (Irlayici Cakmak 2016). Even though there are various issues in every phase of construction project, most of them occur during the construction phase, which is usually associated with contract management (Lew et al. 2014).

## **1.2 Problem statement**

In 2019, the construction industry in Bhutan accounted for more than 16 percent of the Gross Domestic Product (GDP) and employed around 4.5 percent of the labor force from 2,529 construction contractors (Construction Development Board 2019). Given the highest potential to generate wealth, employment, and sustainable growth within the framework of the Gross National Happiness (GNH), the construction industry has been identified as one of the priority sectors in the revised Economic Development Policy 2016. However, public construction works did not have a good reputation when it comes to the quality of infrastructure (Ministry of Works and Human Settlement 2020). According to a report by the World Bank, the procurement of works in Bhutan accounted for most of the government procurement spending (47 percent of the total procurement). It was followed by the procurement of services and goods (24 and 18 percent, respectively) during the tenth Five Year Plan between 2008 and 2013 (World Bank Group 2016).

The World Bank Group assessed the procurement system of Bhutan in 2016. The nation was rated by an overall indicator score of B in terms of the procurement based on the Public Expenditure and Financial Accountability (PEFA) 2016 Framework. This means that Bhutan has a good procurement system in place. The four indicators considered in this assessment were procurement monitoring,

procurement methods, public access to procurement information, and procurement complaints management. It was found that the procurement complaints process was efficient and with regard to procurement of works. More than 80% of the total value of the contracts were awarded through competitive methods (World Bank Group 2016). The public construction projects in Bhutan must adopt the Standard Bidding Documents (SBDs) regulated by the Government Procurement and Property Management Division (GPPMD). These documents have been in place since 2009 (the latest revision), and all government agencies must use these standard documents for any types of construction works. Even though the General Conditions of Contract (GCC) in the SBD encompasses the essential elements of a contract and the documents are updated regularly, the public project delivery services have always been one of the major challenges for the country.

The Good Governance Committee under the National Council of Bhutan presented a Review Report on the Public Procurement System about the existing quality control mechanism. The report pointed out that *“While to a certain extent, the provisions in the GCC spell out inspection of quality of the works during execution, there is no clear delineation of responsibility and accountability mechanism to ensure quality assurance. This has led to different agencies having their own system of monitoring the quality of work with the system still weak in some agencies”* (Good Governance Committee 2016). Furthermore, time and cost overruns in the public projects in Bhutan have been increasing every year. These facts were compiled and analyzed by the Construction Development Board (CDB), which is an overseer of the construction industry in Bhutan. As an agency that monitors and ensures that construction projects are executed according to existing rules and regulations, the CDB publishes an annual report showing important facts and figures of the construction industry in Bhutan. Table 1.1 displays the data regarding schedule delays and cost overruns of the public construction projects in the past five years (Construction Development Board 2019). As can be seen, the number of projects with schedule delays and cost overruns has been increasing over the years.

*Table 1.1. Schedule delays and cost overruns of the public construction projects in Bhutan*

<b>Financial Year</b>	<b>Total Number of Projects Completed</b>	<b>Number of projects with Schedule Delay</b>	<b>Number of projects with Cost overrun</b>
2014-15	1041	29 (2.78%)	443 (42.55%)
2015-16	1091	257 (23.6%)	485(44.5%)
2016-17	719	460 (64%)	585 (81.4%)
2017-18	494	258 (52.2%)	221(44.7%)
2018-19	330	74 (52.73%)	217 (65.76%)

It is evident from these documents that the public construction projects in Bhutan did not perform well. Thus, it is necessary to identify the gaps between the existing standard construction contracts and the practical management of public construction projects. In addition, we need to investigate if the public projects in Bhutan are failing due to shortcomings in the standard construction contract document.

### **1.3 Research objective**

The objective of this research is to identify and analyze the challenges in managing large public construction projects in Bhutan using the form of General Conditions of Contracts (GCC) of the Standard Bidding Documents (SBD) 2019. The research also proposes recommendations to address these challenges.

### **1.4 Scope of research**

The research is focused only on the public construction projects in Bhutan, including roads, bridges, and buildings using the Standard Bidding Document (SBD) 2019 for the procurement of work under the Procurement Rules and Regulations (PRR) 2019 of Bhutan.

The research investigates only the General Conditions of Contracts (GCC) of the Standard Bidding Documents (SBD).

To propose the recommendations, we examine the International Federation of Consulting Engineers (FIDIC) Conditions of Contract for Construction 2017.



## CHAPTER 2: LITERATURE REVIEW

### 2.1 Construction contracts

#### 2.1.1 Definition of construction contract

Construction contracts can be defined in many ways. A construction contract is an agreement between an employer (sometimes referred to as a client) and a contractor to construct, repair, modify, renovate or even demolish something in an agreed time frame for an agreed price and to agreed standards (Bowmans 2016). According to International Federation of Consulting Engineers (FIDIC), contract includes the contract agreement, letter of acceptance, letter of tender, any addenda referred to in the contract agreement, the conditions, specification, drawings, schedules, the contractor's proposal, Joint Venture (JV) undertaking (if applicable) and the further documents (if any) which are listed in the contract agreement or in the letter of acceptance (Lahham 2019). According to the Procurement Rules and Regulation of Bhutan, a contract is the formal document which sets out the complete agreement between the parties. It shall contain all the terms and conditions of the contract, define the rights and obligations of the contracting parties, and incorporate any documents which are necessary for the fulfillment of the contract as appropriate. Any such documents shall be clearly marked and referred to in the signed and dated contract (Ministry of Finance 2019). In summary, a construction contract is an agreement between two parties which are usually the owner and the contractor. Each of the parties will be legally bonded by the terms and conditions stipulated in the contract. The contractor must ensure that the work is delivered whereas the owner must make the payment for the work performed.

The failure of construction projects results from various factors from the planning stage till the project completion. However, several literatures reveal that major challenges occur during the construction stage, in which construction contracts are generally the legal basis for the administration of the project. It is important that the contracting parties clearly understand the terms and conditions of the contract.

According to Surahyo (2018), construction contract documents must serve the following purposes:

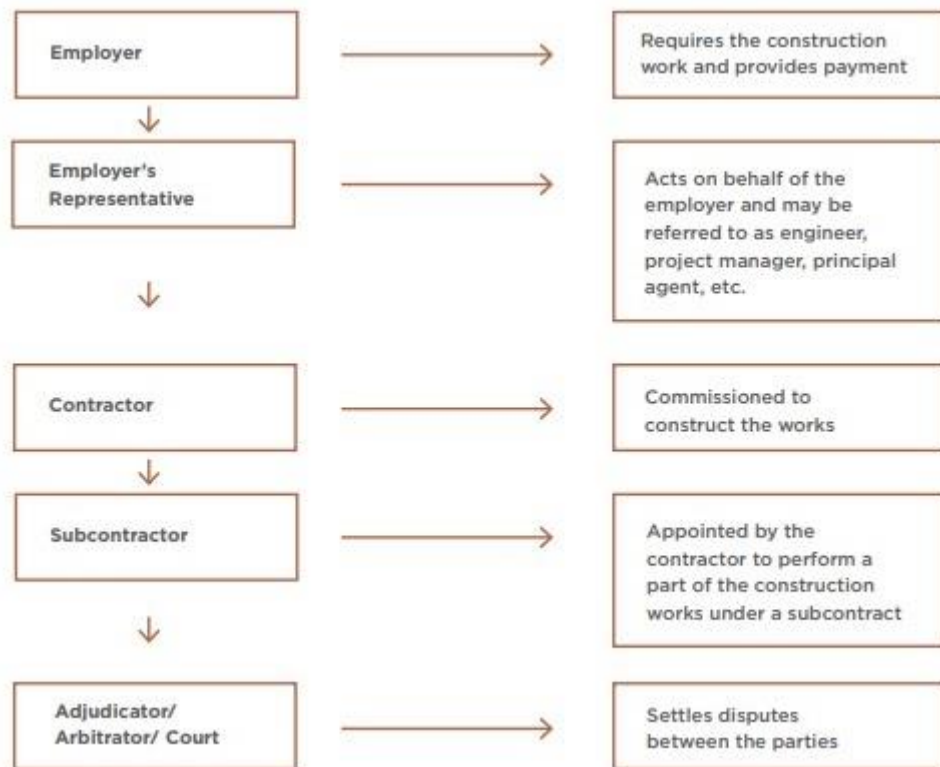
- Define the project delivery model and describes what the project involves in detail,
- Explain the scope of work and services to be performed,
- Identify materials to be incorporated into the project including their quality,
- Describe the contract obligations between the parties and the responsibilities of the consultant who administers the construction contract for the owner,
- Serve as a tool to control, monitor, administer, and manage the project, and
- Provide information for acquiring regulatory and financial approvals required for construction.

Typically, a contract must contain various essential requirements to achieve the client's satisfaction for the finished products (e.g., building, civil engineering and special trade works) in terms of functionality, on time, within budget and in accordance with the specifications and quality. In the case of Bhutan, the Procurement Rules and Regulation (2019) states that a contract shall contain:

- The purpose of the contract, which shall be clear, precise, lawful and enforceable;
- The conditions of contract;
- A set of precise and clear technical specifications including drawings; and
- A set of priced Bill of Quantities (BOQ) listing the supply or works items and their unit rates or prices.

### *2.1.2 Parties involved in construction contracts*

The owner and the contractor are the two main parties of the construction contract. Yet there are also other parties which play a crucial role towards the success of the projects. Figure 2.1 displays different parties involved in construction contracts and their roles (Bowmans 2016).



*Figure 2.1 Parties involved in construction contracts and their roles (Bowmans 2016)*

The employer usually appoints an engineer (project manager) as his representative. The engineer will administer the project on behalf of the employer and ensure that the project will be completed as desired. Depending on the contract terms and conditions, the contractor will sometimes subcontract some parts of the work to subcontractors who are specialized in it or can perform them better. Whenever there are disputes between the contracting parties, they should be settled by the adjudicator, arbitrator, or court. In addition, some parties are indirectly involved such as, suppliers who supply construction materials for the project. Any delay in supplying the required material can have a series of consequences and delay the overall project.

### *2.1.3 Types of construction contracts*

Construction contracts serve as a means of pricing overall construction works. They also structure the allocation of risk to the various parties involved (Surahyo 2018). Construction contracts can be divided into the price-based and cost-based

contracts. Lump-sum contracts (fixed price) and unit-price contracts are the two common types of price-based contracts and, cost-plus is a type of cost-based contract.

Lump-sum contracts are appropriate when the scope of the work is clear, and variations are least expected. Payments to the contractor will be made timely at the achievement of each milestone as described in the agreed contract document. In this type of contract, the risk is more on the contractor as the work must be completed within the agreed fixed price and sometimes the quality may be compromised as the contractor will try to reduce the actual cost of the work to maximize the profit. In the case of unit-price contracts, the owner provides the bill of quantities (BOQ) which contains the details of the items of works to be performed with an estimated quantity. The contractor has to quote the rate for each item. Payments will be made to the contractor for the total work done taking the individual rates of each item. Unit-price contracts are favorable when the owner is not sure about the scope of the work estimated at the beginning and changes are expected as the work progresses. The unit-price contract is used in the public construction projects of Bhutan. The government agencies provide the BOQ in the bidding document for the bidders. The awarded contractor gets the payment at the quoted rate when the work is completed. The unit price contract of Canadian Construction Documents Committee (CCDC-4) allows quantity variation up to 15 percent; whereas the FIDIC conditions of contract allow only 10 percent variation from the quantity estimated in the BOQ (Surahyo 2018). In these contracts, the quoted rates are not applicable if the actual quantities fall short or exceed these limits. In unit price contracts, the risk is borne by the owner as the final project cost is not known. Yet in this contract type, changes can be made easily using the unit prices and rates in the BOQ as the basis.

The cost-plus contract is a cost-based contract where the contractor earns the actual cost of the construction, overheads, and an agreed profit margin. Typically, payments are made monthly. However, this contract types has no direct financial incentives for the contractor to perform efficiently (Elbeltagi et al. 2016). When this type of contract is executed, the risk is minimal on the contracting parties and changes are easily accommodated. Cost plus contract is advantageous when the scope of the

work is vague and the owner wants to be equally involved in the construction process.

Choosing an appropriate contract strategy is crucial for the success of any project. A contract strategy means selecting organizational and contractual policies, means, and methods required for the execution of a specific project throughout all stages of pre-design, design, construction and post construction with a goal of meeting main project objectives (Surahyo 2018). Each type of contract can be combined with one or more types of project delivery method. Most common types of project delivery methods are Design-Bid-Build (DBB), Design-Build (DB), and Construction Manager at Risk (CMR). The owner usually selects the types of contracts based on the desired mode of payment and his risk preference. Turner and Simister (as cited in Lowe, 2004) demonstrated a technique to select the appropriate type of contract, as shown in the figure 2.2.

		Uncertainty of the Product		
		Low	High	
Uncertainty of the process	High	Fixed-Price Design and Build	Cost-Plus Design and Build Alliance	High
	Low	Remeasurement Build Only	This situation was not researched	Low
		Low	High	
		Ability of the client to intervene		

*Figure 2.2 Selecting the type of contract (Turner and Simister as cited in Lowe, 2004)*

## 2.2 Standard forms of construction contracts

There is no best standard form of contract to suit all types of construction works (Lew et al. 2014). Different construction projects require different forms of contracts. Construction projects generally require extensive contracts to express precisely the legal, financial, and technical facets of the project. Standard forms of

contracts are widely used because they provide a recognized and predictable contractual basis, save time, both in writing and in negotiating the contract, and are familiar to the project/contract management teams. These result in smoother-running projects and avoiding mistakes that could disrupt work progress (Lowe 2004). There are various professional organizations that prepare international standard forms of construction contracts which are widely used in the construction industry. The intention of producing a standard contract is to achieve a common approach by the parties to all contracts and standard interpretations of risks and responsibilities involved. Some of the well-known standard forms of construction contracts are published by the Canadian Construction Documents Committee (CCDC), the International Federation of Consulting Engineers (FIDIC), the New Engineering Contract (NEC) and the Joint Contracts Tribunal (JCT) Contracts of UK, the Engineers Joint Contract Documents Committee (EJCDC) and the American Institute of Architect (AIA) document of USA.

Although the standard contracts are widely used in the construction industry, such standard forms of contract requires further investigation (Othman 2008). Robust drafting policies of newer standard forms of conditions of contract should be adopted, rather than adhering to the perceived ideal standard contracts.

### **2.3 Challenges in administering construction contracts**

The entire project life cycle revolves around the pre-construction, construction, and post-construction stages. There are issues in every phase of construction, but major problems usually occur during the construction phase, which heavily relies on contract management (Lew et al. 2014). Construction Development Board (2019) concluded that in Bhutan most of the complications in the construction process arise in the project implementation phase. Projects and programs are the key instruments of the public sector for realizing policies, delivering transformational policy change, and building new systems. This is achieved with the support of private sectors executing the work. Public projects are often underpinned by formal contracts that binds the contracting parties to a set of legal obligations, the intent of which is to correspond to and drive the desired outcomes of the project. The contract is

constructed to legally enforce a set of mutually agreed terms and conditions (T&Cs). It acts as a fundamental reference point for the contracting parties throughout the duration of the project (Bloomfield et al. 2019). Failure of construction contracts often result in project delays, cost overrun, poor quality, conflicts, and dispute among the contracting parties.

Construction contracts are often clear and concise, but their users cannot make the best use of them. Misinterpretation and not abiding by the terms and conditions stipulated in the contract are some common challenges of construction contract administration. For example, violating the conditions of contract was a common factor that causes disputes in the public work projects in Thailand (Israngkura Na Ayudhya 2011). Although many countries have standard forms of construction contracts, successful implementation of such documents is rare. Limited studies have been carried out to address such issues. For example, in Saudi Arabia public projects have been using the one-type-fits-all national standard construction contract document since its institution in the late 1980s. Yet the contractors argue about its lack of equitability. This standard form of contract was evaluated based on 11 attributes. The survey results of the owners, contractors and consultants indicated that the contract was barely adequate, raising concerns about its efficiency and effectiveness (Ibn-Homaid 2006). In the Philippines, the Government Procurement and Policy Board (GPPB) has formulated standard bidding forms. However, they lacked consultation with contractors which are a major stakeholder, leading to major drawbacks of these documents. A study identified fifteen risks that were found to cause conflicts of risk principles, the contractors risk allocation preference, and the allocation of risk in the GPPB's GCC. The contractors were aware of this flaw but were reluctant to challenge due to the concerns of not winning any projects to sustain their business.

There are many other challenges about the construction contract administration. The following sections review some common issues, which are found in the past literature.

### 2.3.1 *Delay and cost overrun in construction projects*

In the construction industry around the world, time overruns are regarded as one of the most critical project delivery problems (Kazaz et al. 2012). Construction projects are time bound, and cost is always a constraint in project management. These limits are generally specified in the contract. Construction projects must be completed within the agreed time and budget. Various factors leading to construction project delay and cost overrun occur during the construction phase and are related to construction contracts.

Globally, challenges in the construction industry are similar and congruent. Yet these challenges are severe proportionately in developing countries and more evident during projects implementation (Cyrus et al. 2019). Some of the previous studies related to construction project delays in the developing countries are as follows.

In India, factors affecting construction projects delays were analyzed using factor analysis and regression modeling (Hemanta Doloi et al. 2012). Questionnaires and personal interviews were used to identify the key factors impacting delay in Indian construction industry. From the factor analysis, the most critical factors causing construction delay are lack of commitment, inefficient site management, poor site coordination, improper planning, lack of clarity in project scope, lack of communication, and substandard contracts. The regression model indicated that slow decisions from owner, poor labor productivity, architects' reluctance for change, and reworks due to mistakes in construction as the main reasons for the delays in the Indian construction projects.

Chan et al. (1997) conducted a survey that identified 83 delay factors in Hong Kong, including poor site management and supervision, unforeseen ground conditions, low speed of decision making by the project teams, client-initiated variations, and necessary variations of works. These are critical factors causing delays for both building and civil engineering works.

Construction delays in Thailand were explored by the surveys through unstructured interviews in 12 high rise building construction projects experiencing delays (Ogunlana et al. 1996). The results were compared with the similar studies of



other developing countries. They highlighted 26 factors causing construction delays in Thailand, which were nested into three layers: (1) problems of shortages or inadequacies in industry infrastructure (mainly supply of resources), (2) problems caused by clients and consultants, and (3) problems caused by contractor incompetence/inadequacies.

Gomelesio (2013) analyzed the delays in the government road projects in Ghana. It showed both causes and effects of project delays using opinion surveys of the contractors, consultants, and the subcontractors engaged in government projects as the primary source of data. A survey was carried out with a sample size of 40 respondents from construction projects that were due for completion by 2012. None of these projects was completed on time. Overall top 20 factors were identified and ranked in terms of their prominence. The results showed that the government's failure to make payment on time is the main cause of delays. Ametepey et al. (2018) performed another construction project delay study in Ghana but focused on local government projects. According to this study, the public construction projects in Ghana always suffered delays. The results revealed that the main causes of schedule delays in the local government construction projects in Ghana were delay in progress payments, variation orders during construction, difficulties in financing projects by contractors, delay in material delivery, and unforeseen site conditions. From these two studies, it can be noted that failure to make payments on time was the main cause of delay of public construction projects in Ghana.

Similar studies were carried out in Nigeria to analyze the causes and effects of project delay and cost escalation. Omoregie et al. (2006) identified 15 major causes of project delay and cost escalation wherein Price fluctuation was found to be the most critical factor causing price escalation followed by financing and payment of completed works, poor contract management, delay, and change in site conditions. Mohammed et al. (2012) described 43 factors that cause delay in construction projects in Nigeria. Improper planning, lack of effective communication, design errors, shortage of supply are some of the major factors in the ranking list.

An assessment of building construction projects in Uganda reported a total of 81 delay attributes. These attributes were categorized into four groups: consultant-

related delay factors, contractor-related delay factors, client-related delay factors, and external-related delay factors (Lawrence et al. 2014).

In Turkey, design and material changes were found to be the most predominant factor causing time extension in construction projects, followed by delay of payments and cash flow problems. The top ten causes of time extension were pointed via literature review and interviews (Kazaz et al. 2012).

Due to frequent and lengthy delays in the public construction projects in Saudi Arabia, Alsuliman (2019) investigated the causes of the delays of these projects. A total of 50 factors causing delay were compiled through literature review. These factors were divided into four categories based on their occurrence at different stages of the construction projects. The maximum number of factors causing delay were observed from the construction stage of the project.

In Vietnam, Kim et al. (2015) conducted a deep analysis of factors affecting the delay in the government construction projects. They suggested some appropriate solutions for countering the delay. Questionnaire surveys were distributed to 220 participants mostly from the list of the Construction Management Association in Vietnam. The analysis results indicated 31 delay factors. Based on the ranking of these delay factors by their means, the five highly ranked delay factors were information delays and lack of information exchange between the parties, incompetent owner, incompetent supervision consultant, incompetent contractor, and difficulties in financing project by owner.

In Bhutan, factors contributing to the time and cost overrun in construction projects were categorized into two groups as lapses from the procuring agency and lapses from the contractors. Lapses from the procuring agencies are improper planning, unsatisfactory site feasibility studies, design changes, incomplete specifications, noncompliance with contract conditions, disputes due to discrepancy of contract documents and weak enforcement of regulation and monitoring. Lapses from the contractors are negligence, poor site management, documentation, work planning, financial mismanagement, non-deployment of committed resources and complacency (Construction Development Board (CDB), 2019).

According to Aljohani (2017), nine out of ten projects experienced cost overrun. The main potential causes were frequent design changes, contractors' financing, and payment delay for completed work, lack of contractor experience, poor cost estimation, poor tendering documentation, and poor material management.

It is common that the construction industry is the last to accept changes brought about by new technologies compared to other industrial branches (Mitkus et al. 2008). Developed countries are very advanced in coping with the changing world by adopting new technologies rapidly but the construction industry does not seem to be much different from developing countries. Construction industries in the developed countries are also going through similar challenges as those of developing countries.

Acharya et al. (2006) explored the construction projects in Korea and came up with six pertinent conflicting factors with their importance weightage, namely differing site conditions (24.1 percent), public interruption (22.5 percent), differences in change order evaluation (21 percent), design errors (17.1 percent), excessive contract quantities variation (8.2 percent), and double meaning of specifications (7.1 percent).

The Dutch transportation infrastructure projects are challenged by scope changes as a significant reason for contract changes. The data from 45 Dutch transportation infrastructure projects were analyzed. It was concluded that compared to larger projects, small projects tended to have more relative contract change costs and contract changes due to omissions in the contract (Verweij et al. 2015).

With more emphasis on problems experienced by contractors, the performance on large contemporary construction projects in the UK was studied by Sullivan et al. (1986). Some of the major factors which led to unanticipated delays and extra costs were late receipt of information, variations, mechanical and electrical (M&E) construction and procurement delays, ground problems, and bad weather. Agyekum-Mensah et al. (2017) also explored the causes of delay from the participants experience in the UK. Thirty-two (32) empirical attributes were identified and grouped into 15 main categories such as insufficient planning, poor project management, unclear initial project objectives, communication, and inappropriate

resource management, and these were consistent with other studies and hence described as universal problems.

### 2.3.2 *Conflicts and disputes in construction contracts*

Researchers around the world have given equal efforts in analyzing and understanding the conflict and dispute issues arising from construction contracts. Disputes are insidious often resulting in time overrun, cost overrun, litigation, and sometimes the complete abandonment of projects, Sambasivan and Soon (2007) cited in Ayudhya et al. (2011). Disputes arising out of construction contracts are highly technical and complex in nature. It requires experts with special skills to resolve this kind of disputes effectively (Nishith Desai Associates 2020). Possible methods used to settle the disputes arising from the construction contract are negotiation, mediation, arbitration, or litigation. Among these, mediation was found to be the best alternative dispute resolution method as it saves both money and time (Duchaussoy 2019). Khekale et al. (2015) listed 13 subjects that usually cause most of the contractual problems:

- 1) Changes in contract works
- 2) Differing in unusual site conditions encountered
- 3) Suspension of work
- 4) Variation in quantities
- 5) Damage due to natural disasters
- 6) Re-inspection and acceptance
- 7) Termination for the convenience of the client
- 8) Possession prior to completion
- 9) Escalation of price due to inflation
- 10) Acceleration of work progress
- 11) Ripple effect
- 12) Currency fluctuation effect
- 13) Ambiguity in specifications and drawings

Some authors considered proper contract documentation as the most important for avoiding and resolving disputes while some proposed that choosing an appropriate

procurement method is a preventive method which could increase the occurrence of disputes if not done effectively (Younis 2010). Rauzana (2016) pointed out that conflicts are inevitable due to differences in the perceptions among the project participants, and conflicts can quickly turn into disputes if they are not well managed. Disputes are one of the main factors which hamper successful completion of construction projects (e.g., desired time, budget, and quality). According to Acharya et al. (2004), successful completion of a conflict-free project is desirable for project executors, yet it is difficult to attain due to the involvement of numerous people with an interest of their own. Jaffar et al. (2011) conducted literature review on the factors of conflicts in the construction industry and summarized the factors of conflict resulting from contractual problems such as late giving of possession, delay interim payment from client, and unclear contractual terms.

#### 2.4 Probability-Impact matrix

Probability-impact matrix is a qualitative assessment method based on the likelihood of occurrence and the impact of an event on the project. It is commonly used in risk analysis process to categorize and prioritize the risk factors. The likelihood and impact of the factors are assessed through interviews and surveys with experienced stakeholders and experts in the subject. The priority level of a factor is the product of likelihood and impact:

$$PL = L \times I \quad (1)$$

where  $PL$  = Priority Level

$L$  = Likelihood

$I$  = Impact

Higher the combined score of the likelihood and impact, higher the priority level of the factors and vice-versa. The probability-impact matrix can help in identifying the critical factors in the project and hence enable the management to adopt the best response measure and control the project better.

Dumbravă et al. (2013) explained about using probability-impact matrix in analysis and risk assessment of projects. According to this author, the probability-

impact matrix is a qualitative method for assessing the risk and it yields descriptive results, which can be easily understood by decision makers. The probability-impact matrix has been used for risk assessment in several researches (Botha et al. 2019; Do et al. 2017; Kassem et al. 2019). The authors have divided the matrix into different number of zones to conduct the risk assessment. For instance, Kassem et al. (2019) used probability-impact matrix to analyze risk factors of oil and gas construction projects in Yemen and he considered five zones in the matrix, ranging from very low to very high zones. Botha and Badenhorst-Weiss (2019) used impact versus probability risk matrix to evaluate risks for risk management in a bulk coal export logistic chain in South Africa. The matrix was divided into three zones as; L (low likelihood/impact), M (medium likelihood/impact) and H (high likelihood/impact) as indicated by the colors green, yellow and red respectively in Figure 2.3.

Impact of Risk	Extreme	5	M	M	H	H	H
	High	4	L	M	M	H	H
	Medium	3	L	M	M	M	H
	Low	2	L	L	M	M	M
	Negligible	1	L	L	L	L	M
			1	2	3	4	5
			Rare	Unlikely	Possible	Likely	Almost certain
			Probability of Risk				

*Figure 2.3 Probability-Impact Matrix (Botha and Badenhorst-Weiss 2019)*

## 2.5 Conclusion

The use of standard contracts for construction projects can help administer the projects effectively. Contracting parties prefer adopting the standard construction contract as they become familiar with provisions of these documents, and moreover standard contracts encapsulate almost all the required conditions for the execution of project with minimum disputes among the parties.

It is critical to choose an appropriate type of contract based on the nature and requirement of an individual project. Generally, the owner is the party that selects the type of contract for the project and the contractor must abide by the terms and conditions of the contract signed. Despite the efforts from different perspectives to design a good contract for a long time, contractual problems are still a challenge in administering the construction projects. One of the reasons of not being able to avoid the challenges in contract administration is due to the involvement of several parties, with interests of their own.

According to past literatures, some of the common challenges that occur during the construction stage are variation and deviations from the initial contract, payment issues, poor communication among the contracting parties, improper planning, unforeseen ground condition, etc. The summary of contractual problems from the literature review is compiled and presented in Appendix A.

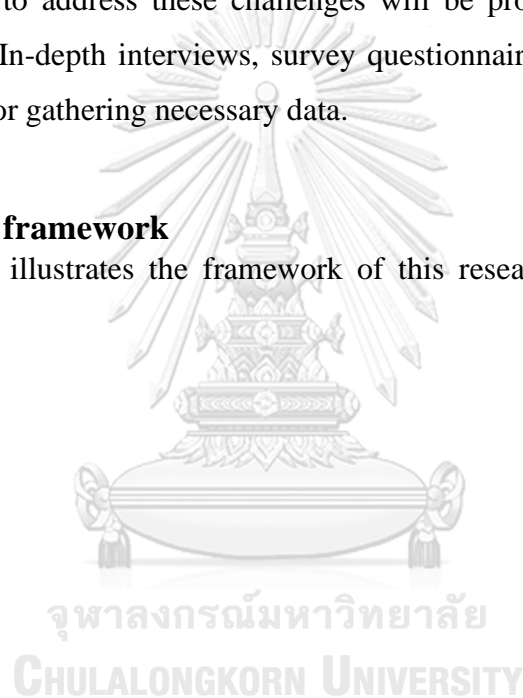
The challenges in managing the public construction projects in Bhutan have been persistent for a long time but no related study have been found in the past literature. There are few studies and reports on the performance of public construction projects in Bhutan but none of them investigated the problems with regard to the standard construction contract, which is the main tool for administering the construction projects. The standard construction contract is perceived as the most ideal document but as mentioned in one of the past literatures, in section 2.2, even the standard contracts require investigation. Therefore, this research investigates the standard form of construction contract of large public projects in Bhutan and propose possible improvements to the existing provisions of the form of contract.

## CHAPTER 3: RESEARCH METHODOLOGY

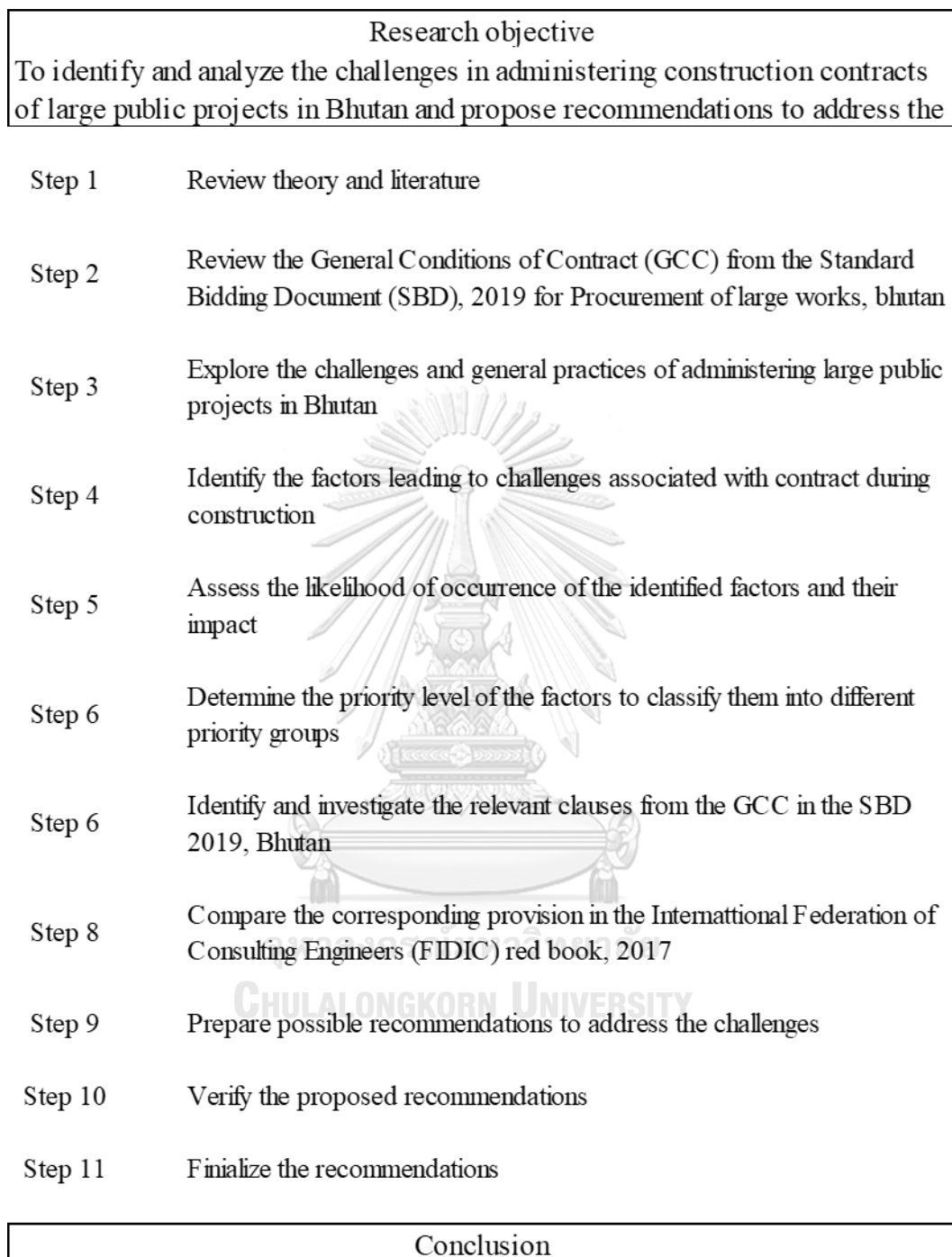
This chapter describes the research framework and the methods adopted to achieve the objective of identifying, analyzing, and managing the challenges in administering the construction contracts of the large public projects in Bhutan. The following sections discuss the research steps, and the data analysis processes for the identification and analysis of challenges encountered by the practitioners in administering the construction contract of the large projects in Bhutan in detail. The recommendations to address these challenges will be proposed and validated by a group of experts. In-depth interviews, survey questionnaires, and document analysis are used as tools for gathering necessary data.

### 3.1 Research framework

Figure 3.1 illustrates the framework of this research, which consists of 11 steps.







*Figure 3.1 Research Framework*

*Step 1 Review theory and literature*

A variety of resources are explored to gain insight of construction contracts and their practices in different countries. Theories and literature are searched and reviewed on various topics such as definitions and types of construction contracts, standard forms of construction contracts, and challenges in construction contract administration.

*Step 2 Review the General Conditions of Contract (GCC) in the Standard Bidding Document (SBD), 2019 for Procurement of Works (large works), Bhutan*

The General Conditions of Contract (GCC) in the Standard Bidding Document (SBD), 2019 for procurement of works above Nu. 5 million of Bhutan is reviewed to understand its purpose, general structure, and provisions.

In Bhutan, the Procurement Rules and Regulations (PRR) 2019 and the SBD are the legal framework for any public procurement of goods, works, and services through National Competitive Bidding (NCB). The documents are prepared and regulated by the Government Procurement and Property Management Division (GPPMD) under the Ministry of Finance. The government agencies are mandated to use the SBD in conjunction with the PRR for preparing the bidding documents. There are two types of SBD for the procurement of works based on the estimated value of the work as shown in Table 3.1.

*Table 3.1 Types of Standard Bidding Document (SBD)*

<b>Standard Bidding Document</b>	<b>Estimated value of the work</b>
Procurement of works (large)	Above Nu. 5 million
Procurement of works (small)	Below Nu. 5 million

*[Bhutanese Ngultrum (Nu.) 1=USD 74.35 as of January 15, 2021]*

The SBD for procurement of works (large) has ten sections as follows.

Section I      Instructions to bidders (ITB)

Section II	Bidding data sheet (BDS)
Section III	Eligible countries
Section IV	Evaluation and qualification criteria
Section V	Bidding forms
Section VI	General conditions of contract (GCC)
Section VII	Special conditions of contract (SCC)
Section VIII	Specifications and performance requirements
Section IX	Drawings
Section X	Contract forms.

The information about the contract specific needs of the agencies is provided in the BDS and the SCC. The detailed technical requirements are included in specifications and performance requirements as well as drawings. Once the work is awarded to the winning contractor, the form of GCC along with the SCC is the principal contract document between the government agency and the contractor to administer the project. This standard form of contract is designed to be used for unit-price contracts and lump-sum contracts with the traditional project delivery method (design-bid-build, DBB). The bidders have to quote their bid prices according to the design of the project provided by the agency. The GCC consists of five sections. Section A (General) contains the definition and interpretation of some important terms used in the contract, the risks of each of the parties, the purpose and requirement of insurance for the work, as well as the procedure for dispute resolutions among the parties. Section B (Time Control) provides mechanisms such as programs and progress reports to ensure that the project is completed within the scheduled time. The provisions for a time extension and delay orders are also included in this section. Section C concerns the quality control of the project. Section D presents cost control, which includes issues such as variations and price adjustments, payment, compensation events, liquidated damages, and other similar provisions. The last section, Section E completion of the contract, incorporates the provisions regarding project closeout, taking over the work, settling the final account, termination, and payment upon termination.

*Step 3 Explore the challenges and general practices of administering the large public projects of Bhutan*

In-depth interviews were conducted to gather the data about the challenges encountered by the practitioners in administering construction contracts of the large public projects in Bhutan. Interviews provide the opportunity to interact with the participants and can provide more detailed and comprehensive information. A group of practitioners are selected as the participants for the interviews using the purposive sampling method, which is a nonrandom choice of an informant due to the qualities the informant possesses (Tongco 2006). Semi-structured questions are used in the interviews because they are flexible and can keep the discussions within the subject matter. The conversation of the interviews is recorded for further analyses.

*Step 4 Identify the factors leading to challenges associated with contracts during the construction stage*

The contents of the conversation from the interview are analyzed to compile the factors causing challenges in administering the construction contracts of the large public projects. The factors are categorized into three groups: pre-construction stage, construction stage, and general issues. The factors under the construction stage are identified as the factors causing challenges associated with the contract during the construction stage. These factors are taken forward for further analyses.

*Step 5 Assess the likelihood of occurrence of the identified factors and their impacts on the project*

Based on the factors identified through the in-depth interviews, a survey questionnaire is prepared and distributed to government engineers and the contractors to determine their likelihood of occurrence and their impacts on the project. The participants are expected to use their knowledge and work experience to evaluate the likelihood of occurrence and the impact of the factors on the project. A five-point Likert scale is used to assess the likelihood and impact, as shown in Tables 3.2 to 3.4.

Table 3.2 Likelihood of occurrence

Likelihood level	Score	Description
Never	1	Not even once
Rare	2	1-3 times in 10 projects
Likely	3	4-5 times in 10 projects
Almost certain	4	6-7 times in 10 projects
Certain	5	8-10 times in 10 projects

Table 3.3 Impact on time

Impact on time	Score	Description
Negligible	1	Less than 10% delay
Low	2	10-30% delay
Medium	3	30-50% delay
High	4	50-70% delay
Extreme	5	More than 70% delay

Table 3.4 Impact on cost

Impact on time	Score	Description
Negligible	1	Less than 10% cost overrun
Low	2	10-30% cost overrun
Medium	3	30-50% cost overrun
High	4	50-70% cost overrun
Extreme	5	More than 70% cost overrun

*Step 6 Determine the priority level of the factors to classify them into different priority groups*

The priority level of the factors is determined by the average scores of the likelihood of occurrence and the impact from the survey. The priority level of a factor is the product of likelihood and impact as described in equation (1) in chapter 2. A likelihood-impact matrix is used to classify the factors causing challenges associated with the contract during the construction stage into three groups: low-priority (green zone), medium-priority (yellow zone), and high-priority (red zone) as shown in Figure 3.2. The matrix is adopted and modified from Botha and Badenhorst-Weiss (2019),

wherein the probability-impact matrix was used for risk assessment. For this research likelihood is used instead of the probability.

Impact	Extreme	5	5	10	15	20	25
	High	4	4	8	12	16	20
	Medium	3	3	6	9	14	15
	Low	2	2	4	6	8	10
	Negligible	1	1	2	3	4	5
			1	2	3	4	5
			Rare	Unlikely	Possible	Likely	Almost Certain
			Likelihood				

*Figure 3. 2 Likelihood-Impact matrix*

In this research, the likelihood of occurrence is represented by the score, rather than the probability. For example, if the score of the likelihood of occurrence of factor 1 (F1) is 5 and the score of its impact is also 5, the priority level of F1 can then be calculated by multiplying these two scores (i.e., 25). F1 with the priority level of 25 will fall into the high-priority (red) zone, for which the likelihood of occurrence is certain and the impact on the project is extreme. Similarly, for factor 2 (F2) with the likelihood of occurrence score of 1 and the impact score of 1, the priority level will be 1. It is therefore in the low-priority zone (green). F2 rarely occurs and its impact on the project is negligible. The challenges caused by the factors in the low-priority group are just noted, considering no or minor effect on the project. Thus, recommendations are proposed only for the challenges caused by the factors in the medium-priority and high-priority groups.

*Step 7 Identify and investigate the relevant clauses of GCC from the SBD, 2019 for the procurement of the large works in Bhutan*

In this step, we identify and investigate the clauses in the GCC which are relevant to the challenges caused by the factors in the medium-priority and high-priority zones. If related provisions are not found, it is considered ‘*not available.*’ If the relevant provisions are found, they are further investigated to check if the existing clauses address the challenge adequately. The modification of the existing clauses will then be proposed.

*Step 8 Compare the provisions of the GCC of Bhutan with the corresponding clauses of the International Federation of Consulting Engineers (FIDIC) Conditions of Contract (COC) for Construction, 2017*

It may not be justified if the proposed contract modifications are solely based on the perception of the research participants and the knowledge of the researcher. Thus, the adjustments to the existing clauses are also justified by comparing them with those of an international standard form of construction contract. We can obtain more appropriate and consistent recommendations. In this research, the FIDIC Conditions of Contract (COC) for Construction (2017) or FIDIC Red Book (second edition) is selected for this purpose because FIDIC is an international standard form of construction contract that is recognized and used globally. FIDIC has a balanced approach to the roles and responsibilities of the parties involved in a contract.

*Step 9 Prepare recommendations to address the challenges caused by the identified factors*

Based on the comparison of the proposed modifications with the relevant clauses in FIDIC in the previous step and the suggestions from the respondents of the in-depth interview, the recommendations are prepared to address the challenges in administering the construction contracts of the large public projects.

*Step 10 Verify the proposed recommendations*

Generally, the qualitative research approach is criticized for producing subjective results as the results are derived from the views and opinions of the

participants as well as the knowledge interpretation of the researcher. Thus, the verification of the proposed recommendation is necessary. The elicitation of opinion from the experts is a formal process for obtaining information or answers to specific questions where the information is highly subjective (Creedy et al. 2010). The proposed recommendations of this study are validated by a group of experts through Delphi technique.

Delphi technique is a structured process of collecting group consensus. It has been presented as a survey, study, procedure, method, approach, polling, and technique (Habibi et al. 2014). This technique is effective when researchers need to collect ideas from isolated experts on a specific topic and establish an agreement to discover the underlying assumptions or perspectives among the experts. A panel consisting of several experts will be formed and the proposed recommendations will be discussed with each of them for their opinions and comments. The proposed recommendations will be either emailed to the experts or discussed via online conversation using various social media platforms depending on convenience. The comments will be compiled and again discussed with the experts, before we finalize the recommendations. The process could be repeated until a common consensus among the group members is achieved. A panel of experts consists of individuals who are relevant to the construction industry of Bhutan. The experts might be procurement professionals, senior practitioners from the government agencies, and the contractors.

#### *Step 11 Finalize the recommendations*

The recommendations prepared after the verification by the experts using Delphi technique in the previous step will be compiled and concluded as the final recommendations to address the challenges in the large public construction projects of Bhutan.

### **3.2 Data collection**

In this research, the data was collected between May 2020 and March 2021. The details of the data collection process in this research are as follows.



### 3.2.1. Literature review

Relevant theories and literature from different sources were obtained from journal articles, conference proceedings, textbooks, newspapers, reports, films and broadcasts, as well as websites to gain the insight about construction contracts and to explore general contractual problems in different countries. The information about general practices for dealing with the challenges in different countries are useful for deriving possible solutions for some challenges in Bhutan.

### 3.2.2. In-depth interview

Face-to-face and online in-depth interviews were conducted to explore the common challenges in the public construction projects of Bhutan and understand the general practices to manage the challenges. Semi-structured questions were used. The respondents included procurement professionals, government engineers, project managers, and contractors registered with the Construction Development Board (CDB). The number of interviewees commonly range from eight to 30, depending on the topic and length of the interview (Philadelphia 2016). In this research, a total of 14 respondents were selected for this interview. Table 3.5 shows the distribution of the respondents in this research.

Table 3.5 Number of respondents for the in-depth interview

	<b>Respondent</b>	<b>Number</b>
1	Procurement professionals	3
2	Contractors Association of Bhutan (General Secretary)	1
3	Government engineer/project manager	5
4	Contractor	5
	<b>Total</b>	<b>14</b>

The respondents with the minimum experience of five years were selected. All the participating contractors were certified by the Construction Development Board (CDB) of Bhutan. The CDB is a government agency bridging between the private

sector and the public sector in Bhutan. Its key functions encompass registration, classification and monitoring of contractors, consultants, and engineers/architects.

The availability and the willingness of the selected respondents for the interview were first confirmed via email or telephone. After the confirmation, interviews were conducted either face to face or online. The online interviews were conducted using various social media platforms depending on the convenience. Each interview lasted between 30 minutes to one hour.

The following questions were asked to explore the challenges the respondents were facing in administering the public construction projects using the standard construction contract. However, it was an open-ended discussion, which was not limited only to the framed questions.

- 1) General information (number of years of experience, contact number, email addresses)
- 2) What do you find the most challenging in executing and administering the public construction projects in Bhutan?
- 3) Can you tell me what are the general practices to overcome such challenges are?
- 4) Since the public construction projects are guided by the General Conditions of Contract (GCC) in the Standard Bidding Document (SBD) for procurement of works in Bhutan, how do you think the related provisions in the GCC can be improved to reduce such problems?

### 3.2.3. Questionnaire Survey

A questionnaire was used to gather the information on the likelihood of occurrence and impact of the identified factors causing challenges in contract administration. The questionnaire was created based on the factors identified previously by the in-depth interview. The respondents were asked to evaluate each of the factors on a five-point Likert scale to assess the likelihood of occurrence and the impact based on their knowledge and work experience. The priority level was then determined from the scores, which were mapped into the impact-likelihood matrix to classify the challenges into three groups: high-priority, medium-priority, and low-priority.

The questionnaire was created in *Google Forms*, which consists of four parts. Part 1 gathers the general information of a participant. Part 2 assesses the likelihood of occurrence of the factors in the public projects of Bhutan. Part 3 and 4 assess the impact of the factors on project time and cost, respectively. It was distributed to qualified government engineers and contractors via email. The email addresses of the government engineers were obtained from the website of Ministry of Works and Human Settlement. The email addresses of the contractors were provided by the Contractors Association of Bhutan (CAB). There are 20 districts in Bhutan, and each engineering division is headed by a district engineer. Since most of the infrastructure development works are carried out at the individual district level, the questionnaires were emailed to all 20 district engineers. The sample size for the contractors was calculated by applying the same formula used for the sample size calculation of contractors in the Annual Report 2018-2019 of Construction Development Board (CDB), Bhutan (Construction Development Board 2019), as follows.

$$\text{Sample size} = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left( \frac{z^2 \times p(1-p)}{e^2 N} \right)} \quad (2)$$

where N = Population size

e = Margin of error

z = Z score

Currently, the total number of the large and medium contractors in Bhutan is 514. Considering a confidence level of 85% and margin of error of 10%, the formula yields the sample size of 48. Herein, the questionnaire was emailed to 50 large and medium contractors.

## **CHAPTER 4: CHALLENGES IN CONTRACT ADMINISTRATION**

This chapter explains the process of identification and analysis of the challenges in administering the construction contracts of large public projects of Bhutan. The challenges are investigated by identifying the factors leading to the disagreement between the contracting parties during the construction stage. First, in-depth interviews were conducted to explore the common factors causing challenges in administering the large public projects of Bhutan. From the results of the interview, the factors which contribute to the challenges associated with the construction contract were identified for further analyses. After the analysis, priority level of these identified factors was determined using a likelihood-impact matrix.

### **4.1 Identification of the factors contributing to the challenges associated with contract during construction**

#### *4.1.1 Exploring the common challenges of administering the large public projects of Bhutan*

In-depth interview with experienced practitioners was conducted to explore the common factors contributing to the challenges in administering the large public projects of Bhutan.

##### *Demographic profile of respondents of in-depth interview*

A total of 14 respondents agreed to participate in our interview: Five respondents were government engineers with work experience from nine to 29 years. Five participants represented large- and medium-sized contractors registered with the Construction Development Board (CDB) of Bhutan. They had work experience ranging from five to 13 years. Three procurement professionals were included because they play an important role in developing the procurement policies of Bhutan. They also understand the scope and limitation of construction contracts in general. The General Secretary of the Contractors Association of Bhutan (CAB) was one of

the respondents because he is an important link between the contractors and the government and is considered a good source of information. All the respondents possessed more than five years of work experience. Table 4.1 outlines the details of the respondents for our in-depth interview.

*Table 4.1 Details of the participants of the in-depth interview*

<b>Sl. no</b>	<b>Name of respondent</b>	<b>Category of profession</b>	<b>Work experience (Years)</b>
1	Participant 1	Government Engineer/Project manager	11
2	Participant 2	Government Engineer/Project manager	12
3	Participant 3	Government Engineer/Project manager	29
4	Participant 4	Government Engineer/Project manager	9
5	Participant 5	Government Engineer/Project manager	20
6	Contractor 6	Medium contractor	7
7	Contractor 7	Medium contractor	7
8	Contractor 8	Large contractor	5
9	Contractor 9	Large contractor	12
10	Contractor 10	Large contractor	8
11	Participant 11	Procurement professional	15
12	Participant 12	Procurement professional	8
13	Participant 13	Procurement professional	10
14	Participant 14	General Secretary (CAB)	20

#### *Results of the in-depth interview*

From the in-depth interview, a total of 26 factors contributing to the challenges in administering the large public projects were compiled as shown in Table 4.2. As can be seen, these factors can be grouped into three categories based on the nature of occurrence: the pre-construction stage, the construction stage, and general issues. All these factors affect the overall performance of the projects directly or indirectly. Some factors such as poor estimates prepared by the employer, unrealistic project duration, awarding the work to the lowest financial bidder, and incompetent contractor exist before construction. Factors such as the requirement of separate

standard construction contract for medium and large public projects, non-compliance and misinterpretation of contract provisions and labor shortages effect the project performance but these are general issues, which needs different strategies to manage. Therefore, these factors are grouped separately as: General issues.

*Table 4.2 Result of the in-depth interview*

<b>Pre-construction stage</b>		<b>Construction stage</b>		<b>General issues</b>			
1	Poor estimates by employer	1	Committed resource of contractor	2	Extreme weather	1	No separate standard contract document for medium and large public projects
2	Unrealistic project duration	3	Poor supervision by employer	4	Employer-related variation	2	Non-compliance with contract
3	Insufficient planning	5	Performance security	6	Delay in material procurement	3	Misinterpretation of contract provisions
4	Confidentiality of bid evaluation report	7	Delay in progress payment	8	Misuse of mobilization advance payment by contractor	4	Labor shortage
5	Low bid award	9	Lack of value engineering	10	Cost of temporary utilities		
6	Inadequate drawing and specification	11	Delay due to disputes	12	Delay in taking over the completed work by employer		
7	Incompetent contractor	13	Incorrect rating of contractor's performance	14	Lack of provision about cost compensation		
		15	Lack of workers compensation insurance				

#### 4.1.2 Identification of the factors contributing to challenges associated with the contract during construction

In this research, we focus only on the factors that can be addressed by the standard form of contract and are associated with the construction stage. The original 26 factors that were derived through the in-depth interview were reduced to 15 factors, as tabulated in Table 4.3. These 15 factors were subsequently analyzed. It should be noted that most of the identified challenges are similar to the contractual issues in other developing countries identified in past literature. However, we found a number of unique challenges in Bhutan such as lack of the value engineering concept, inaccurate rating of contractor's performance after the completion of the project, lack of workers compensation insurance, and delay in taking over the completed work by the employer.

*Table 4.3 Factors causing challenges associated with the contract during construction*

1 Committed resource of contractor	2 Extreme weather
3 Poor supervision by employer	4 Employer-related variation
5 Performance security	6 Delay in material procurement
7 Delay in progress payment	8 Misuse of mobilization advance payment by contractor
9 Lack of value engineering	10 Cost of temporary utilities
11 Delay due to disputes	12 Delay in taking over the completed work by employer
13 Incorrect rating of contractor's performance	14 Lack of provision about cost compensation
15 Lack of workers compensation insurance	

#### *Description of the challenges caused by the factors identified in the above table.*

The following are the brief description of the challenges in contract administration caused by the factors identified. The challenges are discussed in more detail in chapter 5.

#### *Committed resource of contractor*

In Bhutan, contractors are permitted to operate in multiple projects at a time. However, they usually have limited resources such as heavy equipments. If the

contractors commit the same resources to multiple projects, it is likely that they might fail to ensure the availability of the resources at the jobsites.

#### *Extreme weather*

In the standard construction contract of Bhutan, an extreme weather condition is not a compensable delay. However, in some cases where the effect of weather on the project is severe, contractors may be able to appeal to the authorities for an extension of time and/or cost compensations.

#### *Poor supervision by employer*

The role and knowledge of the employer and employer's representative is important for the success of the project. If the employer's representative is incompetent, the project cannot be managed effectively.

#### *Employer-related variation*

In the public construction projects of Bhutan, most of the variations result from frequent change of the employer's representatives, financial problems, and changes required as the project progresses. These variations disrupt the contractor's work plan, and cause project delays and cost overruns.

#### *Performance security*

When a contract is signed, the project owner requires the contractor to furnish a performance security to guarantee that the work will be completed as agreed. If the contract is terminated due to the contractor's default, the employer is entitled to claim the performance security. The standard form of construction contract of Bhutan does not have any provision about the forfeiture and the return of performance security during termination of contract.

#### *Delay in material procurement*

When contractors procure materials and equipment for the project, some suppliers require a full upfront payment. The current standard form of contract permits an advance payment for the material procurement only if the items are



delivered at the site. The contractor's failure to make this payment on time may delay its material procurement.

#### *Delay in progress payment*

The payments in construction projects are made when the completed work is informed by the contractor and verified by the employer. The verification process by the engineer is usually prolonged, which in turn delays the progress payments to the contractors.

#### *Misuse of the mobilization advance payment by contractor*

In some cases, the contractor misuses the mobilization advance payment provided by the employer to start the work and fails to commence the work as agreed in the contract.

#### *Lack of value engineering*

Once the contract is finalized, the standard form of construction contract of Bhutan does not have any provisions to encourage either party to propose any new changes to improve the efficiency of the project. An addition of new knowledge and technologies should be encouraged. The project owner should allow a value engineering changed proposal (VECP) by the contractors.

#### *Cost of temporary utilities*

Once the site is handed over to the contractor, the cost of any temporary utilities such as water and electricity for the execution of the project must be borne by the contractor only. In many cases, the contractors in Bhutan argued that the employer should share these costs.

#### *Delay due to disputes*

During the project execution, the conflicts and disputes between the contracting parties are resolved via various means such as mediation, arbitration, adjudication, and litigation. The dispute resolution processes are usually time-consuming. In the public projects of Bhutan, the representatives of the parties are

sometimes fully engaged in resolving the issues and fail to perform their duties in maintaining the progress of the project.

*Delay in taking over the completed work by the employer*

In construction contracts, time limits are usually specified for any major process required for the project. However, the current standard form of construction contract of Bhutan does not specify a time limit for the employer to take over the work from the contractor when it is completed. The contractor must depend on the employer to close out the project. When the process of closing the project is delayed by the employer, it affects the cashflow of the contractor and also prevents the contractor from participating in another project.

*Incorrect rating of the contractor's performance*

In Bhutan, once the project is completed, the engineer of the employer must rate the performance of the contractor and issue a certificate called the Average Performance Score (APS). The purpose of the APS is to differentiate the contractors performing well from those performing poorly. However, such ratings in practice are mostly based on the personal relation between the parties, which results in an unfair evaluation of the contractor's performance.

*Lack of the provision about cost compensation*

Typical construction contracts entail time and cost compensations. Yet, the standard form of construction contract of Bhutan has only time compensation.

*Lack of worker's compensation insurance*

The worker's compensation insurance is required by law in most of the countries to compensate for any injury, sickness, diseases, or death of any person employed by the contractor. In the construction contracts of Bhutan, insurance is required only for the work, plant, and materials to be built in the work. There is no requirement of a compensation insurance for the workers.

## 4.2 Analysis of the identified factors

For the analysis, the 15 factors contributing to the challenges of contract administration during construction identified previously were further categorized into three groups. Questionnaires were prepared based on these factors to assess their likelihood of occurrence and impact and priority level of each factor was determined by multiplying the average scores of its likelihood of occurrence and impact. Herein, the likelihood of occurrence was measured in terms of the frequency of occurrence of a factor during construction. The impact of a factor is measured by considering its consequence on project time and cost.

### *Categorization the identified factors*

For the purpose of analysis, the 15 factors identified previously were categorized into three groups as shown in Table 4.4. As can be seen, C1, C2, C3, C4, C5, and C6 refer to the contractor-related factors. E1, E2, E3, E4, E5 and E6 are the employer-related factors. The factors related to both parties are represented as B1, B2, and B3.

*Table 4.4 Categories of the factors contributing to the challenges*

Contractor-related		Employer-related	
C1	Committed resource (Personnel & equipment)	1	E Poor supervision
C2	Delay in material procurement	2	E Variation
C3	Misuse of mobilization advance	3	E Performance security during contract termination
C4	Value engineering	4	E Delay in progress payment
C5	Cost of temporary utilities	5	E Delay in taking over the completed work
C6	Workers compensation insurance	6	E Incorrect rating of contractor's performance
B1. Extreme weather			
B2. Delay due to disputes			
B3. Lack of provision for cost compensation event			

#### 4.2.1 Questionnaire survey

These 15 factors were listed in a survey questionnaire to assess their likelihood of occurrence and impact on project time and cost. Appendix B contains a sample of the questionnaire used for this purpose. To test the practicality of the questionnaire, it was first emailed to five respondents and it was then modified as per their suggestions. The modified questionnaires were then emailed to 20 government engineers and 50 medium and large-sized contractors in Bhutan. However, only 13 of 20 (65%) government engineers and 15 of 50 (31%) contractors returned valid responses (i.e., the overall response rate is 40%). The response rate of 20 to 30% is acceptable for a postal questionnaire in the construction industry (Lew et al. 2014). As a result, our overall response rate of 40% can be considered adequate. However, it should be noted that the response rate from the contractors was quite low. Currently, there are 514 medium and large-sized contractors; therefore, the sample size is 50. Despite the repeated follow-ups, we could obtain only 13 responses out of 50 samples. As a result, the information gathered from the contractors in this research may not represent the entire industry.

Part 1 of the questionnaire concerns the general information of a respondent, which includes the number of years of work experience and the work category. All the government engineers who participated in the survey had more than five years of work experience. Five of them had more than 20 years of work experience. Regarding the contractors, one respondent has fewer than five years of work experience, and two had more than 20 years of work experience. In general, most of the respondents had work experience between five and ten years. Table 4.5 summarizes the information of the respondents.

*Table 4.5 Details of the survey respondents*

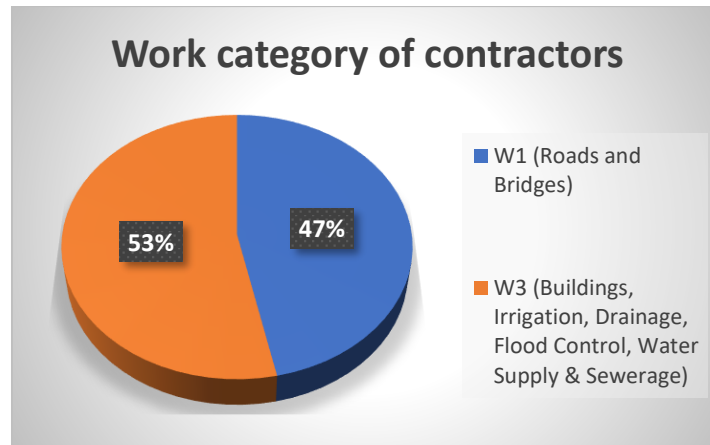
Respondents	Sample size	Response submitted	Work experience
Government engineers	20	13 (65%)	Less than 5yrs – 0 respondent 5-10yrs - 5 respondents 10-20yrs - 3 respondents More than 20yrs - 5 respondents
Contractors	50	15 (30%)	Less than 5yrs - 1 respondent 5-10yrs - 6 respondents 10-20yrs - 6 respondents More than 20yrs - 2 respondents

*Work category*

According to the Construction Development Board (CDB), the public infrastructure projects in Bhutan are divided into four categories:

- W1 Roads and Bridges
- W2 Traditional Bhutanese Painting/Finishing Works
- W3 Buildings, Irrigation, Drainage, Flood Control, Water Supply and Sewerage
- W4 Power and Telecommunication Works

The contractors participating in our survey represented work categories W1 and W3, as illustrated in Figure 4.1. The government engineers did not represent a specific work category because they have to administer all types of works within their agency.



*Figure 4.1 Work categories of the contractors*

#### *4.2.2 Analysis of likelihood of occurrence of the identified factors and their impact on time*

##### *Assessment of likelihood of occurrence and impact on time*

Part 2 of the questionnaire concerns the assessment of likelihood of occurrence of each factor. The survey results indicate that the factors that are most likely to occur in administering the construction contracts of large public projects of Bhutan are the absence of committed resource from the contractor, misuse of mobilization advance by the contractor, cost of temporary utilities, and effects of the extreme weather condition on the projects. Meanwhile, the claim of the performance security during contract termination is least likely to occur.

Part 3 of the questionnaire is designed to measure the impact of a factor on the project time. The survey results show that the factors having the highest impact on the project time are misuse of mobilization advance by the contractor, absence of committed resource from of contractor, and delay in material procurement. In contrast, delay in taking over the completed work by the employer and claim of performance security during contract termination have the minimum impact on the project time.

### *Determination of priority level of the factors*

The priority level of each factor is determined by multiplying the average scores of the likelihood of occurrence and the impact on the project time. Table 4.6 shows the average scores of likelihoods and time impact of the factors from the survey. As can be seen, the factor with the highest priority level is misuse of mobilization advance by the contractor. The factor with the lowest priority level is claim of performance security during the termination of contract.

*Table 4.6 Priority level based on the likelihood of occurrence and time impact*

Factors	Impact on		Priority Level
	Time	Likelihood	
C3 Misuse of mobilization advance by contractor	3.1	3.0	9.30
C1 Committed resource of contractor	3.1	3.0	9.30
C2 Delay in material procurement	3.1	2.9	8.99
B1 Extreme weather	2.9	3.0	8.70
C5 Cost of temporary utilities	2.8	3.0	8.40
E4 Delay in progress payment	2.9	2.9	8.41
C4 Lack of value engineering	2.9	2.8	8.12
E6 Incorrect rating of contractor's performance	2.9	2.7	7.83
E2 Employer-related variation	2.8	2.8	7.84
B2 Delay due to disputes	2.7	2.7	7.29
B3 Lack of provision about cost compensation	2.6	2.8	7.28
C6 Lack of workers compensation insurance	2.5	2.6	6.50
E1 Poor supervision by employer	2.6	2.5	6.50
E5 Delay in taking over the completed work by employer	2.3	2.3	5.29
E3 Performance security	2.3	2.1	4.83

### *Likelihood of occurrence and time impact matrix*

The average scores of the likelihood of occurrence and the time impact of every factor are plotted on a likelihood of occurrence and time impact matrix. All the factors can then be categorized into three groups represented by three different colors: red for high-priority, yellow for medium-priority, and green for low-priority, as

shown in Figure 4.2. As can be seen, all 15 factors are in the medium-priority group, and none is in the high- or low-priority group. However, it can be noted that most of the contractor-related factors has higher priority level compared to the employer-related factors.

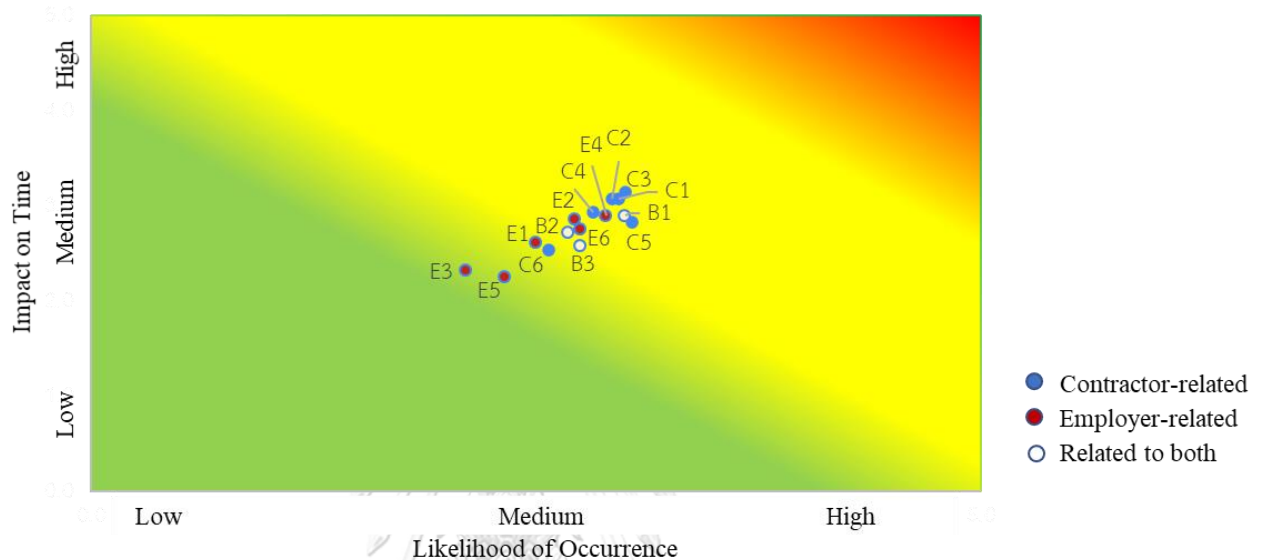


Figure 4.2 Likelihood of occurrence and time impact matrix

#### 4.2.3 Analysis of likelihood of occurrence of the identified factors and their impact on cost

##### Assessment of likelihood of occurrence of the identified factors and their cost impact

The last part of the questionnaire is designed to measure the impact on the project cost. Our survey results show that the cost of temporary utilities borne by the contractors has the highest impact on the project cost. Delay in taking over the completed work by the employer has the minimum cost impact.

##### Determination of priority level of the factors

The priority level of each factor is determined by multiplying the average scores of the likelihood of occurrence and the cost impact. Table 4.7 displays the average scores of likelihoods and cost impact of the factors from the survey. As can be seen, the factor with the highest priority level is the cost of temporary utilities. The



factor with the lowest priority level is delay in taking over the completed work by the employer.

*Table 4.7 Priority level based on the likelihood of occurrence and the cost impact*

Factors		Impact on Cost	Likelihood	Priority level
C5	Cost of temporary utilities	3.2	3.0	9.60
B1	Extreme weather	3.0	3.0	9.00
C3	Misuse of mobilization advance by contractor	2.9	3.0	8.70
C2	Delay in material procurement	2.9	2.9	8.41
C1	Committed resource of contractor	2.8	3.0	8.40
E2	Employer-related variation	2.9	2.8	8.12
C4	Lack of value engineering	2.7	2.8	7.56
E4	Delay in progress payment	2.6	2.9	7.54
B2	Delay due to disputes	2.6	2.7	7.02
C6	Lack of workers compensation insurance	2.6	2.6	6.76
E6	Incorrect rating of contractor's performance	2.5	2.7	6.75
B3	Lack of provision about cost compensation	2.5	2.8	7.00
E1	Poor supervision by employer	2.5	2.5	6.25
E3	Performance security	2.4	2.1	5.04
E5	Delay in taking over the completed work by employer	2.1	2.3	4.83

*Likelihood of occurrence and cost impact matrix*

The average scores of the likelihood of occurrence and the impact on cost of every factor are plotted on a likelihood of occurrence and cost impact matrix, as shown in Figure 4.3. As can be seen, all 15 factors are in the medium-priority group, and none is in the high- or low-priority group. However, it can be noted that most of the contractor-related factors has the higher priority level than those of the employer-related factors.

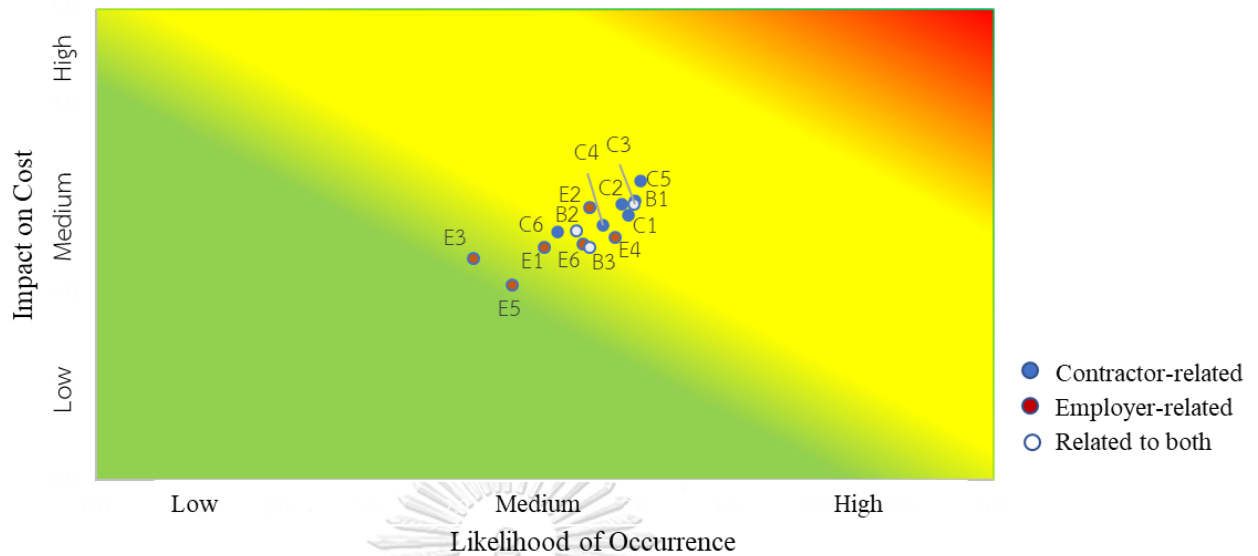


Figure 4.3 Likelihood-Impact on cost matrix

### 4.3 Conclusion

A total of 26 factors causing challenges in administering the large public projects of Bhutan are identified through in-depth interview with the experienced practitioners within the construction industry of Bhutan. Out of these, 15 factors are found to be associated with the contract administration during the construction stage and can be addressed by the standard construction contract of Bhutan. The likelihood of occurrence, and impact on the time and cost of the projects are assessed by administering questionnaire survey and the priority level of the factors are determined from the average scores of 1) likelihood and impact on time and 2) likelihood and impact on cost, obtained from the survey. Finally, the average scores of Likelihood-Impacts on time and Likelihood-Impact on cost are plotted on a Likelihood-Impact matrix and the results of both the matrices indicated that all 15 factors are in the medium-priority group. The analysis results suggest that there are no major challenges in administering the construction contracts of large public projects of Bhutan.

## **CHAPTER 5: RECOMMENDATIONS TO ADDRESS THE CHALLENGES**

According to the analysis performed in Chapter 4, all 15 factors contributing to the challenges in contract administration were categorized as the medium-priority group. The next step is to propose the recommendations to address the challenges caused by these factors. We began with identifying the relevant clauses in the standard form of construction contract of Bhutan for large public projects, namely, the General Conditions of Contract (GCC) from the Standard Bidding Document (SBD) for Procurement of Works (above Nu.5 million) 2019, Bhutan. The provisions were investigated and compared with the corresponding clauses of the International Federation of Consulting Engineers (FIDIC) Conditions of Contract (COC) for Construction, 2017 to comprehend how these challenges are addressed in international contracts. Based on the investigation of the GCC and FIDIC, the recommendations for each of the challenges were prepared. The relevant comments from the respondents in the in-depth interview were also considered for deriving the recommendations. These recommendations were verified by a group of experts to derive the final recommendations, which incorporate the experts' consents and suggestions.

### **5.1 Identification of clauses in the GCC, SBD 2019, Bhutan**

The General Conditions of Contract (GCC) of the Standard Bidding Document (SBD) for Procurement of Works (above Nu.5 million) 2019, Bhutan was examined to identify the clauses, which correspond to the challenges in contract administration caused by the 15 factors derived from the likelihood of occurrence and impact analysis. The identified clauses were paired with each of the factors. However, if the related provisions are not found, it will be presented as '*not available*,' as shown in Table 5.1.

*Table 5.1 Identification of the clauses in the GCC, SBD 2019, Bhutan*

<b>Factors</b>		<b>Clauses in the GCC</b>
C1	Committed resource of contractor	Clause 10 [Personnel]
		Clause 27 [Program]
C2	Delay in material procurement	Sub-clause 51.2 [Secured advances]
C3	Misuse of mobilization advance by contractor	Sub-clause 51.1[Advance payment]
		Sub-clause 51.3
C4	Lack of value engineering	Not available
C5	Cost of temporary utilities	Clause 8 [Setting Out]
C6	Lack of workers compensation insurance	Clause 14 [Insurance]
E1	Poor supervision by employer	Multiple Clauses*
E2	Employer-related variation	Clause 40 [Variations] & Clause 41 [Payments for Variations]
E3	Performance security	Clause 52 [Securities]
		Sub clause 52.3 and 52.4
E4	Delay in progress payment	Clause 43 [Payment certificate]
E5	Delay in taking over the completed work	Sub-clause 55.1 [Completion]
		Sub-clause 56.1 [Taking over]
E6	Incorrect rating of contractor's performance	Clause 34 [Identifying defects]
		Sub-clause 55.2 [Completion]
B1	Extreme weather	Clause 45.1 [Compensation Events for allowing time extension]
B2	Delay due to disputes	Clause 24 [Disputes]
		Clause 25 [Procedure for disputes]
B3	Lack of provision about cost compensation	Clause 45 [Compensation events for allowing time extension]

*\*The role of the employer is described in multiple clauses under all four sections of GCC*

## 5.2 Preparation of recommendation

### 5.2.1 Contractor-related challenges

#### *Committed resource of contractor (C1)*

In Bhutan, contractors are permitted to operate multiple public projects at a time. Every construction project requires the contractor to commit several resources such as key personnel and construction equipment as specified by the employer in the tender document. During the project execution, the contractor is obligated to make the committed resources available at the job site. Penalties are imposed if the contractor fails to ensure the availability of the committed resources. Even though the large contractors in Bhutan are permitted to take up to eight projects at a time, it is a major challenge to arrange different resources dedicated to each project. Once a certain resource is committed to a project, the contractor cannot propose that resource for another project until the project is complete. While the key personnel may be required to be present at the site throughout the project duration, some of the equipment will be required for the execution of certain activities only. If the schedule of the contractor's personnel and equipment required for each major stage of the work is prepared and submitted, the contractor can plan and allocate the available resources accordingly. This can reduce the project cost as the contractor's cost of acquiring or hiring additional resources will be reduced. Table 5.2 shows the comparison of provisions on contractor's resources from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017.

*Table 5.2 Comparison of provisions on contractor's resource from GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017*

<b>GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan</b>	<b>FIDIC COC for Construction, 2017</b>
<p><i>Clause 10 [Personnel]</i></p> <ul style="list-style-type: none"> <li>• Contractor to employ key personnel and committed equipment at the work site</li> <li>• Penalties are imposable if the contractor fails</li> <li>• Fail to deploy resources for longer duration, it becomes fundamental breach of contract</li> </ul> <p><i>Clause 27 [Program]</i></p> <ul style="list-style-type: none"> <li>• Contractor to submit general methods, arrangements, order, and timing for all the activities in the Work</li> </ul>	<p><i>Sub-clause 8.3 [Programme]</i></p> <ul style="list-style-type: none"> <li>• Contractor to submit details of the program with supporting reports</li> <li>• Report includes estimated schedule of contractor's personnel and type of equipment required for each major stage of the work</li> </ul>

### *Recommendation*

The recommendation for these challenges to modify *Clause 27 [Program]* by including the requirement for the contractor to submit the estimated schedule of contractor's personnel and type of equipment required for each major stage of the work as part of the program. The employer can check the availability of the resources according to the schedule and reduce the penalties on the contractors for non-availability of resources at the site when it is not required.

### *Delay in material procurement (C2)*

According to the contract, it is a responsibility of the contractor to manage necessary goods and materials to complete the project. The fragmented nature of construction projects and the dependency of the parties involved complicate the procurement process. The contractor is expected to plan the procurement and delivery process of any goods or materials before the project begins to execute the project efficiently. If the employer can identify special goods and materials required for the project and indicate it in the Special Conditions of Contract (SCC), the contractor can plan the procurement process accordingly.

In addition, the procurement of goods and materials in a large project is a huge financial burden on the contractor, especially when suppliers require a full upfront payment. Even though this issue is stipulated in the standard form of construction contract of Bhutan, the relevant provisions are inadequate. The contractor is entitled to claim 75% of the total cost of the material as secured advance only when the material is delivered at the site of work. Moreover, it is the responsibility of the contractor in case that the supplier requires a full upfront payment before the items are dispatched. If the contractor fails to make a payment on time, the procurement process is delayed. This will ultimately affect the overall progress of the project. Table 5.3 shows the comparison of provisions on material procurement from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017.

*Table 5.3 Comparison of provisions on material procurement from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017*

<b>GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan</b>	<b>FIDIC COC for Construction, 2017</b>
<p><i>Sub-clause 51.2 [Secured advances]</i></p> <ul style="list-style-type: none"> <li>• Secured advance of not more than 75% of the total cost</li> <li>• Material has to be delivered at the site of work</li> </ul>	<p><i>Sub-clause 14.5 [Plants and materials intended for the work]</i></p> <ul style="list-style-type: none"> <li>• Plant and materials listed in the contract document for payment</li> <li>• Payment allowed for plant and material delivered to the site as well as those shipped</li> <li>• Eligible for advance payment equivalent to 80% of amount agreed or determined by the engineer</li> </ul>

#### *Recommendation*

The recommendation for this challenge is to modify *sub-clause 51.2 [Secured advances]* as follows.

- 1) Specify the need for the employer to identify special goods and materials required for the project in the Special Conditions of Contract (SCC) for better procurement during the project execution
- 2) Allow secured advances for goods and materials delivered at site as well as those shipped towards the site to prevent delay of material procurement.

### *Misuse of mobilization advance (C3)*

After the contract is executed, the employer usually provides a financial assistance to the contractor to commence the work by giving a Mobilization Advance Payment (MAP). In Bhutan, the employer can provide the MAP up to 10 percent of the agreed contract amount, which must be repaid by the contractor before the project completion. Although the MAP is an incentive to the contractor, it is also a risk for the employer because the contractor may not use the MAP for the intended purpose. The MAP could be made in several installments if the employer foresees any major risk in paying the MAP to the contractor. For example, the employer can first pay 5 percent of the MAP and release the next 5 percent when the contractor proves the right utilization of the first instalment. Table 5.4 shows the comparison of provisions on mobilization advance from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017.

*Table 5.4 Comparison of provisions on mobilization advance from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017*

<b>GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan</b>	<b>FIDIC COC for Construction, 2017</b>
<p><i>Sub-clause 51.1[Advance payment]</i></p> <ul style="list-style-type: none"> <li>• MAP – 10% of the agreed contract price</li> </ul> <p style="text-align: center;"><i>Sub-clause 51.3</i></p> <ul style="list-style-type: none"> <li>• Employer can encash the bank guarantee if the contractor fails to demonstrate how the advance was used</li> </ul>	<p><i>Sub-clause 14.2 [Advance payment] – Guidance</i></p> <ul style="list-style-type: none"> <li>• The employer can choose to provide the MAP at once or in several installments</li> </ul>



### *Recommendation*

The recommendation for this challenge is to modify *Clause 51 [Advance payment]* by providing alternatives to make the advance payment in installments by the employer (if necessary) for better monitoring of the advance payment made to the contractor.

### *Lack of value engineering (C4)*

Value engineering is an organized approach to identify and eliminate any unnecessary cost and reduce the overall project cost without compromising the scope and quality of work. It is a common technique to encourage contractors to creatively generate alternatives and bring out the best possible value for the lowest cost. It is a useful concept to improve the functions and processes of the project to achieve the same goal. At any stage of project execution, the contractor should be allowed to initiate a Value Engineering Changed Proposal (VECP). If it is acceptable to the employer, the benefit can be shared equally between both parties. Unfortunately, the value engineering concept does not exist in the standard form of construction contract of Bhutan. Table 5.5 shows the provisions on value engineering from the GCC, FIDIC Conditions of Contract (COC) for Construction, 2017.

Table 5.5 Provisions on value engineering from the FIDIC Conditions of Contract (COC) for Construction, 2017

GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan	FIDIC COC for Construction, 2017
<i>Not available</i>	<p><i>Sub-clause 13.2 [Value engineering]</i></p> <ul style="list-style-type: none"> <li>• The contractor, at any time, can initiate the VECP</li> <li>• Submit a written proposal to the engineer for consideration</li> <li>• If the proposal is accepted, the engineer shall instruct a variation</li> <li>• Any consequence (gain or loss) is to be shared equally</li> </ul>

#### *Recommendation*

The concept of VECP should be introduced to the standard form of contracts of Bhutan to encourage contractors to add value to the project.

#### *Cost of temporary utilities (C5)*

The contractor has to arrange the required temporary utilities (e.g., access road and electricity) for the execution of work. In typical construction contracts, the contractor must bear the cost of providing any necessary temporary works and utilities at the site. This requirement also exists in the standard form of construction contract of Bhutan. Before submitting the tender, the contractor is expected to study the site thoroughly and prepare the bid price taking into account of all the expected costs. However, in practice this is considered an additional cost by the contractors in Bhutan. As a result, they often try to claim this expense from the employer. Table 5.6 shows the comparison of provisions on temporary utilities from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017.

Table 5.6 *Comparison of provisions on temporary utilities from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017*

GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan	FIDIC COC for Construction, 2017
<p><i>Clause 8 [Setting Out]</i></p> <ul style="list-style-type: none"> <li>• Contractor is responsible for setting out the work</li> </ul>	<p><i>Sub-Clause 4.1 [Contractor's General Obligation]</i></p> <ul style="list-style-type: none"> <li>• Any temporary work required for execution of work</li> <li>• Contractor's responsibility</li> </ul> <p><i>Sub-Clause 4.19 [Temporary Utilities]</i></p> <ul style="list-style-type: none"> <li>• Contractor's responsibility</li> <li>• Unless the employer states in the contract that it will be provided for use</li> </ul>

#### *Recommendation*

We suggest *Clause 8 [Setting Out]* should be modified by describing the contractor's responsibility in setting up the work, including arrangement of temporary utilities and carrying out temporary works for the execution of the work. This can prevent unnecessary claims by the contractor.

#### *Lack of workers' compensation insurance (C6)*

The workers' compensation insurance is required by law in most countries to compensate for any injury, sickness, disease, or death of any person employed by the contractor. In the standard form of construction contracts of Bhutan, an insurance is required only for the work, plant, and materials to be built in the work. Table 5.7 shows the comparison of provisions on insurance from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017.

*Table 5.7 Comparison of provisions on insurance from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017*

<b>GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan</b>	<b>FIDIC COC for Construction, 2017</b>
<p><i>Clause 14 [Insurance]</i></p> <ul style="list-style-type: none"> <li>loss of or damage to the Works, Plant and Materials to be built into the works</li> </ul>	<p><i>Clause 19 [Insurance]</i></p> <ol style="list-style-type: none"> <li>the Works and Contractor's Documents, together with Materials and Plant for incorporation in the Works</li> <li>Goods and other things brought to Site by the Contractor</li> <li>Liability for breach of professional duty</li> <li>Injury to persons and damage to property</li> <li><b>Injury to employees</b></li> <li>Other insurances required by Laws and by local practice</li> </ol>

#### *Recommendation*

We suggest that *Clause 14 [Insurance]* be modified by including the requirement of the workers' compensation insurance in projects to protect the contractor's employees.

#### *5.2.2 Employer-related challenges*

##### *Poor supervision (E1)*

From the contractor's perspective, the poor quality of public construction projects in Bhutan results from insufficient project monitoring by project managers and incompetent site engineers. A critical factor that affects the quality of work is the incompetence of representatives from the employer as well as the contractor. The existing standard form of construction contract of Bhutan has several provisions describing the mechanism for project supervision during contract administration.

### *Recommendation*

We think that no change is necessary regarding the challenge of poor supervision by the employer. As a matter of fact, this results from the parties not performing per the contract provisions and the lack of regular trainings on contract management to educate the stakeholders.

### *Variations (E2)*

Employer-related variations usually encompass the change of work scope, addition or omission of work, change in design, as well as change in specification of material and goods. In the public construction projects of Bhutan, variations usually result from the frequent change of the employer's representatives, financial problems. Sometimes, changes are required as the project proceeds. Most of the time variations has a negative impact on projects such as project delays, cost overruns. It may also disrupt the contractor's work plan. Even though it is undesirable for the contractor, the employer has the right to initiate a variation. According to the contract, variation can be initiated any time during the project execution and it becomes an obligation for the contractor. By examining the relevant provisions in the standard form of construction contract of Bhutan, it is found that the processes and management of variations are adequately stipulated in the existing clauses. The provisions have also been compared with the relevant provisions of FIDIC for the further verification. Table 5.8 shows the comparison of provisions on variations from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017.

*Table 5.8 Comparison of provisions on variation from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017*

<b>GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan</b>	<b>FIDIC COC for Construction, 2017</b>
<p><i>Clause 40 [Variations] &amp; Clause 41 [Payments for Variations]</i></p> <p><b>Right to vary:</b> Project Manager</p> <p><b>Variation includes:</b></p> <ol style="list-style-type: none"> <li>1. increase or decrease in the quantity</li> <li>2. Omission of any work</li> <li>3. change in the character or quality</li> <li>4. change in the levels, lines, position and dimensions</li> <li>5. additional work (Not more than 20% of initial contract value or thresholds specified)</li> <li>6. change in any specified sequence or timing</li> </ol> <p><b>Types of variation:</b> Variation by instruction and variation by quotation</p>	<p><i>Clause 13 [Variations and adjustments]</i></p> <p><b>Right to vary:</b> Engineer</p> <p><b>Variation includes:</b></p> <ol style="list-style-type: none"> <li>1. changes to the quantities</li> <li>2. changes to the quality and other characteristics</li> <li>3. changes to the levels, positions and/or dimensions</li> <li>4. omission of any work</li> <li>5. any additional work, Plant, Materials, or services necessary</li> <li>6. changes to the sequence or timing</li> </ol> <p><b>Types of variation:</b> Variation by instruction and variation by request for proposal</p>

### *Recommendation*

No change of contract provisions is necessary to address the challenges due to the employer-related variation. The existing provisions are adequate.

### *Performance Security (E3)*

When a contract is signed, the contractor must furnish a performance security to guarantee that the work will be completed as agreed. If the contractor fails to perform accordingly, the employer may terminate the contract and is entitled to claim the performance security. The performance security is expected to compensate the employer for any additional cost after the termination of contract (e.g., additional costs for hiring a new contractor to complete the remaining work). The standard form

of construction contract of Bhutan does not have any provision concerning the claim and the return of the performance security in case of the termination of contract. The employer usually forfeits the performance security when he terminates the contract due the contractor's default. Even though this practice has been established for a long time, it is a potential source of disputes between the parties. This is because the existing contract provisions do not clearly state the employer's right to claim the performance security in case of the termination of contract. Table 5.9 shows the comparison of provisions on Performance security from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017.

*Table 5.9 Comparison of provisions on PS from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017*

<b>GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan</b>	<b>FIDIC COC for Construction, 2017</b>
<p><i>Clause 52 [Securities]</i></p> <ul style="list-style-type: none"> <li>• PS to be furnished by the contractor to the employer</li> </ul> <p style="padding-left: 40px;"><i>Sub clause 52.3 and 52.4</i></p> <ul style="list-style-type: none"> <li>• Employer can claim the PS:               <ol style="list-style-type: none"> <li>1. In case the contractor fails to extend the validity of the PS</li> <li>2. If the contractor fails to complete its obligation under the contract</li> </ol> </li> </ul>	<p><i>Sub clause 4.2.2 [Claims under the PS]</i></p> <ul style="list-style-type: none"> <li>• Total of five events under which the employer can claim the PS</li> <li>• 4.2.2 (d) Employer can claim the PS when the contract is terminated for contractors' default</li> </ul> <p><i>Sub clause 4.2.3 [Return of the PS]</i></p> <ul style="list-style-type: none"> <li>• The PS has to be returned to the contractor in case the contract is terminated at the employer's convenience or termination by contractor</li> </ul>

#### *Recommendation*

It is recommended that *Clause 52 [Securities]* be modified by stating the events for claim and return of the performance security in case of the termination of contract to avoid conflicts between the contracting parties.

#### *Delay in the progress payment (E4)*

The monthly progress payment in the public projects of Bhutan consists of two steps. First, the contractor submits the monthly claim for the work performed to the site engineer for verification. Second, the project manager certifies the payment and forwards it to the finance section for the release of payments. According to the standard form of construction contract of Bhutan, Project manager (PM) is the only employer's representative, who is authorized for verification and certification of the payment. The time period of 30 days for the project manager to issue the payment certificate to the contractor is ambiguous, especially when the verification process is prolonged by the site engineer. The provision does not include the period of verification process carried out by the site engineer. Therefore, the contractor usually makes a claim on the interest due to the delay in payment. Table 5.10 shows the comparison of provisions on progress payment from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017.

*Table 5.10 Comparison of provisions on progress payment from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017*

<b>GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan</b>	<b>FIDIC COC for Construction, 2017</b>
<p><i>Clause 43 [Payment certificate]</i></p> <ul style="list-style-type: none"> <li>PM has to verify and certify the payment to the contractor within 30 working days from the date of receipt of contractor's monthly statement</li> </ul>	<p><i>Sub-clause 14.6 [ Issue of IPC]</i></p> <ul style="list-style-type: none"> <li>The engineer shall issue IPC to the employer within 28 days after receiving the claim from the contractor</li> </ul>

#### *Recommendation*

*Clause 43 [Payment certificate]* should be modified to avoid the confusion of the time period of 30 days for verifying and certifying the payment. It is recommended to describe the role and time limit for both the site engineer and the PM



separately, (or) the term PM should be replaced by '*Engineer*,' which refers to both the site engineer and the PM.

*Delay in taking over the completed work (E5)*

In construction contracts, time limits are usually specified for every critical milestone. However, in the current standard form of contract of Bhutan, there is no time limit specified for the employer to take over the completed work from the contractor. When the work is complete, the contractor reports to the project manager and request for a certificate of completion. The project manager then verifies the completed work and subsequently issues the certificate of completion. While the completion certificate must be issued within seven days of taking over the work, there is no time limit specified for the project manager to take over the work after receiving the notice from the contractor. Table 5.11 shows the comparison of provisions on taking over the completed work from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017.

*Table 5.11 Comparison of provisions on taking over the completed work from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017*

<b>GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan</b>	<b>FIDIC COC for Construction, 2017</b>
<p><i>Sub-clause 55.1 [Completion]</i></p> <ul style="list-style-type: none"> <li>• Contractor has to request the PM to issue Certificate of Completion of Work</li> </ul> <p><i>Sub-clause 56.1 [Taking over]</i></p> <ul style="list-style-type: none"> <li>• Check and verify if the contractor has fulfilled all the obligation set out in the contract</li> <li>• Employer shall take over the work and issue certificate of completion within 7 days of taking over</li> </ul>	<p><i>Sub-clause 10.1 [Taking over the work and sections]</i></p> <ul style="list-style-type: none"> <li>• Contractor has to apply for the taking over certificate 14 days prior to the work completion</li> <li>• Engineer has to determine whether to reject or issue the taking-over certificate within 28 days after receiving the contractor's notice</li> </ul>

### *Recommendation*

*Sub-clause 56.1 [Taking over]* should be modified. Instead of seven days for issuing the certificate of completion after taking over the work, time limit must be specified for the employer to issue the certificate of completion after being notified by the contractor to prevent delays in issuing the work completion certificate.

### *Incorrect rating of the contractor's performance (E6)*

In Bhutan, at the end of every construction contract, the project manager must issue a performance score certificate to the contractor, called the Average Performance Score (APS). The guideline and scoring pattern for the APS is provided by the Construction Development Board (CDB) of Bhutan. The project manager must rate the performance of the contractor in terms of the quality of work delivered and the time for completing the project. The purpose of the APS is to recognize a contractor's performance by considering the APS of the past three years during the bid evaluation process. According to the guidelines, APS is prepared by the site engineer and approved by the project manager of the agency implementing the contract. In practice, there are discrepancies in assessing the performance of the contractor and issuing the APS. The project manager often rates the APS based on his personal relation with the contractor. This results in an unfair practice of evaluating the contractor's and it forfeits the purpose of APS. Table 5.12 shows provisions on performance rating of the contractor from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan.

*Table 5.12 Provisions on performance rating of the contractor from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan*

<b>GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan</b>	<b>FIDIC COC for Construction, 2017</b>
<p><i>Clause 34 [Identifying defects]</i></p> <ul style="list-style-type: none"> <li>• PM has to issue performance score (out of 70%) on quality of work</li> </ul> <p><i>Sub-clause 55.2 [Completion]</i></p> <ul style="list-style-type: none"> <li>• PM has to issue on-time completion score (out of 30%)</li> </ul>	<i>Not Available</i>

### *Recommendation*

*Clause 34 [Identifying defects]* and *Sub-clause 55.2 [Completion]* should be modified. The unfair practice of assessing the performance of the contractor may be avoided by giving the authority of the final approval of the APS to the tender committee of the employer, rather than the project manager.

### *5.2.3 Challenges related to both the parties*

#### *Extreme weather (B1)*

In construction projects, the employer expects the contractor to plan their work considering the weather condition where the site is located. However, predicting future weather conditions is extremely challenging. As a result, the contractor often claims for a compensation due to an adverse weather condition. In Bhutan, continuous rainfall during the monsoon season and snowfall in winter are the most common climatic conditions that affect construction projects. Although the climatic condition is not a compensable event according to the standard form of construction contract of Bhutan. Yet, there are instances where the employer considers the contractor's claim for a time extension because of severe weather effects. Due to the lack of proper standard guidelines, it is challenging for the employer to determine the contractor's claim. This decision making is often subjective. Some international standard form of construction contracts defines extreme climatic conditions by the return period. For example, a rainfall that occurs once in ten years could be considered an extreme condition for awarding a time extension. Table 5.13 shows the comparison of provisions on extreme weather effect from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017.

*Table 5.13 Comparison of provision on extreme weather effect from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017*

<b>GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan</b>	<b>FIDIC COC for Construction, 2017</b>
<p><i>Clause 45.1 [Compensation Events for allowing time extension]</i></p> <ul style="list-style-type: none"> <li>• Describes the compensation event for time extension</li> <li>• Force majeure is one of the exceptional events or circumstances</li> <li>• Snowfall and rainfall are not included as force majeure</li> </ul>	<p><i>Sub-clause 8.5 [Extension of time for completion]</i></p> <ul style="list-style-type: none"> <li>• The contractor can claim in case of exceptionally adverse climatic conditions at the site</li> <li>• Conditions should be unforeseeable, and</li> <li>• Compare with the available climatic data</li> </ul>

#### *Recommendation*

*Clause 45.1 [Compensation Events for allowing time extension]* should be modified by including an extreme weather condition as an excusable event for allowing a time extension. This will help the employer determine the severity of the climatic condition and reduce unnecessary claims from the contractor.

#### *Delay due to disputes (B2)*

Conflicts and disputes are unavoidable in construction projects. Dispute resolution is also time-consuming. Minor disputes are usually negotiated internally among the parties. If the issues are complex, the process is referred to higher authorities. The standard form of construction contracts of Bhutan includes such dispute resolution processes as adjudication and arbitration. Often, the representatives from the parties focus on the dispute resolution process, subsequently leading to the project delay. In many cases, the losing party cannot make any claim against the other party which fails to perform its duty due to the lack of legal basis. Table 5.14 shows the comparison of provisions on delay due to disputes from the GCC, SBD

Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017.

*Table 5.14 Comparison of provisions on delay due to disputes from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017*

<b>GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan</b>	<b>FIDIC COC for Construction, 2017</b>
<p><i>Clause 24 [Disputes]</i></p> <ul style="list-style-type: none"> <li>• Decision taken by the PM not accepted, the contractor can refer to the Adjudicator within 14 days</li> </ul> <p><i>Clause 25 [Procedure for disputes]</i></p> <ul style="list-style-type: none"> <li>• Adjudicator shall give a decision in writing within 30 days</li> <li>• In case of disagreement, either party may refer to an Arbitrator within 30 days</li> </ul>	<p><i>Sub-clause 21.4.2 and 21.6 [Disputes and arbitration]</i></p> <ul style="list-style-type: none"> <li>• Unless the contract is abandoned or terminated, the dispute resolution process shall not affect the progress of the work</li> <li>• The parties are obligated to perform their duties in accordance with the contract</li> </ul>

#### *Recommendation*

*Clause 25 [Procedure for disputes]* should be modified by including a provision that ensures the parties remain obligated to perform their duties according to the contract during the process of dispute resolution and avoid the delay of work due to the disputes.

#### *Lack of provision about the cost compensation event (B3)*

In construction projects, when the work is disrupted due to an event specified in the contract, the parties can make claims against each other. The compensations for claims are either time extensions or payments of additional costs. However, the standard form of construction contract of Bhutan includes the events for allowing time extensions only. Table 5.15 shows the comparison of provisions on compensation event from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017

*Table 5.15 Comparison of provisions on compensation event from the GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan and FIDIC Conditions of Contract (COC) for Construction, 2017*

<b>GCC, SBD Procurement of Works (above Nu.5 million), 2019, Bhutan</b>	<b>FIDIC COC for Construction, 2017</b>
<p><i>Clause 45 [Compensation events for allowing time extension]</i></p> <ul style="list-style-type: none"> <li>List of compensation events for allowing time extension</li> </ul>	<p><i>Sub-clause 20.1 [Claims]</i></p> <ul style="list-style-type: none"> <li>Employer: reduction in the contract price (and/or) extension of DNP</li> <li>Contractor: additional payment (and/or) EOT</li> </ul>

### *Recommendation*

*Clause 45 [Compensation events for allowing time extension]* should be modified to include cost compensation events in addition to time extension events for fairness.

### **5.3 Verification of the proposed recommendations**

The proposed recommendations were then verified by a group of experts using Delphi technique. Nine respondents, who participated in the in-depth interview and the survey questionnaire, with more than 15 years of work experience were approached for the verification process. In addition, a lead procurement specialist from the World Bank has also been consulted to gain his vast experience of working with the World Bank projects in Bhutan for several years. From these ten respondents, only six agreed to participate. The proposed recommendations were emailed to them. Their suggestions and opinions for each issue are as follows.

#### *Extreme weather*

Since extreme weather is a common ground for claims in the public projects of Bhutan, it is recommended that extreme weather should be included as one of the compensation events in the standard construction contract of Bhutan by allowing a time extension. An expert commented that if extreme weather is included in the contract, its definition should be clearly stated. Leaving it to the discretion of the

parties to determine what constitutes an extreme weather could be a source of dispute. The same expert also pointed out that to avoid unnecessary claims during the contract administration it is important that the employer considers the normal rainfall or snowfall in the contract duration and make the contract duration more realistic.

*Misuse of mobilization advance payment by contractor*

To ensure that the contractor uses the mobilization advance payment for the intended purpose, the contract should provide an alternative for the employer to make the payment in installments. The experts agreed that the proposed recommendation is a good alternative to prevent the misuse of a mobilization advance by the contractor. In addition, one of the experts suggested an escrow account is another alternative. Escrow is an account maintained by a trusted third party for the trading parties when there is a risk of not fulfilling the obligations by either of the party. An escrow account holds the fund temporarily and releases it when the obligation of the contract is fulfilled by both parties. Escrow accounts are commonly used in real estate businesses. Yet, the applicability of escrow accounts in construction contracts may require further investigation. A mobilization advance is considered an interest-free loan to the contractor from the employer to enable the contractor to commence the work without delay. Thus, holding the funds in the escrow account until the contractor begins the work may forfeit the purpose of allowing mobilization advance.

*Lack of value engineering*

Based on the suggestions from the respondents during the in-depth interview and the importance of value engineering in various literature, we proposed to introduce the concept of value engineering in the standard form of construction contract of Bhutan. One of the experts has a reservation on this proposal by pointing out the redundancy of provision on value engineering in the standard form of construction contract of some countries. The expert expressed concern of how well the parties will be able to utilize the purpose of value engineering in the public projects of Bhutan.

Based on the comments and feedbacks received from the experts through the verification process, adjustments are made to the proposed recommendations. There

are no changes required except for the recommendation regarding extreme weather. Extreme weather is proposed to be defined based on the return period and the proposed recommendation is adjusted as follows.

*Clause 45.1 [Compensation Events for allowing time extension]* is modified by including an extreme weather condition as an excusable event, which allows a time extension. In addition, the extreme weather should be defined based on its return period. This will help the employer determine the severity of a climatic condition and reduce unnecessary claims by the contractor.

#### **5.4 Summary of final recommendations**

Table 5.16 summarizes the final recommendations to overcome the challenges. The recommendations to modify or add new clause to the existing GCC of the SBD for Procurement of Works (above Nu.5 million) 2019, Bhutan are presented. Some of the challenges are adequate; therefore, it is unnecessary to make a change.

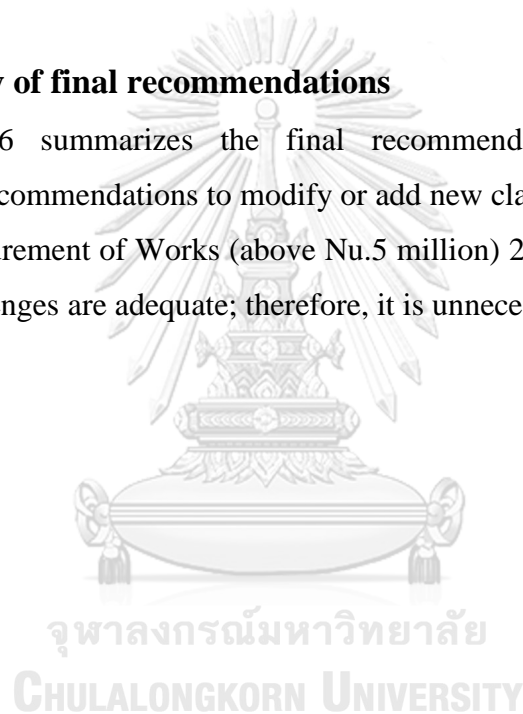




Table 5.16 Summary of proposed recommendations

Factors		Action required
<i>Modification of existing clauses</i>		
C5	Cost of temporary utilities	Modify Clause 8 [Setting out]
C6	Lack of workers compensation insurance	Modify Clause 14 [Insurance]
B2	Delay due to disputes	Modify Clause 25 [Procedure for disputes]
C1	Committed resource of contractor	Modify Clause 27 [Program]
E6	Incorrect rating of contractor's performance	Modify Clause 34 [Identifying defects] & Sub-Clause 55.2 [Completion]
E4	Delay in progress payment	Modify Clause 43 [Payment certificate]
B3	Lack of provision about cost compensation	Modify Clause 45 [Compensation event fir allowing time extension]
B1	Extreme weather	Modify Clause 45.1 [Compensation events for allowing time extension]
C3	Misuse of mobilization advance payment by the contractor	Modify Clause 51 [Advance payment]
C2	Delay in material procurement	Modify Sub-Clause 51.2 [Secured advances]
E3	Performance security	Modify Clause 52 [Securities]
E5	Delay in taking over the completed work	Modify Sub-Clause 56.1 [Taking over]
<i>Addition of new clause</i>		
C4	Lack of value engineering	Add new Clause
<i>No changes required</i>		
E1	Poor supervision by employer	No changes required
E2	Employer-related variation	No changes required

## CHAPTER 6: SUMMARY AND CONCLUSION

This chapter summarizes the overall research and discusses major findings of the research. It also includes the research contributions and limitations.

### 6.1 Summary

There are various challenges in every construction industry around the world. Most problems result from the fragmented nature of the industry and the involvement of multiple parties with different interests. Challenges are more evident in contract administration during construction. Most of them can be mitigated by adopting good construction contracts. Various standard forms of construction contract are recognized and used in the construction industry worldwide. Some of the well-known standard forms of construction contracts are published by the Canadian Construction Documents Committee (CCDC), the International Federation of Consulting Engineers (FIDIC), the New Engineering Contract (NEC) and the Joint Contracts Tribunal (JCT) Contracts of UK, the Engineers Joint Contract Documents Committee (EJCDC), and the American Institute of Architect (AIA) document of USA.

In the Kingdom of Bhutan, the standard form of contract for the public construction projects is the General Conditions of Contract (GCC), which is included in the Standard Bidding Document (SBD) for procurement of works. The SBD has been established since 2009 and updated regularly. Yet, the public projects are still criticized for delivering poor quality infrastructure, and project delays and cost overruns have been increasing over the years. The objective of this research is to identify and analyze challenges in administering the construction contract of large public projects in Bhutan. Recommendations are proposed to address these challenges by investigating the GCC, SBD 2019 for procurement of large works, Bhutan.

The challenges in administering the construction contracts were examined by identifying the factors leading to the disagreement between the contracting parties during construction and affecting the overall performance of the project. A total of 26 factors were identified by conducting an in-depth interview with a group of

experienced practitioners in Bhutan. From the 26 factors identified, 15 factors contributed to the challenges associated with the construction stage. For the further analysis, these 15 factors were subdivided into three groups: contractor-related, employer-related, and factors related to both parties. To assess the likelihood of occurrence and impact of these factors on project time and cost, a questionnaire was prepared and distributed to government engineers and contractors. The priority levels of the factors were determined using a likelihood of occurrence and impact matrix. The results indicated that all 15 factors are in the medium-priority zone, and none is in the low-priority and high-priority zone. According to the likelihood of occurrence and time impact analysis, misuse of mobilization advance payment by contractor has the highest priority level; whereas, claim of performance security during contract termination has the lowest priority level. From the likelihood of occurrence and cost impact analysis, cost of temporary utilities borne by the contractors has the highest priority level; whereas, delay in taking over the completed work by the employer has the lowest priority level.

Since all 15 factors contributing to the challenges associated with the construction stage are in the medium priority group, recommendations were prepared to address the challenges caused by all these factors. The recommendations were prepared by identifying and examining the relevant clauses of the standard form of construction contract of Bhutan and comparing the provisions with the corresponding clauses of the FIDIC Conditions of Contract (CoC) for Construction (FIDIC Red Book Second Edition). The suggestions from the interviewed experts were also considered. Finally, the proposed recommendations were verified by a group of experts. The final recommendations are proposed after obtaining consents and suggestions from the experts.

The final recommendations to overcome the challenges caused by the factors identified in this research are as follows.

### ***Modification of existing clauses***

1. *Cost of temporary utilities (C5)*

We suggest *Clause 8 [Setting Out]* should be modified by describing the contractor's responsibility in setting up the work, including arrangement of temporary utilities and carrying out temporary works for the execution of the work. This can prevent unnecessary claims by the contractor.

2. *Lack of workers compensation insurance (C6)*

We suggest that *Clause 14 [Insurance]* be modified by including the requirement of the workers' compensation insurance in projects to protect the contractor's employees.

3. *Delay due to disputes (B2)*

*Clause 25 [Procedure for disputes]* should be modified by including a provision that ensures the parties remain obligated to perform their duties according to the contract during the process of dispute resolution and avoid the delay of work due to the disputes.

4. *Committed resource of contractor (C1)*

The recommendation for these challenges to modify *Clause 27 [Program]* by including the requirement for the contractor to submit the estimated schedule of contractor's personnel and type of equipment required for each major stage of the work as part of the program. The employer can check the availability of the resources according to the schedule and reduce the penalties on the contractors for non-availability of resources at the site when it is not required.

5. *Incorrect rating of contractor's performance (E6)*

*Clause 34 [Identifying defects]* and *Sub-clause 55.2 [Completion]* should be modified. The unfair practice of assessing the performance of the contractor may be avoided by giving the authority of the final approval of the APS to the tender committee of the employer, rather than the project manager.

6. *Delay in progress payment (E4)*

*Clause 43 [Payment certificate]* should be modified to avoid the confusion of the time period of 30 days for verifying and certifying the payment. It is recommended to describe the role and time limit for both the site engineer and the PM separately, (or) the term PM should be replaced by '*Engineer*,' which refers to both the site engineer and the PM.

7. *Lack of provision about cost compensation (B3)*

*Clause 45 [Compensation events for allowing time extension]* should be modified to include cost compensation events in addition to time extension events for fairness.

8. *Extreme weather (B1)*

*Clause 45.1 [Compensation Events for allowing time extension]* should be modified by including an extreme weather condition as an excusable event for allowing a time extension. This will help the employer determine the severity of the climatic condition and reduce unnecessary claims from the contractor.

9. *Misuse of mobilization advance payment by contractor (C3)*

The recommendation for this challenge is to modify *Clause 51 [Advance payment]* by providing alternatives to pay the advance payment in installments by the employer (if necessary) for better monitoring of the advance payment made to the contractor.

10. *Delay in material procurement (C2)*

The recommendation for this challenge is to modify *sub-clause 51.2 [Secured advances]* as follows.

1. Specify the need for the employer to identify special goods and materials required for the project in the Special Conditions of Contract (SCC) for better procurement during the project execution
2. Allow secured advances for goods and materials delivered at site as well as those shipped towards the site to prevent delay of material procurement.

11. *Performance security (E3)*

It is recommended that *Clause 52 [Securities]* be modified by stating the events for claim and return of the performance security in case of the termination of contract to avoid conflicts between the contracting parties.

12. *Delay in taking over the completed work by the employer (E5)*

*Sub-clause 56.1 [Taking over]* should be modified. Instead of seven days for issuing the certificate of completion after taking over the work, time limit must be specified for the employer to issue the certificate of completion after being notified by the contractor to prevent delays in issuing the work completion certificate.

***Addition of new clause***

13. *Lack of value engineering (C4)*

The concept of VECP should be introduced to the standard form of contracts of Bhutan to encourage contractors to add value to the project.

***No changes required***

14. *Poor supervision by the employer (E1)*

We think that no change is necessary regarding the challenge of poor supervision by the employer. As a matter of fact, this results from the parties not performing per the contract provisions and the lack of regular trainings on contract management to educate the stakeholders.

15. *Employer-related variation (E2)*

No change of contract provisions is necessary to address the challenges due to the employer-related variation. The existing provisions are adequate.

## **6.2 Conclusion**

There was a total of 26 factors causing challenges in the contract administration of large public projects of Bhutan, out of which 15 were identified as factors associated with the contract and that can be addressed by the standard form of

construction contract of Bhutan. From the findings of this research, it is evident that there are several practical challenges in the contract administration of large public projects in Bhutan. However, the analysis results indicated that all the challenges are of medium priority and there are no major challenges. According to this result, the General Conditions of Contract in the Standard Bidding Document, 2019 for procurement of large works in Bhutan is acceptable and the existing challenges can be reduced by improving the existing provisions. Recommendations were prepared for all the challenges caused by these 15 identified factors. There was a total of 12 clauses that needs to be modified and one new clause to be added. Challenges due to poor supervision by employer and employer-related variation are not due to the inadequacy of the provisions of the standard form of contract. Therefore, no changes are suggested in the standard form of contract regarding these challenges.

### **6.3 Research contributions**

The practical challenges of administering the construction contracts identified through this research can help the contractors and the government agencies prepare proper contract management plans for their projects.

The recommendations are consistent with the international practices as it has been derived based on an international standard form of construction contract. These recommendations can be used to improve the current practices of administering the public contracts in Bhutan and reduce conflicts among the contracting parties.

The proposed recommendations can be used as a reference by the relevant authorities in making rational decisions to enhance the efficiency of the existing standard form of construction contract of Bhutan.

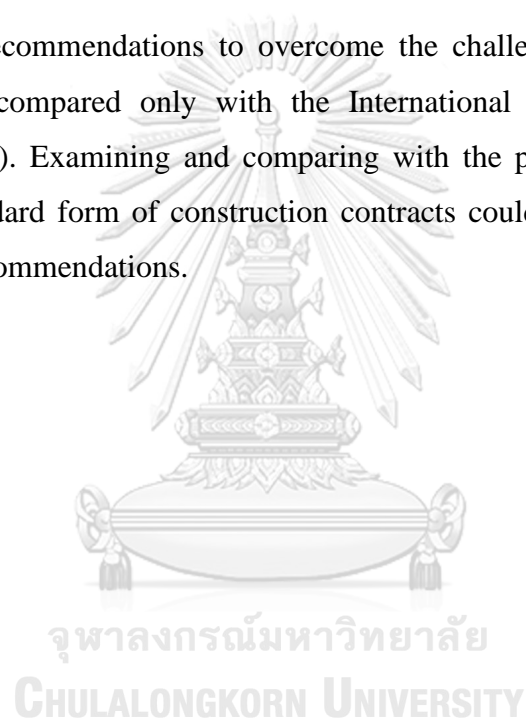
### **6.4 Limitations of research and future works**

This research was focused only on the Standard Bidding Document (SBD) 2019, procurement of works (above Nu. 5 million) for large public projects. The same research could be done for the procurement of small public projects by investigating the Standard Bidding Document 2019, procurement of works (below Nu. 5 million).

The overall contract administration of public projects can be improved if both the SBDs are investigated together simultaneously.

This research was carried out by examining only the form of General Conditions of Contract (GCC), which is just one part of the SBD. As discussed in chapter 4, there are other factors which are out of the scope of the GCC but indirectly contributes to the challenges in contract administration during the construction. The same research could be extended to investigate and analyze the whole SBD, which includes the documents related to the pre-construction stage as well.

To prepare the recommendations to overcome the challenges in this research, the provisions were compared only with the International Federation of Consulting Engineers (FIDIC). Examining and comparing with the provisions of several other international standard form of construction contracts could provide more and better alternatives of recommendations.





## REFERENCES



จุฬาลงกรณ์มหาวิทยาลัย  
**CHULALONGKORN UNIVERSITY**

- Acharya, K. N., Kim, S.-Y., and Lee, Y.-D. (2004). "Conflict Free Project: A Dream of Project Executors." *Proc., Fifth Asia Pacific Industrial Engineering and Management System* Australian Society for Operations Research.
- Acharya, N., Lee, Y., and Im, H. (2006). "Conflicting factors in construction projects: Korean perspective." *Engineering, Construction and Architectural Management*, 13, 543-566.
- Agyekum-Mensah, G., and Knight Andrew, D. (2017). "The professionals' perspective on the causes of project delay in the construction industry." *Engineering, Construction and Architectural Management*, 24(5), 828-841.
- Aljohani, A. (2017). "Construction Projects Cost Overrun: What Does the Literature Tell Us." *International journal of innovation, management and technology*, 137-143.
- Alsuliman, J. A. (2019). "Causes of delay in Saudi public construction projects." *Alexandria Engineering Journal*, 58(2), 801-808.
- AM, J. S., Bell, M., Jovic, W., and Marginean, R. (2014). "Standard Forms of Contract in the Australian Construction Industry." Melbourne Law School, Melbourne, 60.
- Ametepey, S., Gyadu-Asiedu, W., and Assah-Kissiedu, M. (2018). *Causes-Effects Relationship of Construction Project Delays in Ghana: Focusing on Local Government Projects*.
- Ayudhya, N., and Israngkura, B. (2011). "Common disputes related to public work projects in Thailand." *Songklanakarinn Journal of Science & Technology*, 33(5).
- Bloomfield, K., Williams, T., Bovis, C., and Merali, Y. (2019). "Systemic risk in major public contracts." *International Journal of Forecasting*, 35(2), 667-676.
- Botha, A., and Badenhorst-Weiss, J. (2019). "Risk management in a bulk coal export logistic chain: A stakeholder perspective." *Journal of Transport and Supply Chain Management*, 13.
- Bowmans (2016). *A Guide to Construction Contracts*, Bowmans.
- Chan, D. W. M., and Kumaraswamy, M. M. (1997). "A comparative study of causes of time overruns in Hong Kong construction projects." *International Journal of Project Management*, 15(1), 55-63.

- Construction Development Board (2019). "Annual Report 2018-2019." Construction Development Board, Bhutan.
- Creedy, G., Skitmore, M., and Johnny, W. (2010). "Evaluation of Risk Factors Leading to Cost Overrun in Delivery of Highway Construction Projects." *Journal of Construction Engineering and Management-asce - J CONSTR ENG MANAGE-ASCE*, 136.
- Cyrus, B. O. o., Abednego, O. G., and Sylvester, M. (2019). "Appraising the Performance of Construction Projects during Implementation in Kenya, 1963-2018: A Literature Review Perspective." *Journal of Construction Engineering and Project Management*, 9(2), 24.
- Do, S., Likhitrungsilp, V., Tran, K., and Nguyen, P. T. (2017). "Risk Assessment for International Construction Joint Ventures in Vietnam." 4, 104-114.
- Duchaussoy, Q. (2019). "Disputes in Construction Contracts: Commonly experienced but not fully understood?" *PM World Journal*, VIII(II).
- Dumbravă, V., and Iacob, V.-S. (2013). "Using Probability – Impact Matrix in Analysis and Risk Assessment Projects." *Journal of Knowledge Management, Economics and Information Technology*, 3(6), 7.
- Elbeltagi, E., and Eng, P. (2016). "Lecture Notes on Project Management."
- Goldbloom, J. (1989). "The General Conditions of the Contract." *Engineering Construction Specifications: The Road to Better Quality, Lower Cost, Reduced Litigation*, Springer US, Boston, MA, 31-142.
- Gomelesio, J. K. (2013). "Critical Analysis of Delays in Government Road Construction Projects in Ghana." *Ghana Technology University College/Coventry University*.
- Good Governance Committee (2016). "Review Report on the Public Procurement System." National Council Bhutan, 12.
- Habibi, A., Sarafrazi, A., and Izadyar, S. (2014). "Delphi Technique Theoretical Framework in Qualitative." *Int J Eng Sci*, 3, 8-13.
- Hemanta Doloi, Sawhney, A., Iyer, K. C., and Rentala, S. (2012). "Analysing factors affecting delays in Indian construction projects." *International Journal of Project Management*, 30(4), 479-489.

- Herzberg, B. (2019). "Construction: International Construction Law." <https://www.changing-perspectives.legal/construction/international-construction-law/>. (2/12/2020).
- Ibn-Homaid, N. T. (2006). "An Evaluation of the Saudi Contract for Public Works." *Journal of King Saud University - Engineering Sciences*, 18(2), 181-195.
- Irlayici Cakmak, P. (2016). "Causes of disputes in the Turkish construction industry: Case of public sector projects." *ITU J Faculty Arch*, 13(3), 109-118.
- Israngkura Na Ayudhya, B. (2011). "Common disputes related to public work projects in Thailand." *Songklanakarin Journal of Science and Technology*, 33, 565-573.
- Iyer, K. C., Chaphalkar, N. B., and Joshi, G. A. (2008). "Understanding time delay disputes in construction contracts." *International Journal of Project Management*, 26(2), 174-184.
- Jaffar, N., Tharim, A. H. A., and Shuib, M. N. (2011). "Factors of Conflict in Construction Industry: A Literature Review." *Procedia Engineering*, 20, 193-202.
- Kassem, M., Khoiry, M. A., and Hamzah, N. (2019). "Using probability impact matrix (PIM) in analyzing risk factors affecting the success of oil and gas construction projects in Yemen." *International Journal of Energy Sector Management*, 14, 527-546.
- Kazaz, A., Ulubeyli, S., and Tuncbilekli, N. A. (2012). "Causes of Delays in Construction Projects in Turkey." *Journal of Civil Engineering and Management*, 18(3), 426-435.
- Khekale, C., and Futane, N. "Management of Claims and Disputes in Construction Industry."
- Kim, S. Y., Nguyen, V., and Luu, V. (2015). *Delay Factors Affecting the Completion of the Government Construction Projects in Vietnam*.
- Lahham, L. (2019). "Engineering Contracts Management."
- Lawrence, M., Acai, J., and Otim, G. (2014). "An Assessment of the Factors Causing Delays on Building Construction Projects in Uganda." *International Journal of Construction Engineering and Management*, 2014, 13-23.

- Levy, S. M. (2010). "Chapter 4 - Construction contracts pros and cons." *Construction Process Planning and Management*, S. M. Levy, ed., Butterworth-Heinemann, Boston, 67-112.
- Lew, L. P., Dr. H.C Tan, and Wong, D. S. C. M. (2014). "Issues and Challenges Faced in the Management of Claims for Construction Projects." *Construction Project Management*.
- Lowe, D. (2004). "Contract Management." *The Wiley Guide to Managing Projects*, 678-707.
- Ministry of Finance (2019). "Procurement Rules and Regulations ", Royal Government of Bhutan, Bhutan.
- Ministry of Works and Human Settlement (2020). "National Construction Industry Policy." Ministry of Works and Human Settlement Bhutan.
- Mitkus, S., and Trinkūnienė, E. (2008). "Reasoned decisions in construction contracts evaluation / Racionaliuūs sprendimai vertinant statybos rangos sutartis." *Technological and Economic Development of Economy*, 14(3), 402-416.
- Mohammed, K. A., and Isah, A. "Causes of Delay in Nigeria Construction Industry."
- Nishith Desai Associates (2020). "Construction Disputes in India." Nishith Desai Associates.
- Ogunlana, S., and Sysavath, M. (2000). "The Use of International Construction Contracts in Developing Economies: The Case of Lao PDR."
- Ogunlana, S. O., Promkuntong, K., and Jearkijrm, V. (1996). "Construction delays in a fast-growing economy: Comparing Thailand with other economies." *International Journal of Project Management*, 14(1), 37-45.
- Omoriegbe, A., and Radford, D. (2006). *Infrastructure Delays and Cost Escalation: Causes and Effects in Nigeria*.
- Othman, N. (2008). "Standard forms of contract and its influence on construction professionals."
- Philadelphia, C. s. H. o. (2016). "Chapter 13a: Qualitative Data Collection Methods, Participants, Questions."
- Rauzana, A. (2016). "Causes of Conflicts and Disputes in Construction Projects." *IOSR Journal of Mechanical and Civil Engineering*, 13, 44-48.

- Reyes, J. C. V. (2012). *Evaluation of government construction contract and contractors' risk philosophies in the Philippines*, Chulalongkorn University.
- Robinson, M. D. (2011). *A Contractor's Guide to the FIDIC Conditions of Contract*, Wiley.
- Sullivan, A., and Harris, F. C. (1986). "Delays on Large Construction Projects." *International Journal of Operations & Production Management*, 6(1), 25-33.
- Surahyo, A. (2018). "Understanding Construction Contracts." *Canadian and International Conventions*, Springer International Publishing, 246.
- Tongco, M. (2006). "Purposive Sampling as a Tool for Informant Selection." *Ethnobotany Res Appl*, 5.
- Verweij, S., van Meerkerk, I., and Korthagen, I. A. (2015). "Reasons for contract changes in implementing Dutch transportation infrastructure projects: An empirical exploration." *Transport Policy*, 37, 195-202.
- World Bank Group (2016). "Bhutan - Public financial management performance report ", World Bank Group, Washington, D.C.
- Younis, G. (2010). "Minimizing construction disputes." PhD, Salford : University of Salford.

## APPENDIX A Summary of contractual problems from literature review

### Summary of Contractual Problems from Literature Review

Sl. No.	Author	Country	Contractual problems
1	Doloi et al., 2012	India	<ul style="list-style-type: none"> <li>• Lack of commitment</li> <li>• Inefficient site management</li> <li>• Poor site coordination</li> <li>• Improper planning</li> <li>• Lack of clarity in project scope</li> <li>• Lack of communication</li> <li>• Substandard contracts</li> <li>• Slow decision from owner</li> <li>• Poor labor productivity</li> <li>• Architects' reluctance for change</li> <li>• Rework due to mistakes in construction</li> </ul>
2	Chan et al., 1997	Hong Kong	<ul style="list-style-type: none"> <li>• Poor site management and supervision</li> <li>• Unforeseen ground conditions</li> <li>• Low speed of decision making involving all project teams</li> <li>• Client- initiated variations</li> <li>• Necessary variations of works</li> <li>• Problems of shortages or inadequacies in industry infrastructure (mainly supply of resources)</li> </ul>

3	S. O. Ogunlana et al., 1996	Thailand	<ul style="list-style-type: none"> <li>• Problems of shortages or inadequacies in industry infrastructure (mainly supply of resources)</li> <li>• Problems caused by clients and consultants</li> <li>• Problems caused by contractor incompetence/inadequacies</li> </ul>
4	Gomelesio, 2013	Ghana	<ul style="list-style-type: none"> <li>• Failure to make payment on time</li> </ul>
5	Ametepey et al., 2018	Ghana	<ul style="list-style-type: none"> <li>• Delay in progress payments</li> <li>• Variation orders during construction</li> <li>• Difficulties in financing projects by contractors</li> <li>• Delay in material delivery</li> <li>• Unforeseen site conditions</li> </ul>
6	Omoriegie et al., 2006	Nigeria	<ul style="list-style-type: none"> <li>• Price fluctuation</li> <li>• Financing and payment of completed works</li> <li>• Poor contract management               <ul style="list-style-type: none"> <li>• Delay</li> <li>• Change in site conditions</li> </ul> </li> </ul>
7	Mohammed et al., 2012	Nigeria	<ul style="list-style-type: none"> <li>• Improper planning</li> <li>• Lack of effective communication</li> <li>• Design Errors</li> <li>• Shortage of Supply</li> </ul>
8	Kazaz et al., 2012	Turkey	<ul style="list-style-type: none"> <li>• Design and material changes</li> <li>• Delay of payments</li> </ul>



			<ul style="list-style-type: none"> <li>• Cash flow problems</li> </ul>
9	Kim et al., 2015	Vietnam	<ul style="list-style-type: none"> <li>• Information delays and lack of information exchange between the parties</li> <li>• Incompetent owner</li> <li>• Incompetent supervision consultant</li> <li>• Incompetent contractor</li> <li>• Difficulties in financing project by owner</li> </ul>
10	Construction Development Board (CDB), 2019	Bhutan	<ul style="list-style-type: none"> <li>• Improper planning</li> <li>• Unsatisfactory site feasibility studies</li> <li>• Design changes</li> <li>• Incomplete specifications</li> <li>• Noncompliance with contract conditions</li> <li>• Disputes due to discrepancy of contract documents</li> <li>• Weak enforcement of regulation</li> <li>• Monitoring</li> <li>• Poor site management</li> <li>• Documentation</li> <li>• Work planning</li> <li>• Financial mismanagement</li> <li>• Non-deployment of committed resources</li> <li>• Complacency</li> </ul>
11	Acharya et al., 2006	Korea	<ul style="list-style-type: none"> <li>• Differing site conditions</li> </ul>

			<ul style="list-style-type: none"> <li>• Public interruption</li> <li>• Differences in change order evaluation</li> <li>• Design errors</li> <li>• Excessive contract quantities variation</li> <li>• Double meaning of specifications</li> </ul>
12	Agyekum-Mensah et al., 2017	UK	<ul style="list-style-type: none"> <li>• Insufficient planning</li> <li>• Poor project management</li> <li>• Unclear initial project objectives</li> <li>• Communication</li> <li>• Inappropriate resource management</li> </ul>
13	Sullivan et al., 1986	UK	<ul style="list-style-type: none"> <li>• Late receipt of information</li> <li>• Variations, M and E (Mechanical and Electrical) construction</li> <li>• M and E (Mechanical and Electrical) construction</li> <li>• Procurement delays</li> <li>• Ground problems</li> <li>• Bad weather</li> </ul>
14	Aljohani, 2017	NA	<ul style="list-style-type: none"> <li>• Frequent design change</li> <li>• Contractors' financing</li> <li>• Payment delay for completed work</li> <li>• Lack of contractor experience</li> <li>• Poor cost estimation</li> <li>• Poor tendering documentation</li> <li>• Poor material management</li> </ul>

15	Khekale et al., 2015	NA	<ul style="list-style-type: none"> <li>• Changes in Contract work</li> <li>• Differing in unusual site conditions actually encountered</li> <li>• Suspension of Work</li> <li>• Variation in quantities</li> <li>• Damage due to natural disasters and force-majeure</li> <li>• Re-inspection and acceptance</li> <li>• Termination for the convenience of the client</li> <li>• Possession prior to completion</li> <li>• Escalation of price due to inflation</li> <li>• Acceleration of work progress</li> <li>• Ripple effect</li> <li>• Currency fluctuation effect</li> <li>• Ambiguity in specifications and drawings</li> </ul>
16	Jaffar et al., 2011	NA	<ul style="list-style-type: none"> <li>• Late giving of possession</li> <li>• Delay interim payment from client</li> <li>• Unclear contractual terms</li> </ul>

## APPENDIX B Sample of questionnaire survey

### Survey Questionnaire: Assessment of factors causing challenges in administering construction contracts of large public projects

Thank you for participating in this survey. The purpose of the survey is to measure the likelihood of occurrence and impact of the factors listed below, in administering large public construction projects in Bhutan. All the information gathered will be used for academic research only

Email \*

---

#### Part 1 - General Information

1. Which of the sectors below explains your position most appropriately? \*

- Government/Client
- Contractor

2. If you are a contractor, please choose the infrastructure project category according to your license

- W1 (Roads and Bridges)
- W2 (Bhutanese Painting)
- W3 (Building, Irrigation, Drainage, Flood Control, Water Supply and Sewerage)
- W4 (Power and Telecom Works)

3. Which agency or company do you work for? (eg. Thimphu Dzongkhag Administration/Chundu construction) \*

---

4. How many years of work experience do you have in administering large public construction projects in Bhutan? (eg. 5 years) \*

---

**Part 2 – Measurement of Likelihood of occurrence**

How often do you think the challenges due to the following factors occur in public construction projects of Bhutan?

Judgements may be made using the work experience from past projects as follows:

Never - Not even once

Rare - 1-3 times in 10 projects

Likely - 4-5 times in 10 projects

Almost certain - 6-7 times in 10 projects

Certain - 8-10 times in 10 projects



2.1 Contractor-related factors

	Never	Rare	Likely	Almost certain	Certain
1. Absence of committed resource of contractor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Delay in material procurement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Misuse of mobilization advance payment by contractor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Lack of value engineering	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Cost of temporary utilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.. Lack of workers compensation insurance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 2.2 Employer-related factors

	Never	Rare	Likely	Almost certain	Certain
1. Poor supervision by the employer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Employer-related variation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Performance security during	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Delay in progress payment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Delay in taking over the completed work by employer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Incorrect rating of contractor's performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 2.3 Factors related to both the parties



	Never	Rare	Likely	Almost certain	Certain
1. Extreme weather	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Delay due to disputes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Lack of provision on cost compensation event	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Part 3 – Impact on time**

In your opinion, what would be the impact of following factors on the completion time of project?

The magnitude of impact on time may be measured in terms of delay from the initially agreed project duration in the past projects as follows:

Negligible - Less than 10% delay

Low - 10-30% delay

Medium - 30- 50% delay

High - 50-70% delay

Extreme - More than 70% delay



**3.1 Contractor-related factors**

	Negligible	Low	Medium	High	Extreme
1. Absence of committed resource of contractor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Delay in material procurement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Misuse of mobilization advance payment by contractor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Lack of value engineering	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Cost of temporary utilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Lack of workers compensation insurance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 3.2 Employer-related factors

	Negligible	Low	Medium	High	Extreme
1. Poor supervision by the employer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Employer-related variation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Performance security	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Delay in progress payment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Delay in taking over the completed work by employer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Incorrect rating of contractor's performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



## 3.3 Factors related to both the parties

	Negligible	Low	Medium	High	Extreme
1. Extreme weather	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Delay due to disputes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Lack of provision about cost compensation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**Part 4 – Impact on cost**

In your opinion, what would be the impact of following factors on the cost of project?

The magnitude of impact on cost may be measured in terms of cost overrun from the initial contract price in the past projects as follows:

Negligible - Less than 10% cost overrun

Low - 10-30% cost overrun

Medium - 30-50% cost overrun

High - 50-70% cost overrun

Extreme - More than 70% cost overrun

4.1 Contractor-related factors



	Negligible	Low	Medium	High	Extreme
1. Absence of committed resource of contractor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Delay in material procurement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Misuse of mobilization advance payment by contractor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Lack of value engineering	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Cost of temporary utilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Lack of workers compensation insurance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 4.2 Employer-related factors

	Negligible	Low	Medium	High	Extreme
1. Poor supervision by the employer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Employer-related variation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Performance security	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Delay in progress payment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Delay in taking over the completed work by employer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Incorrect rating of contractor's performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 4.3 Factors related to both parties



	Negligible	Low	Medium	High	Extreme
1. Extreme weather	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Delay due to disputes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Lack of provision on cost compensation event	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## VITA

<b>NAME</b>	Tandin Gyem
<b>DATE OF BIRTH</b>	11 March 1985
<b>PLACE OF BIRTH</b>	Thimphu
<b>INSTITUTIONS ATTENDED</b>	College of Science and Technology
<b>HOME ADDRESS</b>	Thimphu, Bhutan



จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY