

การจัดสรรความเสี่ยงในสัญญาโครงการก่อสร้างทางหลวงในประเทศไทย

นายบุญทา ไช



จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

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ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

RISK ALLOCATION IN PUBLIC ROAD CONSTRUCTION CONTRACTS IN CAMBODIA

Mr. Buntha Say



A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Engineering Program in Civil Engineering

Department of Civil Engineering

Faculty of Engineering

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ในช่วงไม่กี่ปีที่ผ่านมา สัญญาประเภทประกวดราคาแข่งขันในโครงการก่อสร้างถนนภายใต้การสนับสนุนโดยงบประมาณของรัฐบาลในประเทศกัมพูชาได้เพิ่มขึ้นอย่างมากและกำลังจะมากกว่าสัญญาแบบเจรจาต่อรองที่ใช้อยู่ ประเทศกัมพูชาจึงจำเป็นต้องปรับปรุงสัญญาให้มีประสิทธิภาพมากยิ่งขึ้น โดยเฉพาะอย่างยิ่ง สัญญาซึ่งมีการจัดสรรความเสี่ยงอย่างสมดุล งานวิจัยนี้เสนอแนวทางการปรับปรุงเงื่อนไขทั่วไปของสัญญาก่อสร้างทางหลวงโดยมุ่งเน้นข้อสัญญาซึ่งเกี่ยวข้องกับการจัดสรรความเสี่ยง งานวิจัยเริ่มจากการระบุความเสี่ยงในโครงการก่อสร้างทางหลวงในประเทศกัมพูชา จากนั้นจึงเปรียบเทียบเงื่อนไขทั่วไปของสัญญาราชการกับสัญญา FIDIC โดยเฉพาะข้อสัญญาซึ่งเกี่ยวข้องกับการจัดสรรความเสี่ยง การเปรียบเทียบนี้นำไปสู่การปรับปรุงสัญญาหลายประการซึ่งจะถูกตรวจสอบความถูกต้องโดยอาศัยกฎหมายและข้อบังคับของกัมพูชา ที่เกี่ยวข้อง รวมไปถึงผู้เชี่ยวชาญด้านสัญญาและผู้บรรยายในมหาวิทยาลัย จากการวิจัยพบว่า ความเสี่ยงซึ่งเกี่ยวข้องกับการก่อสร้างทางหลวงในกัมพูชามีทั้งสิ้น 25 ตัว จากการเปรียบเทียบระหว่างสัญญา FIDIC กับสัญญาก่อสร้างภาครัฐของกัมพูชาพบว่าข้อสัญญาที่เกี่ยวข้องกับการจัดสรรความเสี่ยงในสัญญาก่อสร้างภาครัฐไม่ชัดเจนและไม่เหมาะสมที่จะใช้สำหรับการจัดการความเสี่ยงหลายตัว งานวิจัยนี้ได้แนะนำทางเลือกที่เป็นไปได้ในการปรับปรุงสัญญาทั้งสิ้น 3 แนวทาง คือ ลบข้อสัญญาซึ่งเกี่ยวกับความเสี่ยงที่ไม่จำเป็นออก เพิ่มข้อสัญญาใหม่ซึ่งเกี่ยวกับความเสี่ยง และแก้ไขข้อสัญญาซึ่งเกี่ยวกับความเสี่ยงที่มีอยู่ การแก้ไขข้อสัญญาที่นำเสนอจะสอดคล้องกับกฎหมายและระเบียบที่เกี่ยวข้อง อย่างไรก็ตามเราก็ไม่สามารถเพิ่มเติมบางประเด็นในสัญญา เช่น การชดเชยค่าใช้จ่าย คอร์ปชั่น และการรับประกันด้านการเงินของผู้รับจ้าง นอกจากนี้ระยะเวลาของแต่ละกิจกรรมที่นำเสนอก็จะแตกต่างจากระยะเวลาที่ระบุไว้ในสัญญา FIDIC

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In recent years, the number of competitively bid contracts for road construction projects under the support of government budgets in Cambodia has been increasing and outnumbering the negotiated contracts being used. The nation strives for more efficient contracts, especially those with balanced risk allocation. This research proposes a guideline for improving the general conditions of public road construction contracts by focusing on risk allocation clauses. It begins with identifying risks in public road construction projects in Cambodia. It then compares the general conditions of the government contract with those of the FIDIC contract, especially their risk allocation clauses. This comparison results in many possible contract modifications, which are then verified with Cambodian related laws and regulations, as well as by experienced contract practitioners and university lecturers. It is found that there are 25 risks associated with public road construction projects in Cambodia. The comparison of the FIDIC and government construction contracts shows that the risk allocation clauses of the Cambodian construction contracts are unclear and inadequate to address several risks. This research suggests three possible alternatives for contract modifications, namely, delete unnecessary risk clauses, add new risk clauses, and modify existing risk clauses. The proposed contract modifications are in accordance with related laws and regulations. Yet, there are some issues that cannot include in the contract, namely, cost compensation, corruption, and contractor's financial guarantee. Moreover, the duration of some activities proposed in the modified contract is different from that in the FIDIC contract.

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CHAPTER 1

INTRODUCTION

1.1. Background

Construction is the process of work characterized by relationships between different parties to deal with complex works and unforeseen problems. Risks can happen during the whole process of construction work to all parties who involve in projects. Risks can lead to conflicts and negative effects on the schedule, cost, quality and scope of work if there is not a good risk allocation. In modern and complex construction projects, risks affect every contracting party such as owner, designer, contractor, subcontractors, and suppliers (Khazaeni et al., 2012a). Normally, all parties in a project must face certain risks, but every party, especially owner, tries to manage them by transferring, reducing, accepting, or avoiding. Each party shall carry greater risks if it is required to play a more important role in order to achieve project success. Because of this, the balanced risks allocation among parties is very important.

Nowadays, since construction projects have become larger and more complex, they require more knowledge of advanced technology. Revolutions in this industry lead to more serious risks. There have been 77 interesting risk allocation studies around the world since 1990, risk allocation in large ongoing construction project countries has been examined (Peckiene et al., 2013) as shown in Figure 1.1.

A contract is a document that can be used to minimize disputes among contracting parties on the responsibility of risks. This is because it presents how risks are allocated. Miswriting or missing of any clauses regarding potential risks in contract may lead to disputes in the project. In addition, a contract is a legal agreement that states the responsibility of all related parties about risks. The main objectives of contracts are to create, change, or terminate one or more duties that bind all parties together. A good

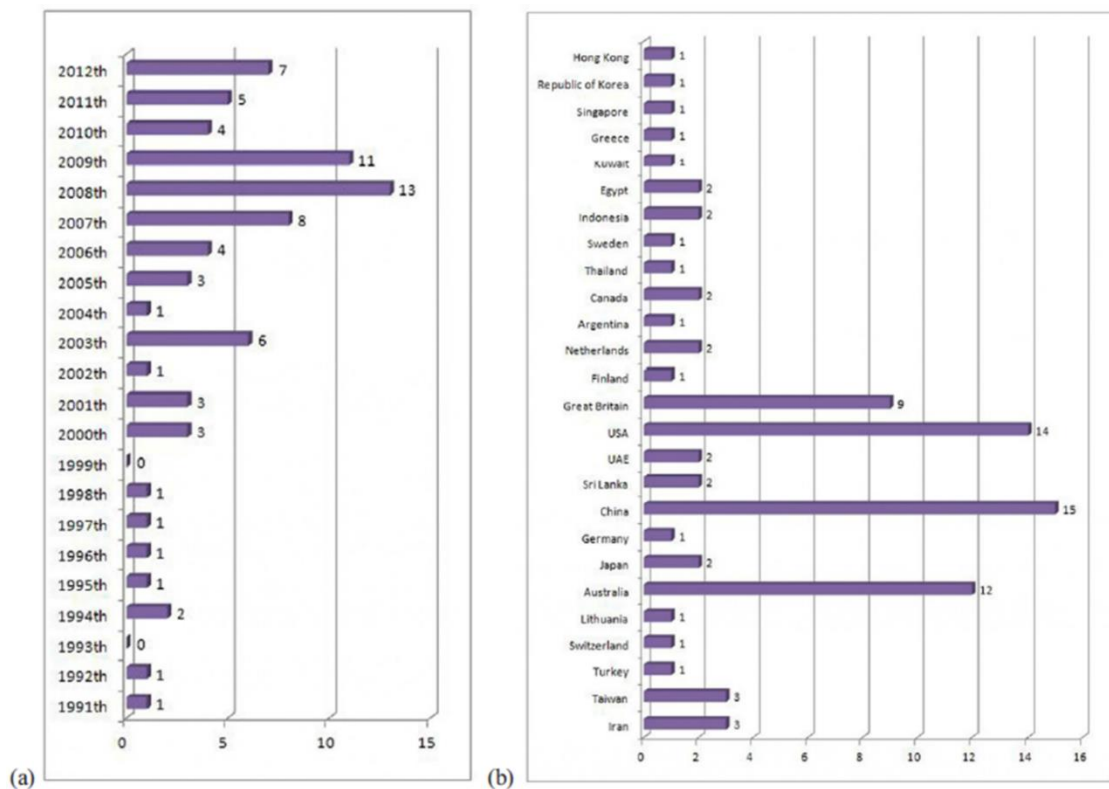


Figure 1.1: Statistics of risk allocation articles in 22 years (a) by year and (b) by country (Peckiene et al., 2013)

contract becomes an effective method to avoid the disputes of misunderstanding risk responsibilities of each party. Contracts should include general conditions that promote the achievement of project success through cost, time, quality and safety.

There are many types of contract currently used in practice such as lump sum contract, cost plus contract, guaranteed maximum price contract, unit price contract, project management contract, and negotiation contract. To gain the maximum benefit, the chosen contract type must correspond with the characteristics of project. Different procurement methods define different parties involving, different responsibility sharing, and different bidding processes. Three common procurement methods are design-bid-build, design-build, and construction management. Different procurement methods and contract types result in different contract terms.

Contracts between owners and contractors are considered the most important contracts in construction projects. This is because it provides a framework for all parties

to establish risk responsibility assumptions (Zaghloul and Hartman, 2003). The principle of allocating responsibility is that each risk should be controlled by the most capable party, and risk that cannot be controlled should be transferred to party who is able to against or absorb risk (Bubshait and Almohawis, 1994). Lack or unclear contract clauses result in failure to allocate right, duty, responsibility and risk between the parties (Khazaeni et al., 2012b). This failure might harm cost and time of project completion.

The complexity of contracts may harm or foster the trust of a new business (Praxmarer-Carus, 2014). Therefore, contracts are preferred to write in the way that might not harm business relationships within parties. Different business cultures in different countries may affect risk allocation differently. The standard form of contract is usually introduced for time and cost saving. However, the standard form of contract cannot be completely applied to any construction projects because the characteristics of each project are unique. Thus, it is necessary to develop a local standard form of contract for each country. It is usually be done by modifying international standard forms of contract to be appropriate for the characteristics of the construction industry in each country.

1.2. Problem Statement

Cambodia is a developing country with a large number of construction projects, both public (infrastructure) and private projects. The characteristics of construction risk vary for different countries. From our literature review, there has been no study on construction risk in Cambodia before. Risks are considered in establishing construction contracts in Cambodia even though a main purpose of contracts is to allocate these risks. If the information about construction project risk in Cambodia is identified, it will be a useful source for contract drafters and policy makers to recognize potential factors more efficiently. Clearly, this is better than based only on subjective judgment or standard clauses in a contract for all types of project.

In the past, public road construction projects under the government budgets in Cambodia were based on the negotiation procurement method, in which both employer and contractor were public agencies. However, in order to improve the

quality of construction work, competitive bidding has been introduced. As a result, the design-bid-build procurement method has become popular for road construction projects under the Ministry of Public Work and Transport. This bidding procurement allows private contractors to get involved in projects. Yet, it leads to various problems. The disputes between the public and the private sector increase and become more critical and difficult to solve. Thus, contract revision is necessary to avoid potential disputes between public employers with private contractors.

It is common that risk allocation in construction contracts is unbalanced. Since employers normally write contracts, most of risks are allocated to contractors. Moreover, the lack of clarity in contract clauses also increases the chance of the corruption in public projects. The lack of detail in risk allocation allows engineers to ask payment from contractors illegally as contractors breach contracts, rather than reporting mistakes. Furthermore, public construction contracts of Cambodia are not revised on a regular basis.

1.3. Research Objective

The main objective of this research is to develop a guideline for improving the general conditions of public road construction contracts to get balanced and effective risk allocation contract clauses. To accomplish this purpose, three sub-objectives are as follows:

1. Identify risks that affect public road construction projects in Cambodia
2. Explore the weaknesses and unbalanced risk allocation of current Cambodia public road construction contracts
3. Propose a guideline of Cambodian public road construction contracts for effective and balanced risk allocation

1.4. Scope of Research

Different types of construction projects are associated with different risks. Therefore, contract clauses are written in accordance with the characteristics of procurement

methods as well as the complexity of project. Due to limited time, it is infeasible to investigate all types of construction projects.

The number of infrastructure projects, especially road construction projects, has been increasing in Cambodia due to the country's development. Road construction projects in Cambodia are normally under the responsibilities of two Ministries, namely, the Ministry of Public Works and Transport (MPWT) and the Ministry of Rural Development (MRD). The MPWT is responsible for national road construction, whereas The MRD is responsible for road construction in rural areas. This research focuses only on national road construction projects under the responsibility of the MPWT.

Public construction projects can simply be divided into two types: (1) the projects supported by donations and (2) the projects supported by Cambodian government budgets. This research focuses only on the second project type. This is because the first project type requires standard forms of contract in which risk allocation has already been well defined.

This research investigates the projects using the design-bid-build procurement method. Such projects involve of the MPWT as the consultant, the Ministry of Economic and Finance (MEF) as the employer, and private road construction companies as contractors. The respondents in this research are the directors, project managers, project coordinators from private contractors, and the officers from the Ministry of Public Works and Transport.

The general condition of contract is normally established for general usage in all types of project. In addition, the particular condition of contract is required for a certain type of project. However, general condition is still the core of contracts illustrating risks which affect contractors and employers. We analyze the current general condition of contracts for any government construction projects in Cambodia established by the MEF. After this study, we will get the general condition of contract which is only appropriate for public road construction projects under support of government budgets in the MPWT. The FIDIC contract Red Book version 1999 is also used as a reference for improving the risk allocation of the government contract.

CHAPTER 2

LITERATURE REVIEW

2.1. Risk of Construction Projects

The word “risk” was first known in 1830, when it was used in insurance transactions. A risk is the multiplication of the probability of a risk’s occurrence and the consequence of that occurrence. Many researches differentiate the word “risk” and “uncertainty”. An event is called an uncertainty when probability of occurrence is unknown. Risk can be defined as the differences between actual and expected results.

Risks can be divided in 3 categories: known, know unknowns and unknown unknowns risks. Known risks refer to risks which occur frequently and inevitable in projects. Known unknowns risks refer to risks whose occurrence is predictable or foreseeable. Unknown unknowns risks refer to unforeseeable risks of which are unforeseeable for both their probabilities of occurrences and their impact even they are examined by experienced people.

Risks in projects can cause project failure. Risks cannot be avoided in projects. Many risks occur in construction projects due to the nature of construction business activities which require multi relationships among different parties in different processes, environments and organizations. However, construction industry is fail in implementing good risk allocation to reach the purpose of time and cost saving (Hameed and Woo, 2007). In construction contracts, there is a normal attitude that all parties try to avoid risks. Owners usually transfer risks to contractors. As the response, contractors divide and transfer parts of project to subcontractors who are considered to be better in covering specific risks for particular work.

Insurance is preferred to cover unforeseeable or uncontrollable risks such as risks from environmental effects. Risk premium is other method for contractors to use when contractors take responsibility of risks. Due to this case, employers can be secure by not covering risks, but certainly faces with high project cost caused by high risk

premium. Risks are sometimes seen as chances to get profit. During project execution, risks can be managed differently from the initial stage of procurement process because the nature of risk is dynamic according to time and project condition. Contingency plans and methods for managing risks must be kept up to date to actual situations that arise, and this risk allocation modification must be consulted with contractors. Some researchers concentrated risk allocation in different stages of project. Zhao et al. studied about risk allocation in two different stages: risk allocation in initial stage named contract risk allocation (before starting projects) and risk re-allocation during the process of contract performance (Hua ZHAO, 2011).

Risk management system is important for project success, especially for construction projects. The main purpose of risk management is to assist businesses to take right risks. To reach the purpose of effective risk management, a good risk management process is required. A good risk management shall follow some steps including risk identification, risk classification, risk analysis and risk response.

Risk identification aims to identify the sources of risk, risk events and the effects of risk. Risk classification is used to group risks by their types and their effects on an organization. Risk identification is valued as the most important step of the risk management process. Early risk identification in projects' life is important not only for sufficient project cost estimation and project constraint identification, but also for good attention on project management for allocating and controlling risks.

Risk analysis techniques are required to analyze consequences and to assess the impact of risks. Risk analysis attempts to capture all feasible options and identify the various outcomes of any decisions. It means the failure of risk analysis when projects do not proceed according to what has been analyzed. The attitude of person or organization who makes decision will affect decision about risks. Three types of people or organization characteristic about risks are risk lover, risk averse and risk neutral.

The final stage focuses on any risk response strategies which require the aid of risk analysis. Four main possible ways for risk response are risk retention, risk reduction, risk transfer and risk avoidance. Risk retention should be appropriate for risks that produce

small, repetitive losses for a particular responsible party. Sharing risk with other parties is a way to reduce disputes caused by risks through contractual arrangement. Risks can also be reduced through education and trainings for alerting potential risks, reducing the probability of losses by physical protection and implementing good risk allocation system. Risks can be transferred when they are economical to do so. Transferring decisions made for a particular risk are processes of estimating risk premium, the probability and consequences of risks when risks are aimed to be transferred. Transferring risks can significantly create other risks to whom they are transferred. Risks can be transferred to insurance companies. In this case, risks are changed from an uncertain exposure to a certain cost. Risk avoidance is straight forward to the refusal of risk responsibilities in contracts, but it cannot be done with careless attention.

A framework for risk responses which is developed by Perera et al. for road projects in Sri Lanka showed that risks should be shared by contracting teams for effective risk handling, should be transferred to act against certain losses and to achieve organizational objectives of each party, should be avoided to achieve with the early detection of events, and should be retained by a particular party who would minimize risks, when they were handled using other methods. However, there is no best risk handling methods, and they would have to be employed depending on the types and nature of risk (Perera et al., 2009).

Type of risk is an indicator used for decision making on ways to respond to risks effectively. A risk hierarchy is created for grouping risks from environmental risks, to market/industry risks, to company risks and to project risks, respectively. Environmental risks can be divided into two categories. First one is physical risks included weather and other natural phenomena. They cannot be controlled but can be mitigated their effects. Second group includes political, social and economic risks which are partially controllable. Market or industrial risks refer to risks caused by the effects of industry. Risks can be grouped by their consequences. These consequences are predictable upon experts' judgment and knowledge, tempered with some information from past events.

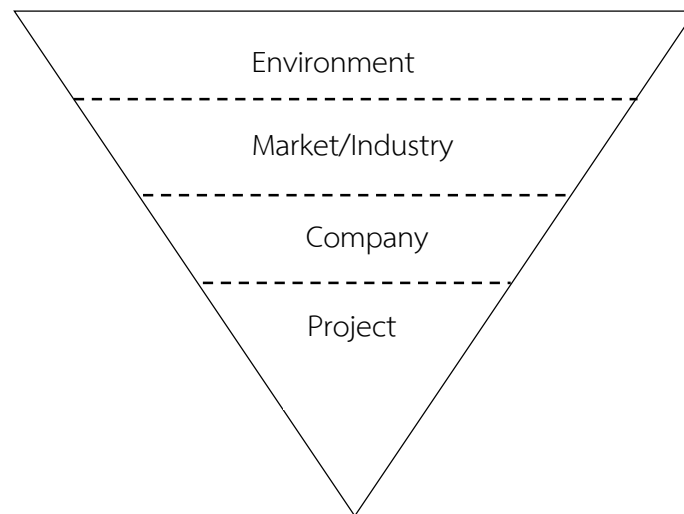


Figure 2.1: Risk hierarchy

By the research of American Society of Civil Engineers, Ming-Teh Wang conducted a research in 1979. Twenty three risks were evaluated about their level of importance and risk allocation by the perception of contractors in the United States. These risks were used again by Roozbeh Kangari in 1995 for conducting the same research and checking on the variation of results within these two times (Kangari, 1995). Risks in construction projects were also identified separately by some researchers in different countries such as Ahmed et al. (1999) in Hong Kong, Kartam & Kartam (2001) in Kuwait, ANDI (2006) in Indonesia, Hameed & Woo (2007) in Pakistan and El-Sayegh (2008) in UAE.

Kartam and Kartam grouped risks in some different categories such as physical, environmental, design logistics, political, construction and operational risks (Kartam and Kartam, 2001). Hameed & Woo came up with 33 risks of construction in Pakistan (Hameed and Woo, 2007). El-Sayegh divided risks in construction projects into two main categories, internal risks and external risks. Internal risks are related to project and company risks including owner's risks, contractors' risks, Designers' risks, subcontractors' risks and suppliers' risks. External risks are related to industrial and environmental risks including political risks, social and cultural risks, economic risks, natural risks and other risks (El-Sayegh, 2008) . Hameed and Woo categorized 16 risks

in five major groups: capability risks, contractual and legal risks, economic risks, physical risks, and political and social risks (Hameed and Woo, 2007).

Table 2.1: Risks in the construction project in the previous

Internal Risk	U.S.A 1979	U.S.A 1995	Hong Kong 1999	Kuwa it 2001	Indo nesia 2007	Pakis tan 2007	UAE 2008	FIDIC Contr act
1. Delayed payments to contractors	✓	✓	✓	✓	✓	✓	✓	✓
2. Unreasonable work termination								✓
3. Improper work suspension								✓
4. Changes in work	✓	✓	✓	✓	✓	✓	✓	✓
5. Lack of project information								✓
6. Delay in obtaining sites access	✓	✓	✓	✓	✓	✓		✓
7. Breach of contract		✓	✓		✓	✓		✓
8. Ambiguity or not understandable contract clause								✓
9. Sudden bankruptcy	✓	✓	✓	✓	✓	✓	✓	✓
10. Act against the country law								✓
11. Electrical, water and other temporary facility								✓
12. Obtaining approval	✓	✓	✓	✓	✓	✓	✓	✓
13. Unclear of contractors' work warranty								✓
14. Delay in solving disputes	✓		✓	✓	✓	✓		✓

arbitration disputes								
15. Defective designs	✓	✓	✓	✓	✓	✓	✓	✓
16. Deficiency in drawing	✓	✓	✓	✓	✓	✓		✓
17. Design documents not issued on time								✓
18. Health or safety protection in site	✓	✓	✓	✓	✓	✓	✓	✓
19. Pollution or negative effects to surrounding environment	✓		✓		✓	✓		✓
20. Poor quality of contractor	✓	✓	✓	✓	✓	✓	✓	✓
21. Contractors' incompetence	✓	✓	✓	✓	✓	✓	✓	✓
22. Lack of labor forces/staff productivity	✓		✓	✓	✓	✓	✓	✓
23. Insurance responsibility								✓
24. Contractors failure in examine the site and its surrounding environment								✓
25. Contractors fail to remedy defect								✓
26. Poor performance of subcontractors	✓		✓	✓	✓	✓	✓	✓
27. Unclear work coordination								✓
28. Problems caused by subcontractor								✓
29. Material quality problems	✓	✓	✓	✓	✓	✓		✓

11. Shortages in manpower availability	√	√	√	√	√	√	√	√
12. Shortages in equipment availability	√	√	√	√	√	√	√	√
13. Unexpected bad weather	√	√	√	√	√	√	√	√
14. Unforeseen site condition	√	√	√	√	√	√	√	√
15. Health effects by chemical or any pollution from the surrounding environment								√
16. Munitions of war and explosive materials								√

2.2. Risk Allocation and Construction Contracts

2.2.1. Risk Allocation and Risk Preference

Risks are the connection of commitment of present resources to future expectation. Proper risk allocation shall be considered on ability to absorb risks and incentives if risks are offered to carry. As a usual practice of risk allocation in lump sum construction projects, employers attempt to pass more risks to contractors. However, some risks cannot totally be transferred such as risks of bad weather condition, inflation, or taxation changes to contractors, even though contractors can usually reduce the degree of exposure to them. When risks are not appropriate for any parties to control them, risks are preferred by both parties to share. Risks are preferred to reduce their liabilities from either one or both contracting parties and recommended remained risk components for joint risk allocation (JRM) (Motiar Rahman and Kumaraswamy, 2002).

Risk allocation can be differentiated in according to payment mechanisms. In lump sum or fixed price contracts, risks which are outside contractors' control such as unforeseen ground condition, or unexpected bad weather, are usually allocated to

employers. Some risks in these categories might be allocated to contractors via contracts, and then an insurance premium is paid to contractors in the form of risk contingency included in bid. However, when employers use a fixed price format, project risks should be low. Admeasure contracts require the use of bill of quantities (BoQ) or schedule rate. This type of payment is used when risks are relatively low and quantifiable. The main concern of employer in this format is risks that the duration or cost of project will exceed their estimations. Contractors and employers should trust each other, and that both parties have the same perception of the probabilities of occurrence and effects of project risks. Cost reimbursable and target cost contracts refer to the cost that contractors incurred in carrying out contract works plus a specified fee for overheads and profit, so no total price is quoted in tender. Any differences between the actual cost of work and target cost set for work are shared, in a predetermined way, between employers and contractors. One of risks that this type of project is different with the cost-reimbursable type of contract is risk in trying to finish at a cost lower than the target cost. Contractors may use standard materials, and this risk should have to be borne by employers.

Many researches were conducted about risk allocation for different construction project types in different countries. Wang and Chou studied risk allocation in high way projects based on 6 projects in Taiwan by focusing on risk allocation in contracts and out of contracts (Wang and Chou, 2003). He found that the critical risk allocation condition affects construction contracts in Taiwan high way projects for different situations of risk allocation characteristic. Contractors' tendency of a certain risk handling will change from actively transferring risks to passively retaining risks when the probability of certain risks is uncontrollable with increasing of the possibility of taking risks. In contrast, if risks are controllable and certainly allocated to contractors, contractors tend to reduce impact caused by risk events rather than retain risks.

Risk allocation was studied by Kangari for different period of time by the first research of ASCE in 1979 and the second one in 1993 in USA. This study aimed to identify the different perceptions of contracting parties on risk allocation for different periods of

time. The result showed that contractors had more willing to resume risk in the form of risk sharing with owners (Kangari, 1995)

Risk allocation criteria can be defined based on:

1. Whether a party is able to foresee risks
2. Whether a party is able to assess the possible magnitude of consequences of risk
3. Whether a party is able to control risks chance of occurring
4. Whether a party is able to manage risks in case of occurring
5. Whether a party is able to sustain consequence if risks occurs
6. Whether a party will benefit from bearing risks
7. Whether premium charged by risks receiving party is considered reasonable and acceptable to employers

Max Abrahamson has suggested that it is proper for a contracting parties to bear risks in any one of the following five cases:

1. If the risks are of
2. loss due to his/her own willful misconduct or lack of reasonable efficiency or cares
3. If he can cover risks by insurance and allow for the premium in settling his charges, and it is most convenient and practicable for risks to be dealt with in this way
4. If the preponderant economic benefit of running risks accrues to him
5. If it is in the interests of efficiency to place risks on him
6. If, when risks eventuate, losses happen to fall on him in the first instance, and there is no reason under any of the above headings to transfer losses to another, or it is impracticable to do so.

Risk allocation also exists in many researches on Public Private Partnership (PPP) projects. Bing et al. analyzed risk allocation in four categories: risks should be allocated to public sector, risks should be allocated to private sector, risks should be shared between public and private sector, and risks need to be allocated according to

individual circumstances of a project (Bing et al., 2005). Risks were divided into three major levels: micro, meso and macro. In addition, risk allocation is also studied by Shen et al. in Hong Kong (2006), Roumboutsos and Anagnostopoulos in Greek (2008), Ke et al. in China (2010), Wibowo and Mohamed for PPP projects of water supplies in Indonesia (2010), Xu et al. for PPP water projects in China (2011), and Mouraviev and Kakabadse in Kazakhstan (2014).

Factors affecting risk allocation decision making were also identified by researchers in order to understand ways to allocate risks effectively. In according to a research, 26 factors affecting to contractors' risks attitudes in construction contracts in China were identified and grouped in 4 different categories: knowledge and experience, contractors' character, personal perception, and economic environment (Jiayuan Wang, 2011).

The differences between risk allocation and risk preference is a reason of disputes or high project contingency in construction contracts. It is necessary to know beforehand about the attitude towards risks, the barriers to risk allocation and the benefits perceived for analysis and management of the risks because risk perception is an important aspect of risk allocation (Hameed and Woo, 2007)

Many researches were conducted to identify differences between actual risk allocation and preferred risk allocation from different contracting parties for different projects in different countries. These researches tried to improve construction contracts in those countries. Perera et al. conducted a research on the comparison of actual risk allocation in road construction projects in Sri Lanka with preferred risk allocation. Then, he developed a risk handling framework for this kind of project. Actual and expected risk allocation in construction contracts in Indonesia was also studied from employers and contractors. The result showed that many risks were unclearly decided, and there were different perceptions in pertaining to employer risks (Andi, 2006)

2.2.2. Construction Contracts

Construction projects start by contractors and employers signing contracts to show agreements within these parties for dividing liabilities, rights, duties and risks for the construction works. Complex relationships among parties in construction projects are necessarily governed by most appropriate construction contracts. Construction contracts shall be carefully drafted and managed to avoid possible exposures to financial penalties, and the risks that might turn profitable projects into an unprofitable.

There are many types of contract with different favors to employers and contractors categorized by different payments. In some situations, contracts can be combination or are partly modified of different contract types. Several basic types of construction contracts which are currently used in construction projects are lump sum, cost-plus guaranteed maximum price, unit price, project management, and negotiated contract. A project delivery system has effects in choosing construction contracts. There are three primary systems which are often used: design build, design-bid-build, and construction management.

Lump sum contracts are typically used with design-bid-build method of project procurement when contractors agree to supply all labor forces and materials for a fixed sum price. Cost-plus contracts are implemented due to the agreements of employer to pay the cost of all labor forces and materials, with a cost-plus basic for contractors' profit. Guaranteed maximum price contracts are contracts that fix a total maximum price. In addition, work has to be finished in according to contracts without exceeding this total maximum price. This contract type is becoming more popular because it can minimize risks, avoid claims, and integrate the diverse interests of complex projects. Unit price contracts are contracts that final price depends on the final quantity of work. This price can vary differently from what it is initially estimated, multiplied by a fixed price for each unit work.

Project management contracts are normally done with architects on an agreements that architects agree to manage contracts and processes of work in order to make sure that all works are done completely on time. Negotiated contracts are similar to design-

bid-build contracts which design and construction performance are done by different firms, but negotiation with a particular contractor is done instead of tendering process. All the types of these contracts contain both advantages and disadvantages in according to the condition of construction projects. Thus, in order to select the most appropriate type of contract for a project, it is necessary to check the characteristic of project with these contracts' characteristic.

Many kinds of standard contracts are used in construction projects. These standard contracts can be varied from company to company and from country to country. Standard form of contracts is used for saving time and cost. However each project requires specific contracts, so particular clauses for particular projects are added. Implied obligations of contracts by local, regional or international laws shall be taken in to consideration for drafting construction contracts, especially for international projects. Many standard contracts are modified to use for contracts in different countries. Some organizations are well-known for their standard contracts such as Fédération Internationale des Ingénieurs-Conseils (FIDIC), Institution of Civil Engineers (ICE), The Association of Consultant Architects (ACA), and International Chamber of Commerce (ICC)-etc.

2.2.3. Risk Allocation by Construction Contracts

Construction risks can be hardly eliminated, but they can be transferred or shared from one party to another through contract clauses. They are increasingly recognized by both contractors and employers about benefits of comprehensive and transparent assignment of construction risks for project success. However, there are only few employers completely administering risks in contract documents (Andi, 2006). Even risks are defined by the multiplication of probability (P) with the impact of occurrence (I), this formula will not be necessary to highlight those risks which shall be considered when writing contracts (Williams, 1996). Therefore, evaluation of risks included in a contract by this formula is not efficiency. It is inequitable and unreasonable to shift risks onto a party in a construction contract without considering on balanced risk allocation among all parties (Peckiene et al., 2013).

Ming-The Wang had divided the risk allocation by contract clauses into 7 condition including (Wang and Chou, 2003) :

- Type A: The contract clauses definitely stipulate that employers should take certain risks.
- Type B-1a: The contract clauses definitely stipulate that contractors should take certain risks, and contractors have no objection to such allocation.
- Type B-1b: The contract clauses definitely stipulate that contractors should take certain risks, but contractors are un-willing to accept such allocation, transgressing the principle of good faith and fair dealing.
- Type B-2: The contract has some sketchy stipulations about certain risks, and for this reason, risk allocation remains unconfirmed.
- Type C-1: Although there is no clauses in the contract to allocate certain risks, the two contracting parties have consensus that employers should take risks.
- Type C-2: Although there is no clauses in the contract to allocate certain risks, the two contracting parties have consensus that contractors should take risks.
- Type D: There is no clause in the contract to allocate certain risks, and the two contracting parties have no consensus about risk responsibilities.

Complexity of contracts can harm business trust between business parties especially for new business partners. Thus, it is important to consider carefully on the optimum way to draft contracts effectively. This contract shall cover all project risks, but might not affect business relationship between both parties.

Risk allocation can be divided based on the types of procurement and contract (Smith et al., 2009). For risk allocation based on the types of procurement and contract, some approaches are described. For conventional approaches which design are responsible by engineers who work on the behalf of employers and with limited contractors' involvement, this organizational structure allocates the risks of change in price to

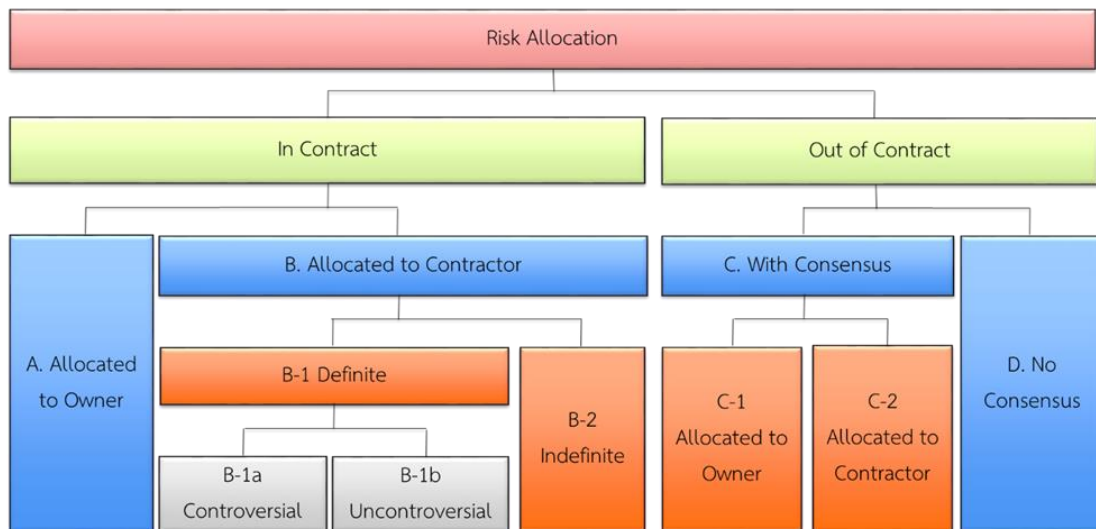


Figure 2.2: Risk allocation types

contractors, while the risk of delay can be allocated to either contractors or employers. Cost-based-reimbursable approach requires contractors to take the majority of risks because contractors are paid on a cost plus fee basis. However, it also means that employers only have to pay for risks that occur. For management contracting approach, employers transfer all risks except those related to the operation of project to management contractors. Then management contractors can transfer risks that they hold through contracts. In fast-track approach, this method of construction requires the compression of design and construction stages by overlapping of many activities and requires a much greater degree of control over construction process. This kind of method increases in projects because the designs of work are not usually finished before construction is started.

2.2.4. The FIDIC Contract

The word FIDIC comes from Fédération Internationale Des Ingénieurs-Conseils. The FIDIC is a standard organization of construction industry which was founded in 1915 by three francophone countries: Belgium, French and Switzerland. This organization is best known by its standard of contract. The FIDIC contract standard is one of the most popular construction standard contracts especially for international projects. Even it is not completely used in some countries; it is used as a reference to form standard

contracts for those countries. These standard contracts are modified for appropriate use for their countries.

The FIDIC Red Book is an international standard condition of contract which is first published in August 1957. In this first edition, there are some editing changes and few minor revisions in some clauses by editing some technical words, adding more description to some clauses, combining clauses and editing some clause descriptions. In 1969, the Second Edition of FIDIC Red Book was published. At this time, the FIDIC Red Book was approved and ratified by International Federation of Asian and Western Pacific Contractors' Associations. In March 1977, the Third Edition of Red Book was published with some significant changes by the effects of Fifth Edition of ICE Form in 1973. The Fourth Edition of FIDIC Red Book was established in 1987 with the major revisions even the title of the document which the word "International" was deleted. This title editing in this Fourth Edition aims to use FIDIC not only in international projects but in domestic contracts all over the world.

The FIDIC contract is well-known in construction industry by its balanced clauses within all parties who involve in contracts. There are many kinds of FIDIC standard contract for different types of project such as Condition of Contract for Construction; Condition of Subcontract for Construction; Condition of Contract for Plant and Design Build; Condition of Contract for Design, Build and Operate Projects; Condition of Contract for EPC/Turnkey Projects and short form of contract.

In November 1996, a document supplemented to the Fourth Edition 1987 was established. This establishment of this supplementary document aims to give users the choices in method for: settlement of dispute; payment; and preventing delay in certification for the purpose of payment. This revision is based on six concepts such as domestic contract, common law system, English legal drafting principle, design and supervision of construction of projects which refer to the role of engineers, remuneration which based on re-measurement contract with the provisional bill of quantity, and risks sharing. In October 1999, FIDIC produced the new set of contract standard forms which are worldwide use until now, including:

- Construction Contract: Condition of Contract for Building and Engineering Works, Design by Employers (FIDIC Red Book)
- The Plant and Design-Build Contract: Condition of Contract for Electrical and Mechanical Plant, and for Building and Engineering Works, Design by Contractors (FIDIC Yellow Book)
- The EPC and Turnkey Contract: Condition of Contract for EPC Turnkey Projects (FIDIC Silver Book)
- The Short Form of Contract (FIDIC Green Book)

The FIDIC Red Book is prepared in 3 sections, general condition, guidance and forms. Because contracts are drafted by employers or engineers, all sections are important for them, and only some sections are important for contractors and staffs in sites who will administer contracts. Some contracts might mention only the rights and obligations of parties in projects. However, the FIDIC contract further provides project management procedures which are essential for project administration. The general condition of the FIDIC Red Book includes twenty main clauses, and each main clause contains of sub-clauses which are approximately 160 sub-clauses. Even there are the groups of different clauses for different categories, in order to solve particular problems, it may be necessary required information from several sub-clauses. After the general condition, the index is included for locating references to a particular subject.

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The main clauses of FIDIC are grouped in the purpose to deal with related subjects:

- Clause 1 is applied to contract in general
- Clauses 2 to 4 deal with the duties and obligations of employer, engineers and contractors in work execution
- Clause 5 deals with the requirements for subcontractors who have been nominated either in contract or as a variation in Clause 13
- Clauses 6 and 7 deal with the requirements for items of men and materials
- Clauses 8,9,10 and 11 give the sequence and mechanism of events during construction work
- Clause 12 gives the procedures for measuring actual quantity for payment

- Clauses 13 and 14 give the procedure of payment from employers to contractors
- Clauses 15 and 16 focus on the condition of termination and suspension by any parties in a contract
- Clause 17 relates project as a whole. It includes the matters which are critical to parties' responsibility and overlap with the requirements of other important sub-clauses
- Clause 18 mentions procedure to do before commencement of work and to solve problems happening in projects by using insurance.
- Clause 19 describes particular problems that might occur especially unpredictable problems from environment to projects. The final-sub-clause also refers to release from performance in a wider context not just only due to force majeure.
- Clause 20 describes the procedure of contractor's claims when problems happen, the resolution of claim and disputes, and the appointment of dispute adjudication board.

The FIDIC contract was used in many researches especially the researches about risk allocation for the whole project risks or for some particular risks. The FIDIC Red book was used to compare and update domestic contracts by the reason of its faire risk allocation concept. However, one research by Charoenngam and Yeh found that some unjust clauses still exist in the FIDIC contract. In this research, typical construction risks were identified, and comparison between the FIDIC contract and the Taiwanese government condition of contract for hydropower construction projects was done. The research found that the major difference between these two forms of contract was that exculpatory clauses in Taiwanese contract are not found in the FIDIC contract. The Taiwanese contract placed contractors in more disadvantaged position than those in the FIDIC contract, and unfair risk allocation was found in both contract forms (Charoenngam and Yeh, 1999).

Ndekugri and McDonnell compared the FIDIC contract form with the NEC (New Engineering Contract) produced by the UK's Institute of Civil Engineers (ICE) in 1993

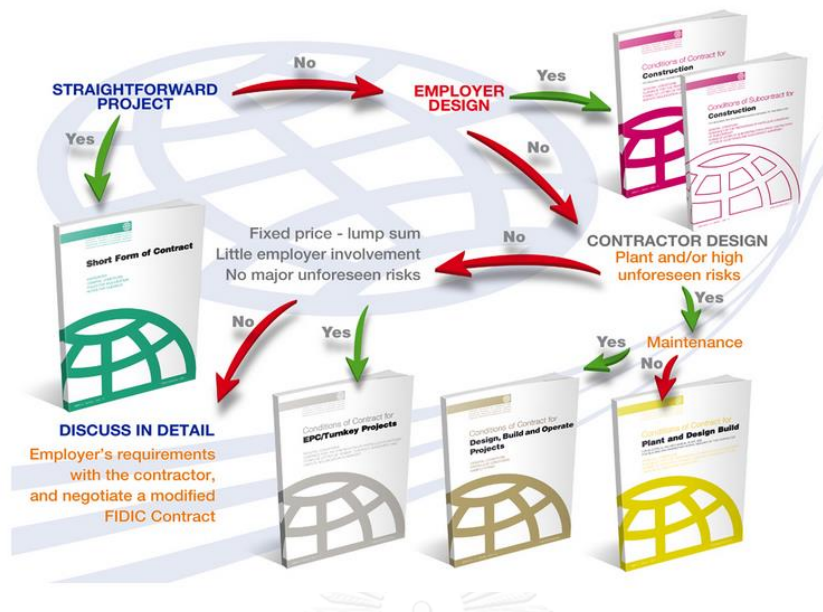


Figure 2.3: Different types of FIDIC contracts for different types of project

about the clauses to deal with site condition issues. The result showed that the NEC emphasizes on how problems will be solved while the FIDIC contract deals more with whether or not encounter condition should have been foreseeable (Ndekugri and Mcdonnell, 1999). Due to risk allocation clauses about unforeseeable condition in Saudi contract, a research was conducted by comparing the tender cost of five different small to medium projects. Each project was required contractors to submit two biddings. The first one is done based on the local Saudi contract, and the second is done based on the FIDIC contract. The curve and an equation for predicting reduction in bidding amount due to different clearness of unforeseeable condition clauses between the two contracts were introduced (Abdelkhalek, 2006).

Another research was done and aimed to develop a standard to divide the responsibility in natural disaster management by using the FIDIC contract as a reference. The FIDIC contract is used because of its fairness and reasonable principle, balanced responsibilities, power and interest (Guo and Sun, 2010). For Turnkey project, the FIDIC Turnkey EPC (Engineers, Procure, and Construct) was investigated and analyzed through risk assessment plan. A modeling system which is more efficient and proactive for contract management environment was created (Bakr et al., 2012).

CHAPTER 3

RESEARCH METHODOLOGY

Risk in construction projects can be studied in different ways based on different project conditions and criteria. This research focuses on risk in construction contracts. This chapter discusses the research methodology used for identifying risks in construction projects, analyzing risk allocation in the current contracts of Cambodian public road construction, developing a guideline for achieving balanced risk allocation in Cambodia road construction contract clauses, and verifying the proposed contract improvement. In this research the term “risk” refers to the risk factor affecting to time, cost, quality and scope of road construction projects.

This chapter begins with the research framework designed for this study. It then presents the detailed research steps for data collection and data analysis. Finally, the concept and method used for verifying the proposed guideline of contract improvement are discussed. Furthermore, this chapter also remarks the limitation of this research methodology.

3.1. Research Framework

Regarding to the problem statements and responding to the research objectives, the research methodology for this study is designed at the initial stage. This design process is designed in according to each objective of the research, and they will be described briefly respectively.

The first objective of this research is to identify risks in public road construction projects under the support of government budgets in Cambodia. Step 1 is design in responding to this first objective.

STEP 1: Identify risks in road construction projects in Cambodia

This step consists of two steps as follow:

(1) Do literature review of related research to identify risks that normally occur in construction projects worldwide. Herein, risk breakdown structure is used for identifying project risks, which are classified into internal risks and external risks. Internal risks encompass risks inherent in projects and in companies. External risks include natural risks, economic risks, and political and social risks.

These risks were then used in a pilot survey. The respondents experienced in Cambodian road construction projects were asked to provide their opinions on risks in projects. Such responses were considered to remove irrelevant risks from the study. In addition, the respondents were also encouraged to provide additional risks that were not mentioned. These additional risks were unique for Cambodian road construction projects under the support of government budgets.

(2) Conduct in-depth interviews to obtain detailed information about risks concerning road construction projects in Cambodia. The risks verified previously were used in the survey of their occurrence, conditions, and characteristics in Cambodia road construction projects. We conduct in-depth interviews with experienced private contractors and public officers to yield the risk factors, frequency of risk occurrence, and impacts on four main project objectives, namely, time, cost, quality and scope.

The second objective of this research is to explore the weaknesses of current contracts of Cambodian government contracts for road constructions. These weaknesses are defined by checking current risk clauses with problems occurring for each risk factor in projects. Then the FIDIC contract is also used to compare with the Cambodian government contract (CGC). This comparison aims to find out the contract which is better in responding to the problems occurring from each risk factor. The results of this checking is also used to support the third objective of this research which proposes

the guideline to improve the current CGC. Thus, 4 steps are designed respectively from the first step as follow:

STEP 2: Identify risk allocation in CGC

The general condition of CGC is analyzed for identifying their risk allocation. One risk might be included in different clauses in contracts. Thus, all related clauses for each risk in the contract are grouped for identifying risk allocation. Subjective judgment is used for analyzing each contract clauses about risks allocation and risk description included in those clauses. The knowledge about laws and contracts in construction domain is a fundamental knowledge for identifying risk allocation. Some criterions are also used for analyzing risk allocation in the contract. These criterions are shown in the Table 3.1. In order to make sure that results of risk allocation analyzed by the author in the CGC is correct, verification of results with experience practitioners is conducted.

Table 3.1: Analysis criterions for risk allocation in construction contracts

Analysis Criterions	Risk Allocated to Contractor	Risk Allocated to Employer	Sharing Risk
Key words	<ul style="list-style-type: none"> Contractor shall... Contractor must... Contractor's risk 	<ul style="list-style-type: none"> Employer shall... Employer must... Employer's risk 	A risk is allocated to both contractor and employer
Project termination condition	Project is terminated due to contractor's actions	Project is terminated due to employer's actions	
Time	_____	Time extension	
Cost	<ul style="list-style-type: none"> Cost deduction Fine 	Extra payment	

STEP 3: Check if risks in projects exist in contract or not

This step aims to check existence of risk factors found in the first step in the general condition of the CGC. If any risk factors are not found in the contract, it means that the Cambodian contract misses those important risk factors in the contract clauses. In contrast, if any risk factors are found in the contract, step four of the research is processed.

STEP 4: Check if problems in projects are covered or not by the CGC clause

In the case that risk factors found in the first step are found in the contract, a further checking is needed. Even these risks are mentioned in the contract, it does not mean the current clauses are good enough to cover all problems of risk factors or good enough on how to deal with them, or clear enough for risk allocation. Two main questions are used to for this checking:

1. Can current contract clauses cover all risk factors and their impact in projects?
2. Does unbalanced or unclear risk allocation exist in the current contract clauses?

Therefore, the purposes of this checking are to determine the risk clause effectiveness in responding to impact to project objectives, and to determine risk allocation effectiveness in the CGC. Information of each risk factor from the in-depth interviews from the first step is the input of this step.

STEP 5: Revise the FIDIC contract

This step is created to respond to the step 3 and 4 of research design. In the case that important risks in projects are not found in the contract clauses in the step 3 or in the case that the current Cambodian contract clauses are found to be ineffective in covering problems caused by risks in the step 4, Step 5 will be activated. Three sub-steps are design for this step:

- (1) This step starts by analyzing related FIDIC contract clauses for any risk factors found in such the two condition mentioned above. This analysis begin with

grouping of related clauses in the FIDIC contract for particular risks. One risk might be included in different clauses, so all related clauses for a particular risk are collected.

(2) Subjective judgment is used for analyzing contract clauses of each risk factor about risk allocation, and their risk detail included in those clauses by using the analysis criterions in the Table 3.1. To avoid mistakes in this judgment, verification with related studies is done. A study about a comparison of China's standard form of construction contract and FIDIC condition of contract for construction (Zhang et al., 2006) is used as a reference for this verification.

(3) Then the CGC is compared with the FIDIC contract. This comparison is focused on 3 types of risk:

- The risks that both contracts are mentioned
- The risks that present in the FIDIC contract but do not exist in the CGC,
- The risks that present in the CGC but do not exist in the FIDIC Contract.

Risk factors found in the first type are taken in to this fifth step. This comparison focuses on the differences of risk allocation in these two contracts and the differences of clearness of these two contracts. These results can be used also to show the effectiveness of the CGC in managing risks and their impact to project objectives, especially risk allocation comparing to the FIDIC contract. This will be a good source of information for proposing additional clauses or risk clause modification in the next step.

Last objective of this research aims to propose a guideline for improving risks clauses for the Cambodian road construction contracts which are effective and balanced risk allocation. 4 Steps are designed to respond this purpose:

STEP 6: Propose contract improvement

Using the results from the analysis in step 5, this step will propose additional clauses and risk clause modification. This proposed contract clause improvement shall follow the framework as shown in Figure 3.1.

Internal risks normally are caused by parties involving in projects. Internal risks can be risks occurring in company and risks occurring in projects. Government policies certainly have influences to projects because the focused projects are public road construction projects. Clauses which mean oppositely to government policy cannot include in contracts. Due to all reasons mentioned, internal risk clauses including in contracts should be considered in two scenarios, risks that can be covered by contracts and risks that cannot be covered by contracts. Risks caused by government policies shall be improved through policy improvement in public procurement.

External risks are normally caused by external effects such as nature, politic, society, economic, and law. External risks can be allocated to parties involving in projects or shared between both parties. Based on concepts of the FIDIC contract about external risk allocation, this standard contract refers to share external risks which are unforeseeable. Furthermore, foreseeable risks are allocated to either parties in projects, especially contractors. Foreseeable or unforeseeable risks can be determined in according to historical data and expert's judgments. Risks are called foreseeable risks when they generally happen in projects at time and locations that are normally known. Moreover, risks can be foreseeable risks when

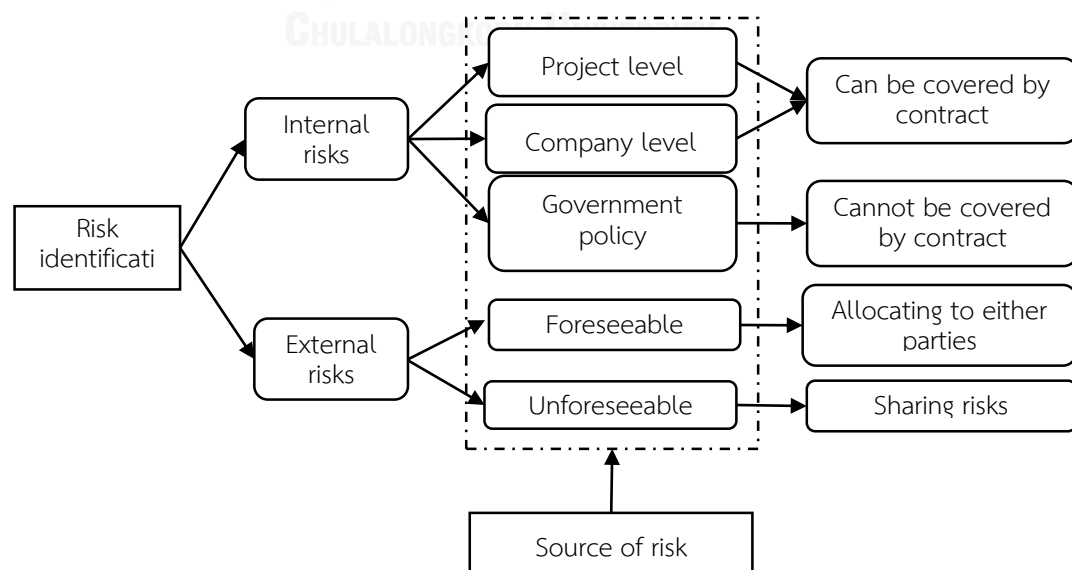


Figure 3.1: Additional risk clauses and risk clause modification framework

they can be predicted by experienced contractors or by giving reasonable evidence. In contrast, risks are called unforeseeable when they unusually happen and cannot be predicted by any experienced contractors or any reasonable evidence.

STEP 7: Verify proposed contract clauses improvement

In order to make sure that proposed improvement of contract clauses about risks and risk allocation is practicable and no any contrasts with laws and regulations of Kingdom of Cambodia. Two verifications are done as shown in Figure 3.2:

(1) Verify with related laws and regulations: all proposed contract clauses are verified with laws or regulation which are related to those clauses. Any clauses found to have conflicts with the laws, they will be deleted. Moreover, proposed contract clauses can be modified by regulations which considered more practicable and prioritized to use in Cambodia comparing to FIDIC clauses. Depending only on author's judgment, mistakes can happen. Thus, results getting from these verifications will be used to discuss with experienced and knowledgeable practitioners or lecturers in laws and contracts in Cambodia.

(2) Verify with experienced practitioners: even this proposed contract improvement is checked with laws and regulations, it does not mean that proposed contract clauses are usable in current practice in Cambodia. Problems of any risks found in projects and in the CGC are reported to respondents. Then proposed clauses for improvement in responding to those problems are reported to respondents. After that, respondents are requested to give their evaluations and recommendations on this proposal whether they agree, not agree or partly agree with the proposed contract clause improvement by giving their reasons.

STEP 8: Keep current contract clauses in CGC

This step follows a result of the analysis in step 4 for the case that no weakness of the current contract clauses is found comparing to problem occurring. In other word, current contract clauses are good enough to use without requiring any modification. Due to this case, contract usage is not the efficient choice to manage

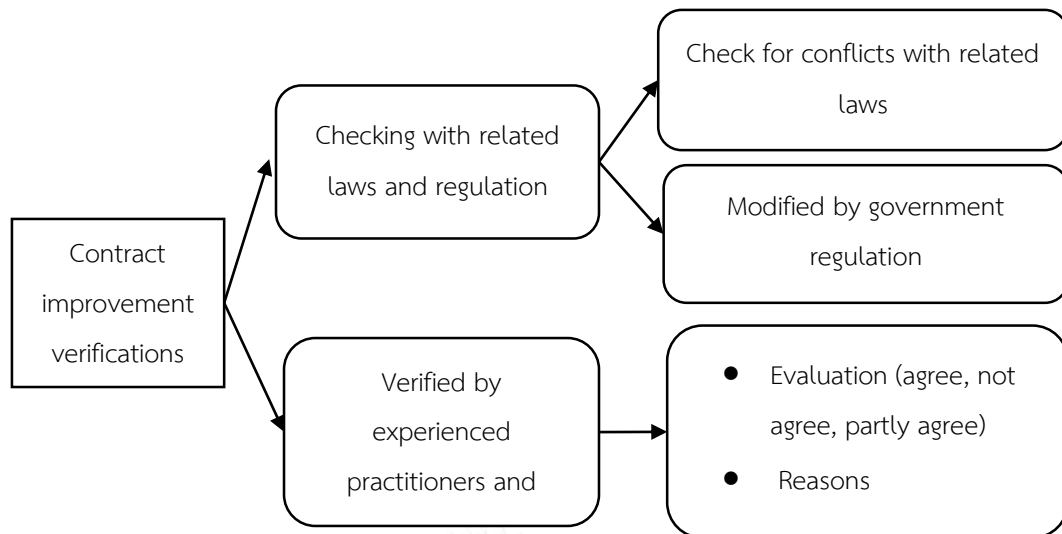


Figure 3.2: Proposed risk clauses verification framework

risks. Problems might be not appropriate to solve by covering them in contracts or might be because of any other reasons. Government policy is a reason that contract clauses are not effective to use for risk allocation in this category.

STEP 9: Summarize contract improvement

This step combines the results from the step 7 and the step 8. This combination is the proposed clause improvement for Cambodian public road construction project using government budget. This is the main objective of this research.

3.2. Data Collection

Data collection is a necessary and important part of a research because it affects to the reliability of research results. All information, evaluations and documents related to risks in construction projects and contracts in Cambodian public road construction projects under the supports of government budget are collected from respondents. There are some processes to follow for data collection:

- (1) From literature review, all necessary information related to construction project risks are gathered especially risks that normally happen in road construction projects. Literature reviews are done based on text books, article journals, international conferences papers, and any related sources from

internet. Moreover, risks concentrated in this study are further focused on risk allocation under construction contract clauses. Next, interview questions are design. A list of risks founded from literature review listed in Table 2.1 is provided to respondents.

- (2) In the in-depth interview, respondents are required to give their opinions based on their experience and perceptions about each risk by answering some questions. These questions are:
- What are risks happening in public road construction projects in Cambodia?
 - How do these risks impact to the time, cost, quality and scope of project?
 - What are the sources of these risks?
- (3) The FIDIC red book version 1999 for design-bid-build projects is used for the comparison with the CGC. The FIDIC contract is analyzed for risk clause description and risk allocation by using author subjective judgment and criterions. In order to verify this analysis, results getting from this analysis are verified with a previous study about a comparison of China's standard form of construction contract and FIDIC condition of contract for construction by Zhang et al. in 2006.
- (4) The standard form of public contract for road construction projects using government budget is gotten from the Ministry of Public Works and Transport. In addition, other related documents, regulations and laws are collected:
- The Civil Code of Kingdom of Cambodia (2007)
 - The Road Law (2014)
 - The Labor forces Law (1997)
 - The Implementing Rules and Regulations Governing Public Procurement (IRRGPP) (2010)

These laws and regulation will be reviewed in order to check for interferences with the improved guideline. It is necessary to check this proposed contract with the Cambodian laws and regulations, because all contracts used in

Cambodia cannot be used if any clauses of this contract contrast with the laws or regulations of Cambodia.

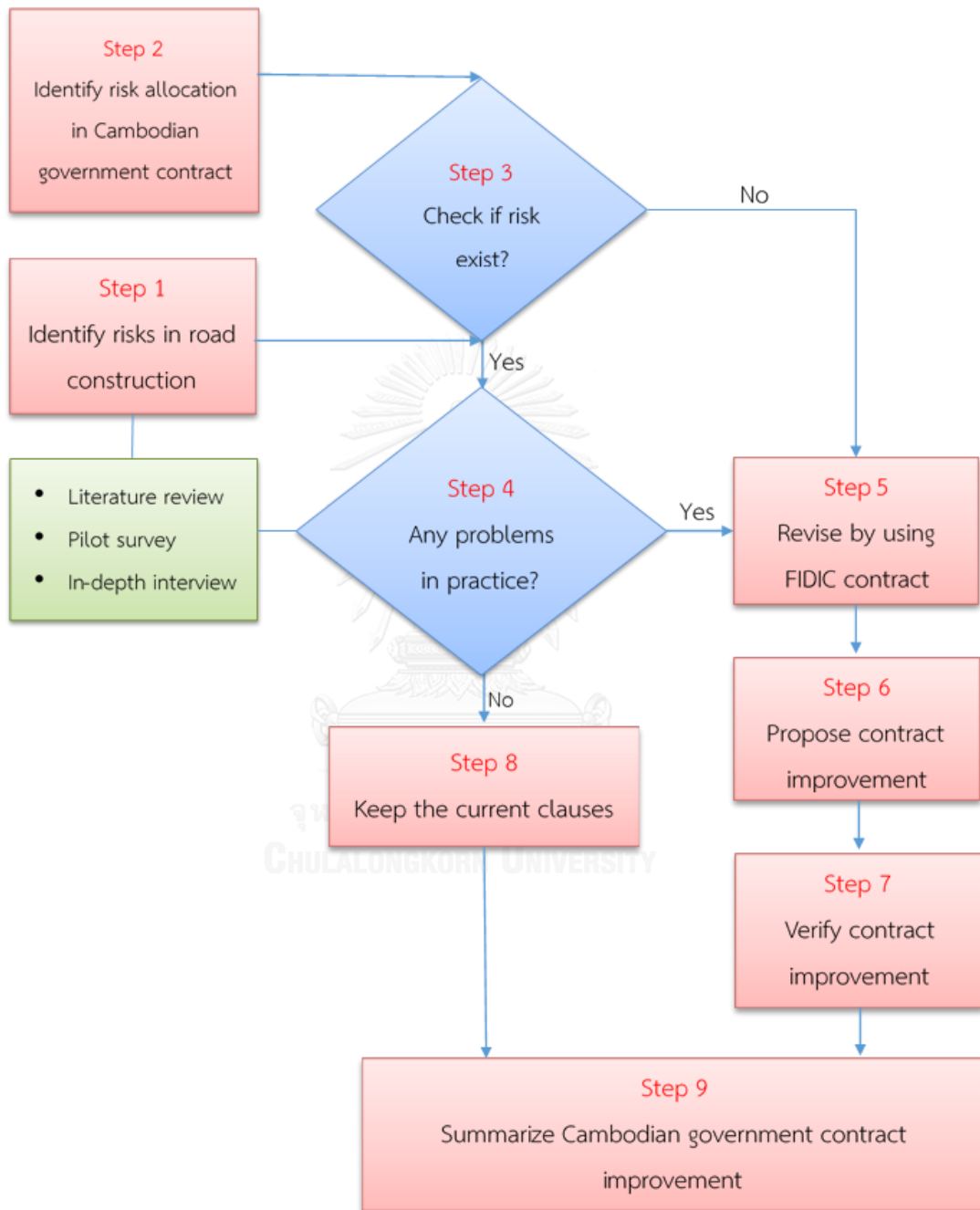


Figure 3.3: Research framework

CHAPTER 4

RISK OF PUBLIC ROAD CONSTRUCTION PROJECTS IN CAMBODIA

Risk management is necessary for the success of construction projects. Risk depends on types of project and countries where projects are located. In this chapter, risks of public road construction projects in Cambodia under the support of government budgets are identified through in-depth interviews with the professionals who are experienced in such projects. The term "risks" refer to risk factors that affect the performances of Cambodia road construction projects.

The eleven respondents participating in this research consist of three contractors and eight government officers who are currently working in the Ministry of Public Works and Transport and involve in public road construction projects in Cambodia under the support of government budgets. The three contractors are all project managers. The eight officers are one director of department, three deputy directors, and four consultants from the Ministry of Public Works and Transport working in public road construction projects under the support of government budgets.

Among the respondents, four of them have work experience less than 5 years, three respondents have work experience between 5 and 10 years, and four respondents have work experience more than 15 years. The interviews were conducted from June to July 2015. Table 4.1 shows all respondents' profile.

For each risk, we identify its description, sources, impact on projects, as well as policies and activities used to solve problems caused by such risk. All risks are categorized into two main groups: (1) the internal risk, which include risks caused by parties involving in projects, and (2) the external risk, which includes political and social risks, economic risks and physical and natural risks.

Table 4.1: Respondents' background

Code	Position	Company and institution	Experience
E1	Director	Department of Sub-National Public Infrastructure and Engineering, Ministry of Public Works and Transport	10 years
E2	Deputy director	Department of Planning and Technical office, Ministry of Public Works and Transport	15 years
E3	Deputy director	Department of Sub-National Public Infrastructure and Engineering, Ministry of Public Works and Transport	15 years
E4	Deputy Director	Battambang provincial department of the Ministry of Public Works and Transport	25 years
E5	Consultant	Department of Sub-National Public Infrastructure and Engineering, Ministry of Public Works and Transport	2 years
E6	Consultant	Department of Sub-National Public Infrastructure and Engineering, Ministry of Public Works and Transport	19 years
E7	Consultant	Department of Road Infrastructure, Ministry of Public Works and Transport	3 years
E8	Consultant	Department of Sub-National Public Infrastructure and Engineering, Ministry of Public Works and Transport	2 years
C1	Project manager	Ly Brothers Limited	3 years
C2	Project manager	Royal Haskoning FC	5 years
C3	Project manager	New Meng Group Co., LTD	5 years

Note: E is employer C is contractor

4.1. Internal Risk

After checking with the respondents in the pilot survey, among all internal risks from the Table 2.1, 13 internal risks are found in Cambodian road construction projects under the support of government budget with 2 other additional risks from the respondents.

In general, the primary obligation of employer is to pay contractors the sum of money in according to contract. Money must be paid immediately and fully, unless there are specific reasons of withholding it. Contractor shall estimates the payment in according to time of payment as agreed with employers. Any delay payments caused by employers will result in payment of interest. Delay payment is a critical risk in public road construction in Cambodia.

There are some reasons which cause this delay payments in Cambodia. The long process in approving payment is a reason of delay payments due to answer of the respondent E2. He added that all entire approving documents must be in hardcopies and shall be checked and approved by many people in many levels from the two Ministries, the Ministry of Public Works and Transport and the Ministry of Economic and Finance. If any officers are absent in this approval, the payment approval cannot be done, and it causes late payments. Weak coordination between contractors and engineers is another reason of late payments. Without good work cooperation from engineers in approving work on time, contractors will be late in submitting payment requests. Contractors can be late in preparing and submitting claim documents to employers. It is other reason of delay payment, however it rarely happens. In according to all respondents, this risk shall be under the responsibility of employer. The Ministry of Public Works and Transport and the Ministry of Economic and Finance shall work together in fastening the processes of approval in both ministries.

Since this risk normally occurs in Cambodia, it is widely recognized by contractors. To respond with this risk, most contractors prepare extra budgets during work execution. Thus, it does not affect time of project completion for contractors who have strong financial support. In according to the three contractors C1, C2 and C3, even contractors cannot get payment on the date specified in contracts; contractors still keep working in projects until work is finished on the date specified in contracts by using his own budgets. However, due to the respondent E4, new contractors for public projects who have weak financial support might be in trouble in this condition. Delay payments will affect the finance of new contractors. Thus, contractors might not complete work on

time because they do not have enough money to pay to labor forces, and materials. There is no effect to cost, quality and scope of work by this risk.

Work Termination rarely happens in public road construction projects. In other way, work suspension sometimes happens in projects. There are some reasons which cause work to suspend. Work suspension can be due to contractors' convenience or poor contractors' work performance. The lack of financial support of contractor can also cause projects to suspend. The capability of contractor to supply materials on time and to give enough payments to labor forces might be affected by the lack of financial resources of contractor and then causes of work suspension. Work suspension might be also caused by the changes of work scope in projects. This work suspension can be caused by contractors themselves who do not have enough manpower or equipment to support work. The cost of project is not much affected by this work suspension because only little money is needed for taking care work during work suspension period. The quality and scope of project are not affected by this risk.

Changes in work are unavoidable risk in projects, but they do not happen in high frequency. It is estimated by the respondent C3 that changes of work in road construction projects are about 10% of entire works. Changes of work normally happen with culvert work.

Work is sometimes changed not because of employer's purposes, but mostly this change aims to decrease any difficulties for contractors and accelerate work processes. Changes of work in public road construction projects in Cambodia sometimes aim to avoid conflicts between project implementation and people living along roads. Most of work changes are small changes and can be solved immediately at sites due to the experience of contractor. However, for big changes, it becomes a complicated risk because these changes require complicated and long processes of approving of work from the two Ministries, the Ministry of Economic and Finance and the Ministry of Public Works and Transport. Thus, negotiations are preferred to use instead, in order to avoid wasting time in this long and complication process of approving of work.

Due to the respondent E7 who works related to road maintenance projects, there is low probability of changes in work due to non-complicated maintenance work. Work is done in according to the code specified by the Road Infrastructure Department of the Ministry of Public Works and Transport.

If this risk happens, there will be impact to time of project. Time can be shortened if changes aim to accelerate work process. In contrast, time can be prolonged if changes of work require long time in approving changes. Changes of work will affect cost of project. However, most of changes are not serious, so there is little effect to the cost of project. There is low impact of change in work to quality of work. Changes in work are not problems to experienced contractors because normally changes in work are not far different from one project to other projects. Thus, contractors can keep good work quality. Extra work is required if scope of work is changed. This changing can increase or decrease work load depending on real situation.

Since employers are the parties who decide on this change, this risk should be under the responsibility of employer. All related ministries are now working in improving regulations of change in work for shortening the processes of work variation approval due to the sizes of work that shall be changed. As an answer from the respondent E2, for small variations which are less than 10% of entire work, the approval of change decisions are made only in low level decision-makers in the Ministry of Public Works and Transport. However, when changes are more than 10% of entire work, approval shall get through the Ministry of Public Works and Transport and then the Ministry of Economic and Finance who is the party making decisions on budgets to use in projects. This is a current practice which problems are solved not due to clauses written in contracts.

Lack of project information is a regular problem which happens in public road construction projects in Cambodia. Projects are not received enough studies before starting. Some projects start immediately without enough studies after the quick decision making of government which might be affected by politic.

Lack of information about water and electricity supply systems along road construction sites is a case of lack of project information. Construction work normally has conflicts with water and electrical network systems, especially for projects located in city areas. It is really a critical and complicated problem to solve. Problems always happen when construction works destroy these systems. A source of this lack of information is due to unclear master plans related to water and electricity supply systems in Cambodia. In addition, cooperation between contractors and employers with the Electricity Authority of Cambodia and the Phnom Penh Water Supply Authority is really poor. Moreover, no previous information of soil condition or specific data related to site condition is provided enough to contractors.

For road maintenance work, the lack of project information is the lack of previous data of road construction. One of the most frequent problems happening in this category is lack of information related to inventories such as bridges or culverts. This is due to experience of the respondent E7. However, this risk has little impact to the time, cost and scope of project, and it is almost no impact on the quality of project. This is because of the general perceptions of contractor working in public projects in Cambodia that accept in taking responsibilities for seeking more necessary information to work in projects themselves. Contractors are also required to do site investigations for additional information which is necessary for work to inform employers before signing contract. Therefore, any problems caused by the lack of project information are under the responsibility of contractor after signing contracts.

Time is really affected by this risk. Contractors shall spend time to solve problems caused by lack of project information. A critical problem which require much time to solve is damages of water or electrical system in the city caused by road construction work. Lack of project information can result in changes of work, and these changes require more cost to compensate. When lack of project information increases the scope of work, contractors shall accelerate their work process. Due to the respondent E6, this condition can affect to the quality of some contractors' work.

The poor quality of contractor is one of the most critical problems in Cambodian public road construction projects. Some contractors working in public road construction projects in Cambodia are low of knowledge in technical work but high in experience. These contractors work based on their experience rather than method statements or engineers' instructions. Conflicts between young engineers with experienced contractors used to happen and can cause projects to delay. In addition, according to the project manager C1, method statements provided are not clear enough for contractors to work effectively.

Corruption in contractors' companies in recruiting staffs can be another reason behind the low quality of contractor's performances. Unqualified staff might be recruited and will affect work quality. In addition, lack of qualified engineers, skilled labor forces and technical people are also reasons of low quality of contractor. Unqualified work management in sites especially equipment management is a critical problem for road construction in Cambodia and can affect the quality of contractor's work. Lack of good coordination between contractors and employers results in lack of information exchanges in projects and results in the low quality of work. Rush work completion required by employers can partly affect to quality of contractor's work performance.

This risk affects the time of project completion since contractors need time to fix problems to reach the quality of work specified by engineers. Much impact will happen to quality of project. Contractors shall fix problems of work when work is not accepted. Thus, more cost is needed to spend on this extra work. Quality of work is much affected by contractors who work based on experience rather than engineering knowledge. For this kind of contractor, when new work is different from previous work, quality of work is impacted. In contrast, for new contractors, lack of experience can cause poor quality of work. There is no impact to the scope of project caused by this risk.

Based on the respondents E1 and E2, in order to increase the quality of contractor, government is now trying to increase numbers of competitive bidding procurement projects. It is expected that more competitions will persuade contractors to take more

attention in improving their performance quality. Moreover, even clear method statements are provided, problems cannot be fully avoided. Improving the quality of engineers for quality assurance is other option for improving inspection for the quality of work.

Long process in getting approval from employers and engineers is a reason of late in starting work. In addition, work commencement might be late due to contractors' lack of man power and equipment to start work, especially for contractors who have many projects at the same time. For new contractors who are weak in their financial support and then get late payments including advanced payments, contractors might delay work commencement. Due to the respondent E4, for experience contractors in this industry, it is not a big problem for them. These contractors can pay late to suppliers for expense on materials and gasoline due to business truth. However, these contractors shall have budgets for supporting cost of labor forces and extra payments such as equipment repairing payments. Weather, especially heavy rain, can be another reason that contractors cannot start work on time. Some contractors will start work until raining season passes.

This risk will affect time of project completion. In order to avoid late in completing work, contractors shall increase working time as well as numbers of equipment and manpower. Thus, cost shall increase, and the quality of work can be affected due to this rush of work completion. The scope of work has small impact by this risk.

Insufficient designs or lack of details in design documents usually happen in projects. However, most of problems are fixed at sites immediately when they are found due to contractors' experience as well as similarity of design work from one project to other projects. Contractors also have responsibilities in re-checking designs according to real condition of sites and inform back to designers if there are differences between designs and exact situations.

In according to all of the three contractors C1, C2 and C3, they also agree that design documents from the Ministry are not enough. Lack of specification of work, especially concrete work also used to happen for concrete road construction projects.

Contractors shall better study and revise designs again for making detailed designs and design documents. These design revisions shall affect the time of project, and the cost or scope of contractor's work when work is much revised. For small revision, time is not impacted because problem can be fixed at sites. Since contractors can quickly realize design errors and correct them in sites immediately, quality is rarely impacted. There is low impact of this risk to the scope of project because most design problems are not serious problems.

Another problem related to design documents is that designs are done long time before work execution. As a result, situations in sites might change such as changes of physical condition, changes of electricity networks or water supply systems, which require changes of designs. Due to long processes in approving changes, designs cannot be changed immediately. The quantity of work might change and will result in a cost variation. Site visits and discussions between contractors and employers about changes are necessary for contractors to do before deciding to involve in projects.

Electricity are not difficult to find for road construction work even sites are located in rural areas because electricity can be produced by generators. Water is difficult to find when construction projects are located in rural areas, especially in dry season. In some areas which are far from the sources of water, contractors shall spend longer time and more cost to deliver water from far distance. For the contractor C1, in city area, water and electricity are easy to find but they are expensive. Contractors shall take responsibility in solving this problem without employers' help. Based on public procurement under the support of government budgets, the cost for facility supplies cannot be claimed while work is implementing. Thus, contractors shall consider in these facility supplies and shall include them in project cost during the bidding stage. Time is required for finding sources of water and delivering. Then cost shall be increase due to the distance of delivering. No impact of this risk to quality and scope of project.

In the current practices of public road construction projects under the support of government budgets, subcontractors are not allowed to involve in projects. However, according to government officers, some contractors use subcontractors secretly

without informing employers. Subcontractors are needed because contractors have limited equipment and manpower, so it is necessary for main contractors to have subcontractors to help and accelerate work progress to reach schedules.

Based on the three contractors who have experience working with subcontractors, Poor quality of subcontractors is a noticeable problem in road construction projects. Some subcontractors have limited knowledge in technical work. Basing only on experience, the quality of subcontractors' work can be affected. The time and cost of project are really affected when unqualified subcontractors are terminated before his responsibilities in projects are completed. Extra cost is required for fixing problems caused by mistakes of subcontractors. However, only part of work under the responsibility of subcontractors is affected. There is no impact to the scope of work. This risk must be under the responsibility of contractors since subcontractors are under the control of contractor.

Weak of contractor financial support in starting work is an internal problem of contractor involving in public projects. Contractors are necessary to have huge financial support for themselves because delay payments normally happen in public road construction projects. This problem normally happens to contractors who have many projects in hand at the same time. Contractors shall distribute their budgets and resources to many projects simultaneously. As a result, some projects will be lack of materials, manpower or equipment supplies. Even this financial problem partly causes by late in payments of employer, all contractors accept that this risk should be under the responsibilities of contractor themselves. Since delay payments are regular problems in public projects, in order to avoid problems, contractors shall have strong financial support for themselves.

Project might be started late or might be suspended by contractors who have financial problems because they cannot supply enough materials and labor forces or staffs to work. When work is started again after suspension or delay in work commencement, extra cost is required for fixing problems during suspension or fastening work to reach the schedule. Contractors' financial problems can effect to the quality of work of

contractor staffs, but it rarely happen. No impact to scope of work is found due to this risk.

The Law on Road of Cambodia is an important law for specifying the usable road areas in Cambodia. Thus, all road construction projects and people living along the public roads must obey this law. Based on the officer E2, some projects of road construction are necessary to change due to their effects to heritage areas. It shall spend extra time and cost for this changing work. This risk requires government to take involvement. However, it rarely happens.

There are other cases provided by the respondent E5 about contractors' activities which are against the country laws. As an example, this respondent provided a case. Wasted soil from sites is delivered by contractors to unload on the land area of people living along a road without permission. This is a case of breaking the law that contractors using private property along roads without permission from owners. As a result, contractors are complained by owners of the land. Thus, contractors shall spend time and money to find new areas to leave this wasted soil, and move it out from the previous areas. The quality and scope of work are not affected by this risk. Contractors is the only party who should take responsibility for this problem.

In according to all contractor respondents, corruption is a concerned risk happening in public road construction projects. The stronger relationship between contractors and employers is the higher possibility of that contractors to get projects. Corruption is seen to use for building good cooperation between contractors and employers in working, approving or solving problems in work. Thus, contractors shall spend on corruption and get less profit from projects.

For road maintenance, corruption is seen in contractors' organization due to recruitment based on relationship. This kind of recruitment may result in the low work quality because unqualified staffs might be recruited. Corruption can happen in all levels of work during budget transferring processes from the Ministry of Economic and Finance, to the Ministry of Public Works and Transport, and from the Ministry of Public Works and Transport to contractors.

This risk affects much to the time and cost of project. Without corruption, contractors might be late in getting approval from the Ministries. Moreover, without corruption, cooperation between contractors and employers might be not good and might result in late working progresses. Contractors shall lose their profit due to corruption in projects. This risk can also affect to the quality of work. Contractors shall balance the quality of his work with available income after losing by corruption, otherwise contractors will lose their profit. In addition, when corruption happens in the processes of staff recruitment, quality of contractor's staffs will be affected. No impact of this risk to scope of work is found. This risk shall be better to solve in both contractors' and employers' organization. However, it requires a strong and long term transformations of national policy about anti-corruption to solve this problem in all public procurements.

Road construction projects easily affect much or less to people living along road construction sites. As a result, people and media will oppose or obstruct construction work. Due to contractor C3's experience about public road construction projects in city area, frequent problems occurring in road construction projects located in crowded areas are annoyance of construction work to surrounding people lives and businesses. When there are road construction projects, local people will face some difficulties such as difficulties in traveling, difficulties in doing their businesses which are located along road construction sites and difficulties in cleaning their homes. As a result, there are a lot of complaints from them and they don't cooperate well with contractors for project implementation.

Pollution is another effect of road construction to both people living along construction roads and passengers traveling along constructed roads. Sound and air pollution are the two pollutions caused by road construction. Noisy sound from equipment working in projects might affect particularly to children and old people. Air pollution is a really serious problem caused by road construction in Cambodia. Dust is a concerned air pollution in road construction projects. It really affects to the health of people living along constructed roads and passengers. Normally, there are many complaints of people living along road construction projects about these issues.

Other concerning problem of road construction to surrounding people is traffic jams and traffic accidents. Due to the condition of roads in Cambodia as well as poor traffic management in road construction sites in Cambodia, traffic jams normally happen on roads under construction. There are many complaints from passengers about this issue. In addition, some cases of traffic accidents caused by road construction projects are reported. Thus, it shall be a critical issue that should be considered to reduce.

Time is needed to solve problems with people who oppose the projects. More time and money will be spending if there are traffic accidents happen. However, no serious problem used to happen before in according to public officers. Quality and scope of project are not affected by this risk.

Beside the risks mentioned above, there are some other risks happening in Cambodian public road construction projects. Each of these risks is mentioned only by a respondent.

One of them is risk caused by other contractors in the same project, provided by the respondent C2. When a contractor has problems with other surrounding contractors, parts of work of all contractors shall suspended until problems are solved. Only time is impacted by this risk.

As a complaint from the respondent C2, the poor quality of engineer is the other problem in public road construction. Even it rarely happens, if it happens, it really affects to the quality and time of project. Poor quality of engineer can result in poor quality assurance and work management. Thus mistakes of contractor might be missed checking. Wrong or insufficient instruction might be provided to contractors. Without effective instruction from engineers, contractor might take longer time in implementing work.

Table 4.2: Internal risks in public road construction projects in Cambodia

Internal Risk	Descriptions
1. Delay payments	<ul style="list-style-type: none"> • Contractors capability in summiting claim documents on time • Long processes of approving payments • Limitation of Government budgets • Lack of coordination between contractors and engineers.
2. Work Suspension	<ul style="list-style-type: none"> • Contractors' internal problems such as lack of labor forces and equipment or materials • Employers' changes of work
3. Changes in work	<ul style="list-style-type: none"> • Avoid problems and accelerate the processes of work • Unsatisfied method statements • lack of detail studies of project causes wrong in designs and BOQs
4. Lack of Project information	<ul style="list-style-type: none"> • Contractors' lack in studying projects • Unclear method statements from employers • Lack of cooperation between contractors and employers in project studies • No sources of project data or difficulties of conducting studies • Rush in starting projects due to political effects
5. Poor quality and performance of contractor	<ul style="list-style-type: none"> • Poor contractors' work capability • Lack and ineffective competitive procurement in selecting good contract for good quality of work • Corruption in projects affecting performances of contractor • Rush finishing work due to political or weather effects • Lack of coordination between contractors and Engineers
6. Delay in obtaining sites	<ul style="list-style-type: none"> • Contractors' incapability in starting work on time due to financial problems, or lack of resources • Late in advanced payments • Effects of corruption in starting projects on time • Bad weather effects
7. Insufficient designs or lack of details in design documents	<ul style="list-style-type: none"> • Low quality of designers to provide good designs and design documents • Design errors due to the changes of physical condition when there is late in work commencement
8. Water; electricity and other necessary facility supplies	<ul style="list-style-type: none"> • Capability in having necessary facility supplies according to the location of project sites
9. Subcontractors' problems	<ul style="list-style-type: none"> • Low performance of subcontractor due to lack of knowledge in technical work. • Lack of coordination between main contractors and subcontractors

10. Internal problems of contractor	<ul style="list-style-type: none"> • Weak of contractor's financial supports
11. Act Against the country Law	<ul style="list-style-type: none"> • Contractors use other people land area without permissions • Impact of project to protected heritage areas
12. Corruption in projects	<ul style="list-style-type: none"> • corruption in projects in order to get projects, get quick approval, and have good cooperation with Engineers during work execution • Effects of family in contractors' company impact work
13. Negative effects to surrounding environment	<ul style="list-style-type: none"> • Problem of annoying the business of people living along construction road • Sound and air pollution • Traffic jam and traffic accidents
14. Problem between contractor with other contractors	<ul style="list-style-type: none"> • Problem of one contractor can affect to surrounding contractors to suspend work.
15. Poor quality of consultants	<ul style="list-style-type: none"> • Lack of consultant knowledge in giving good project management

Table 4.3: Impacts of internal risks to time, cost, quality and scope of public road construction projects in Cambodia

Internal Risk	Impact to projects	
1. Delay payments	Time	<ul style="list-style-type: none"> • Contractors might have financial problem to start or continue work on time, to pay labor forces and materials. It impacts strongly to new contractors with weak financial supports.
	Cost	<ul style="list-style-type: none"> • No impact
	Quality	<ul style="list-style-type: none"> • No impact
	Scope	<ul style="list-style-type: none"> • No impact
2. Work Suspension	Time	<ul style="list-style-type: none"> • Projects might be delayed if contractors do not take any actions in accelerating work to reach schedule when re-starting work after suspension.
	Cost	<ul style="list-style-type: none"> • Some money is needed for taking care work during suspension.
	Quality	<ul style="list-style-type: none"> • No impact
	Scope	<ul style="list-style-type: none"> • No impact
3. Changes in work	Time	<ul style="list-style-type: none"> • In some cases, Changes of work impact to time because changes of work aims to avoid problems in projects and accelerate work processes. • For big changes, it affects much to time of project because any changes of work must be under the long processes of approval in the two ministries.

		<ul style="list-style-type: none"> • However, most of changes in public road construction projects are not serious changes that can be fixed by experienced contractors in sites without much effect to time.
	Cost	<ul style="list-style-type: none"> • Changes in work will affect cost of project. However, there is no budgets for variation. • Most of changes are not serious, so there is little effect to the cost of project.
	Quality	<ul style="list-style-type: none"> • There is low impact to quality to maintenance work because there is a specification published by the Ministry for contractors to follow. • Changes of work are not problems to experienced contractors on work quality because normally changes in work are not far different from one project to other projects.
	Scope	<ul style="list-style-type: none"> • Extra work is required for changing the scope of work that is already planned. This changing can increase or decrease in according to real situation.
4. Lack of Project information	Time	<ul style="list-style-type: none"> • Contractors shall spend time in solving the problem of conflicts of project with many unexpected issues such as electrical or water supply systems due to the lack of these information during project studies.
	Cost	<ul style="list-style-type: none"> • Lack of project information can cause changes of work, and these changes require more cost to compensate. However, the cost due to changes can increase or decrease due to exact work situation.
	Quality	<ul style="list-style-type: none"> • Impact to quality can happen if contractors try to rush work to reach the schedule when there are changes by the lack of project information.
	Scope	<ul style="list-style-type: none"> • Work shall be changed differently from plan. Changes are due to this lack of project information which is required to avoid problems.
5. Poor quality and performance of contractor	Time	<ul style="list-style-type: none"> • If there are many mistakes of contractor's work, contractors are required to spend time in fixing problems. • If contractors' work is not good and not accepted by Engineers, it requires contractors to redo, so time can be doubly increasing.
	Cost	<ul style="list-style-type: none"> • If contractors make mistakes, contractors shall fix problems themselves. • If contractors' work has problems and is not accepted by Engineers, it is required contractors to redo, so cost can be doubly increasing.
	Quality	<ul style="list-style-type: none"> • Quality of work is much affected by contractors who work based on experience rather than engineering knowledge. For this kind of contractor, when work is different from previous work, quality of work is impacted. • In contrast, for new contractors, lack of experience can cause poor quality of work.
	Scope	<ul style="list-style-type: none"> • No impact
6. Delay in obtaining sites	Time	<ul style="list-style-type: none"> • Contractors cannot start work on time specified in contracts and it might affect to the time of project completion. However, most of delays are not serious and happen only during in short period of time.
	Cost	<ul style="list-style-type: none"> • Contractors might spend more cost for fastening work to reach schedule after delay of obtaining a site. However,

		there is not much cost increasing, and contractors can accept it.
	Quality	<ul style="list-style-type: none"> Rush in work implementation work after delay to reach schedule can impact quality of work.
	Scope	<ul style="list-style-type: none"> No impact
7. Insufficient designs and design documents	Time	<ul style="list-style-type: none"> Contractors shall need more time to check and correct any mistakes of changes, but they can be mostly corrected in sites. Even serious mistakes in designs rarely happen, when they happen, they really affect to time for correcting mistakes and approving changes
	Cost	<ul style="list-style-type: none"> No impact
	Quality	<ul style="list-style-type: none"> Contractors can quickly realize them and correct them in sites immediately, due to similarity of project and contractors' experience Thus quality is rarely impacted
	Scope	<ul style="list-style-type: none"> It is low impact of this risk to the scope of project because most design problems are not serious problems.
8. Necessary facility supplies	Time	<ul style="list-style-type: none"> It takes time to find sources of water and delivering. This problem happens when projects are located in rural area where the sources of water might be far from sites.
	Cost	<ul style="list-style-type: none"> When sites are located in city areas, electricity and water are expensive. Cost also can be higher for delivering water due to the distance of delivery.
	Quality	<ul style="list-style-type: none"> No impact
	Scope	<ul style="list-style-type: none"> No impact
9. Subcontractors problem	Time	<ul style="list-style-type: none"> Not many projects are allowed for subcontractors to involve in, but any problems of subcontractors will affect to the total time of project completion. However, it is not much affected.
	Cost	<ul style="list-style-type: none"> Extra cost is require for fixing problems caused by mistakes of subcontractors. However, only part of work under the responsibility of subcontractors is affected.
	Quality	<ul style="list-style-type: none"> Subcontractors are allowed to work only for particular work. Therefore, only the quality of that particular work is affect by poor quality of the subcontractors.
	Scope	<ul style="list-style-type: none"> No impact
10. Internal problem of contractor	Time	<ul style="list-style-type: none"> Project might be started late or might be suspended by contractors who have financial problems because they cannot supply enough materials and labor forces or staffs to work.
	Cost	<ul style="list-style-type: none"> When work is started again after suspension or delay in work commencement, extra cost is required for fixing problems during suspension or fastening work to reach the schedule.
	Quality	<ul style="list-style-type: none"> When contractors do not have enough money for working, contractors cannot hire qualified Engineers or labor forces to work. However, it rarely happens.
	Scope	<ul style="list-style-type: none"> No impact

11. Act Against the country Law	Time	<ul style="list-style-type: none"> According to experiences of respondents, this risk is related to the effect of a project to heritage areas. It requires time to revise and change work plan. In addition, time is also required for contractors to solve problems with surrounding people whose land is used by contractors without any permission.
	Cost	<ul style="list-style-type: none"> The cost of project can be impacted by this risk when extra cost is required by the changes of work scope or solving problems with surrounding people whose land area along constructed roads is used by contractors without any permission.
	Quality	<ul style="list-style-type: none"> No impact
	Scope	<ul style="list-style-type: none"> The scope of work shall be changed due to the changes of work plan to avoid any effects to heritage areas.
12. Corruption in projects	Time	<ul style="list-style-type: none"> Without corruption or good relationship, contractors might be late in getting approval from the Ministries. Without corruption, cooperation between contractors and employers might be not good and might result in late working progresses.
	Cost	<ul style="list-style-type: none"> Contractors shall pay or lose their profit due to corruption in projects.
	Quality	<ul style="list-style-type: none"> In order to compensate cost lost by corruption, contractors shall decrease quality of work. In addition, when corruption happens in the processes of staff recruitment, quality of contractor's staffs will be affected.
	Scope	<ul style="list-style-type: none"> No impact
13. Effects to surrounding Environment	Time	<ul style="list-style-type: none"> Little time is needed to solve problems with people who complain or have accidents caused by project implementation.
	Cost	<ul style="list-style-type: none"> In some cases that work causes accidents, contractors shall take responsible for all payments to victims. However, no serious problems used to happen.
	Quality	<ul style="list-style-type: none"> No impact
	Scope	<ul style="list-style-type: none"> No impact
14. Problems between contractor with other contractors	Time	<ul style="list-style-type: none"> Part of project under the supervision of both contractors might be suspended until problems are solved.
	Cost	<ul style="list-style-type: none"> No impact
	Quality	<ul style="list-style-type: none"> No impact
	Scope	<ul style="list-style-type: none"> No impact
15. Quality of the consultants	Time	<ul style="list-style-type: none"> Without effective instruction from consultants, contractor might take longer time in implementing work.
	Cost	<ul style="list-style-type: none"> No impact
	Quality	<ul style="list-style-type: none"> Quality of work shall be impacted if unqualified engineers gives wrong or insufficient instructions to contractors.

	<ul style="list-style-type: none"> • Mistakes can be made in checking and approving contractors' work
Scope	<ul style="list-style-type: none"> • No impact

4.2. External Risk

Among all external risks from the literature reviews, 10 external risks are responded by the respondents in pilot survey as important risks in public road construction projects under the support of government budget. This risk category will be discussed in three different groups: political and social risks, economic risks and physical and natural risks.

4.2.1. Political and Social Risk

Nowadays, war threats do not affect projects since it is fully peace in the country now. However, explosive materials sometimes impact construction projects which are located in battle areas during civil war period, especially provinces along borders. Explosive materials mostly damage equipment and sometimes affect to lives of equipment operators. This risk may increase cost and time of project, if explosion damage equipment or makes people injury. Even there is no explosion, it requires work to suspend until explosive materials are taken out. Contractors are required to take responsibility of this problem.

As often, there are conflicts about sources of explosive materials whether they are located in sites, or they are delivered with construction materials from other places accidentally. If they do not located in sites, a discussion is needed for finding responsible party. Contractors mostly shall take this risk.

For new road construction projects, there are budgets from the Ministry of Economic and Finance for taking out explosive materials from construction sites at initial stage. This is due to the answer of the respondent E2. These areas are specified by the Ministry of Public Works and Transport. Even there is such of this action, the chances of meeting explosive materials during work execution are still possible and can damage equipment or sometimes also can injure or kill people. However, these cases happen in low frequency.

Even war threats are not much mentioned in contract clauses, contractors said that contractors should be able to claim for time extension if there are wars happening in the areas of construction projects. As an example from the respondent E5, in 2008, there was a problem of military conflict between Cambodia and Thailand along the border. A road construction project which was located near the conflict area was delayed until the situation became normal. The cost and scope of project can also be affected if there are problems caused by military conflicts, but contractors can claim for time extension due to this issue.

Local authorities work as representatives for local people who live along road construction projects in solving any problems with contractors. When there are complaints about any difficulties caused by construction work, local authorities will negotiate with contractors to find appropriate solutions. Thus, it requires time for this negotiation before continue to work. In order to spend less time on this negotiation, the Ministry of Public Works and Transport whose role as the employer shall take action in helping these two parties to come up with an agreements as soon as possible.

Different political believes is other reason of conflicts between local authorities and contractors. Some local authorities from anti-government parties do not well cooperate with contractors in order to have good work implementation. Then it can cause time extension. However, in some cases, local authorities role as arbitrators when there are conflicts happening between local people with contractors or employers.

Public disorder rarely disturb road construction work. However, in according to the respondent C3 working in projects located in factory zones, public disorder sometimes happens and affects projects which are located along factory zones. There are often protests made by workers and they makes difficulties to construction work, especially difficulties of equipment mobilization. This issue can cause contractors to suspend work for a period of time. This means that the time of project might be affected, but there are no influence to the cost, scope or quality of work.

4.2.2. Economic Risk

Variation of material cost between contract signing time and work execution time is a reason impacting the expenses of contractor. Gasoline is a critical material which normally changes its price. However, cost variation is not yet included in contracts. Based on the respondent E2, cost variation clause is currently under discussions for improvement. As a recommendation from the contractor C2, contractors should store gasoline at the beginning of project execution. Even this risk affects cost of project, it does not affect time, quality and scope of project.

In public projects, payments to contractors are in Riel (Cambodian currency), but most of construction materials in Cambodian market are sold in US dollar. Thus, the different currency rate between Khmer Riel (Cambodian currency) and US Dollar can cause contractors to lose their profits. This problems are agreed by all respondents in the interview. Only cost of construction may be affected by this risk.

Material availability varies by the location of sites whether they are far or near the sources of materials. Material availability becomes an obstacle for contractors when sites are located far from material sources. If materials cannot be found near construction sites, materials shall be delivered from far distance. This delivery requires extra time and cost. To avoid much cost variation due to extra expenses on material delivery, contractors shall do site visits and investigate the availability of materials, and estimate the cost of materials including material delivery cost. Cost increasing due to unavailability of materials is normally allocated to contractors. Contractors cannot claim for any cost variation due to material availability after signing contracts.

Two contractors C1 and C2 reported that sand is difficult to find and expensive in current time. This cost increasing is due to the new policy of the government in strengthening sand businesses in Cambodia. These two respondents added that the critical materials for road construction are based course and sub-based materials such as crushed stone and laterite. They are difficult to find in Cambodia. Availability of materials also depends on the time of project execution. Some materials which are

expected to have during project studies might not be available at the time of project execution.

The availability of manpower varies for different seasons, in according to the answer of the contractor C2 and the public officer E2. There are differences between the availability of unskilled workers and skilled workers especially equipment operators. During raining season, most of road construction projects are not started yet, so many equipment operators are available to find. In contrast, unskilled workers are difficult to find because most of unskilled labor forces are farmers who go back to their hometowns to do their agriculture work during raining season. In opposite, during dry season, skilled labor forces is difficult to find since there are huge requirements by many construction sites in the country. Thus, the cost of skilled labor forces is increasing. However, unskilled labor forces are much available in dry season which is not rice planting season.

Furthermore, due to the low salary of labor forces in Cambodia, many labor forces leave the country to work abroad, especially Thailand. This lack of labor forces causes contractors to spend time in finding labor forces and spend more money in order to have enough labor forces to work. When labor forces are not available much in the country, the quality of labor forces is not much concerned. As the result, work quality can be affected due to the limited quality of labor forces.

The Lack of labor forces' skill, especially among equipment operators, is a problem which can affect the time, cost especially quality of project. This is due to the answer provided by the respondent E4. Most of equipment operators in Cambodia do not get any trainings in school. They know how to operate equipment by learning from each other. As the result, even they can work; the effectiveness of their work is not good.

There are not much problems caused by equipment availability for road construction projects in Cambodia. Only small equipment is mostly needed, and it is available everywhere with appropriate price to rent or buy. However, some heavy equipment is required for some particular projects. Heavy equipment is expensive and difficult to

find in Cambodia. Not many projects require heavy equipment. Small equipment is used instead of this heavy equipment.

Time of project completion will increase when small equipment is used instead of heavy equipment. Small equipment shall work harder in order to get the same result as heavy equipment. By using small equipment instead of heavy equipment, quality or work might be negatively impacted. High cost shall be spent for buying or renting heavy equipment in Cambodia. However, this risk do not impact the scope of work.

4.2.3. Physical and Natural Risk

Bad weather is normally unavoidable in road construction projects. Heavy rain is a main problem of bad weather. Storms sometimes happen and become obstacles for project implementation. It causes short period of project delay. Bad weather can increase the scope of work when it destroys the work that is already done. As an example from the respondent C1, a contractor starts to move all equipment and manpower to the project site in July, but because of flood, work needs to be delayed until October.

For road maintenance, there is a program of work called routine maintenance. Due to the respondent E7, this program has a maintenance work schedule which normally recommends work to start at the beginning of March and at the end of November to avoid the effects of rain. Road maintenance work normally faces with many problems during raining season and results in much impact to the time and quality of project. Extra cost is needed to pay for labor forces, even during work suspension caused by this bad weather. In addition, more cost is also needed for remedying any defects caused by this bad weather. In order to solve these problems, a code of road maintenance is made for using in different seasons.

Unforeseeable site condition which is often met in road construction projects in Cambodian is unexpected soil condition. This unexpected condition might affect designs and work plans. Even there are soil tests, they cannot be done for all parts of project. There are disadvantages and advantages of unexpected soil condition. Unexpected soil condition is advantages when contractors can find soil materials which

are appropriate to use for projects. In opposite, when wasted soil is unexpectedly discovered, it requires more time to take it out and more money to spend on appropriate materials to fill.

As an example, the respondent C2 provided a case. In a project, the depth of wasted soil was estimated about 0.5 m depth for every location in according to soil tests. Because soil tests cannot be done in all location, the depth of wasted soil varies from 0.5m to 2 m depth for different locations. As a result, more work is needed. Extra time and cost are required for this additional work and for more materials needed to fill excavated volumes. Even there are tests of soil layer before starting projects, they are not enough to avoid this unexpected changes of soil condition since tests cannot be done in all points of project areas. Unforeseeable physical condition risk does not much happen and does not strongly affect maintenance work.

The time of project is impacted by this risk because time is required to change for new plan and scope of work which caused by the changes of soil condition. Cost can increase or decrease. More materials can be more needed than what has been estimated, then cost will increase. However, soil condition is sometimes better than what has been estimated, then cost will decrease. Extra work shall required because work shall be revised and changed based on the real situation of soil condition. However, quality of work is not impacted by this risk.

In the projects of donor support, 10% of contingency is provided for such this risk, but in projects under the support of government budget, contractors themselves shall take responsible for this risk. Thus, contractors shall study clearly about this problem and propose an appropriate bidding price to employers. This cost will secure contractors from any extra cost caused by this unforeseeable soil condition.

Table 4.4: External risks in public road construction projects in Cambodia

External Risk types	Risk	Description
Political and Social	1. War threats or explosive materials	<ul style="list-style-type: none"> • Long time of civil war in Cambodia • Military conflicts along the borders
	2. Risk caused by public authorities	<ul style="list-style-type: none"> • Local authorities take role as representative of local people to confront and negotiate with contractors when there are problems caused by construction work to local people • Different political believes is other reason of conflicts between local authorities and contractors
	3. Public disorder or insecurity	<ul style="list-style-type: none"> • Protests often happen in factory zones
Economic	4. Inflation	<ul style="list-style-type: none"> • Changes of material cost in market, especially gasoline
	5. Currency fluctuation	<ul style="list-style-type: none"> • Different currencies used for payments to contractors and materials selling in market
	6. Shortages in material	<ul style="list-style-type: none"> • Material availability depends on site location and varied by time • Sand, based course and sub base materials such as crushed stone and laterite are difficult to find and expensive
	7. Shortages in manpower	<ul style="list-style-type: none"> • Lack of labor forces, especially skilled labor forces due to low salary forces many labor forces go to work abroad • Good equipment operators are difficult to find • Labor forces availability due to different seasons
Natural Risk	8. Shortages in equipment	<ul style="list-style-type: none"> • Lack of heavy equipment for some particular work
	9. Unexpected bad weather	<ul style="list-style-type: none"> • Heavy rain, storms and flood
	10. Unforeseeable site condition	<ul style="list-style-type: none"> • Changes of soil condition especially unexpected changes of soil layers

Table 4.5: Impacts of external risks to time, cost, quality and scope of public road construction projects in Cambodia

External risks	Impact to projects	
1. War threats or explosive materials	Time	<ul style="list-style-type: none"> Time is required for taking out explosive materials. Moreover, if this explosive materials affect to machine or life, more time is required to repair machine and save people.
	Cost	<ul style="list-style-type: none"> If explosive materials injure people or damages any equipment or works, cost of project shall be increase to remedy defects of work and machine and cure injured people.
	Quality	<ul style="list-style-type: none"> No impact
	Scope	<ul style="list-style-type: none"> No impact
2. Risk caused by the public authority	Time	<ul style="list-style-type: none"> Time is required for negotiating with local authorities. However, it might not take much time if employers involves in negotiation with local authorities.
	Cost	<ul style="list-style-type: none"> No impact
	Quality	<ul style="list-style-type: none"> No impact
	Scope	<ul style="list-style-type: none"> No impact
3. Public disorder or insecurity	Time	<ul style="list-style-type: none"> Project suspension normally happens to projects located in factory zones due to the protests of workers, then it is not appropriate for contractor to work as normal.
	Cost	<ul style="list-style-type: none"> No impact
	Quality	<ul style="list-style-type: none"> No impact
	Scope	<ul style="list-style-type: none"> No impact
4. Inflation	Time	<ul style="list-style-type: none"> No impact
	Cost	<ul style="list-style-type: none"> The cost of project shall be increased or decreased much or less due to the variation of cost of materials in market. However, there is no extra budgets provided for this variation.
	Quality	<ul style="list-style-type: none"> No impact
	Scope	<ul style="list-style-type: none"> No impact
5. currency fluctuation	Time	<ul style="list-style-type: none"> No impact
	Cost	<ul style="list-style-type: none"> The cost of project shall be increased or decreased much or less due to different exchange rate between US Dollar and Khmer Riel. However, there is no extra budgets provided for this variation.
	Quality	<ul style="list-style-type: none"> No impact
	Scope	<ul style="list-style-type: none"> No impact
6. Shortages in material	Time	<ul style="list-style-type: none"> Time is required in finding appropriate materials to use for projects or find labor forces to work in season that labor forces are not much available.
	Cost	<ul style="list-style-type: none"> Necessary materials are difficult to find and shall be bought in high cost

	Quality	<ul style="list-style-type: none"> Quality of work might be moderately impacted when necessary materials cannot be found, and other similar materials are used instead.
	Scope	<ul style="list-style-type: none"> No impact
7. Shortages in manpower	Time	<ul style="list-style-type: none"> Lack of labor forces will cause the progresses of project moving slowly.
	Cost	<ul style="list-style-type: none"> The cost of project is affected by this risk when more money shall be used for having enough skilled and unskilled labor forces, especially skilled labor forces.
	Quality	<ul style="list-style-type: none"> Quality is also affected due to lack of skilled labor forces especially equipment operators.
	Scope	<ul style="list-style-type: none"> No impact
8. Shortages in equipment	Time	<ul style="list-style-type: none"> Work execution time increases because small equipment is used instead heavy equipment which is not available.
	Cost	<ul style="list-style-type: none"> Some heavy equipment is difficult to find and require to buy or rent in high cost.
	Quality	<ul style="list-style-type: none"> Quality is also affected due to lack of appropriate equipment for particular work.
	Scope	<ul style="list-style-type: none"> No impact
9. Unexpected bad weather	Time	<ul style="list-style-type: none"> Time extension is really required when bad weather force contractors to suspend work. In some cases, projects might be delayed more than a month due to the effects of raining flood during raining season.
	Cost	<ul style="list-style-type: none"> Extra cost is required to pay for labor forces, even during work suspension, and for remedying any defects caused by this bad weather.
	Quality	<ul style="list-style-type: none"> There is impact to the quality of work, especially when there are effects of raining flood which might damage completed work.
	Scope	<ul style="list-style-type: none"> There is low impact to project scope because little effect might happen and requires extra work for remedying defects.
10. Unforeseeable site condition	Time	<ul style="list-style-type: none"> The time of project is impacted by this risk because time is required to change for new the plan and scope of work which caused by the changes of soil condition.
	Cost	<ul style="list-style-type: none"> Cost can increase or decrease. More materials can be more needed than what has been estimated, then cost will increase. However, soil condition is sometimes better than what has been estimated, then cost will decrease.
	Quality	<ul style="list-style-type: none"> No impact
	Scope	<ul style="list-style-type: none"> Work shall be revised and changed based on the real situation of soil condition.

4.3. Conclusion

Twenty five risks in public road construction projects in Cambodia shall be taken attention. Fifteen internal risks are listed in the Table 4.2, and ten external risks are listed in the Table 4.4. Risks are caused by different sources for both internal and external risks. Four sources of internal risk are found such as risks from construction work, risks caused by contractors' organization, risks caused by public agency and risks caused by external effects. Internal risks are found from four external sources such as political effects, natural effects, economic effects and social effects.

These risks affect differently to project objectives. Time and cost are mostly affected by all risks, while quality is sometimes affected. Scope of project is rarely affected. Little impact to project objectives is counted as no impact. Among 25 risks, 23 risks impact time, 18 risks impact cost, 11 risks impact quality and only 4 risks impact scope of public road construction projects. However, the public projects under the supports of government budget are particularly risky for private contractors because of some particular sources of risk in this procurement such as complex and long policy in decision making in public ministries, limited annual budgets, and corruption that roots deeply in public work. Contractors shall recognize these risks and act accordingly, if they want to involve in public road construction projects under government budget supports.

CHAPTER 5

RISK ALLOCATION IN THE GENERAL CONDITION OF CAMBODIAN GOVERNMENT CONTRACT AND THE FIDIC CONTRACT

Risk allocation of each risk factor in both the CGC and the FIDIC contract is studied in this chapter. However, only the word “risk” is used instead of risk factor in this chapter. General condition of government contract for public procurement established by the Ministry of Economic and Finance in 2010 and the FIDIC contract red book version 1999 are analyzed for their risks description especially risk allocation.

These two contracts are reviewed and analyzed for their risk description and risk allocation. The results of risk allocation from general condition of the CGC will be verified by two respondents. The first respondent is a lecturer who teaches about construction laws and contracts in the Institute of Technology of Cambodia. He is also a public officer who work as an arbitrator in dispute resolution for public construction projects in Phnom Penh, Cambodia. He has been worked in this field more than 20 years. The second respondent is a deputy director of planning office of the Ministry of Public Works and Transport. He has around 15 years of experience in working with public road construction projects procurement for both donor budget support and government budget support. By the way, the results of risk allocation from the FIDIC contract will be verified with the previous studies, especially the study of Zhang et al. in 2006 about a comparison of China’s standard form of construction contract and FIDIC condition of contract for construction. (Zhang et al., 2006)

5.1. Risk Allocation in the General Condition of Cambodian Government Contract

In the general condition of government contract for public construction procurement, most of internal risks are written to be allocated to contractors except risks caused by employers. Contractors are allocated to be responsible for all risks caused by contractors themselves, and employers are allocated the risks made by employers

and engineers. Not many external risks are mentioned in the general condition of public construction contract. Only few risks are shared between contractors and employers in the contract. In addition, some risk clauses are found to be unclear about risk allocation. These clauses can cause readers confusing about risk allocation. However, employers are given more advantages in allocating risks in the CGC. These results will be illustrated respectively.

5.1.1. Risks Allocated to Contractor

Among all internal risks, risks due to contractors' behavior, risks related to materials and equipment, risks caused by weak coordination within parties in projects and corruption in projects are allocated to contractors. No external risk is allocated to contractors in the contract. The clauses which mean to allocate these risks to contractors are described below.

Poor quality of contractor is written in the CGC in several clauses. The clause 4 of the CGC is specified contractors to complete work on time with good quality. Quality of contractor is seen to be written in the contract related to three main criterions: time, quality and safety.

The clause 5 of the CGC is mentioned the quality of contractor based on ability in completing projects on time. Due to this clause, projects shall be completed properly and on time specified in contracts. The clause 31 of the contract is written in a purpose to require contractors to start work on time. Moreover, the clause 27 gives contractors the right of getting delay on project completion under decision of employer 14 days after receiving the request for time extension from employers with sufficient reasons. However, if contractors are late in requesting this time extension, it is the responsibility of contractor. Any actions and expenses for fastening work processes shall be contractors' responsibility. As the result of this late work completion, contractors are fined 0.1% of total project cost for a day late, but sums of these fines must not be more than 10% of project cost. When this claim reaches 10% of project cost, employers can consider on terminating projects.

Related to the quality of work of contractor, the clause 15 of the contract requires contractors to work properly by using appropriate labor forces and equipment according to technical specifications. In order to make sure that work is done properly, all of technical specifications, plans and all related documents for temporary work or construction work prepared by contractors must be issued by employers or in according to specifications provided by employers. This is due to the clause 32. In term of quality assurances, the clause 34 of the contract provides right to employers to check contractors' work or request contractors to conduct tests for finding out defects. The clause 35 of the contract also gives descriptions of taking tests.

In order to achieve good quality of work, contractors shall have enough and qualified staffs and labor forces. This is what the clause 10 of the contract has been included. In addition, employers have right to request and approve the change of staffs and labor forces who are considered to be not qualified enough for work execution by providing enough reasons. Processes of this change are also written in this clause.

Work shall be guaranteed about its quality by contractors after construction is completed. Due to this concept, the clause 36 of the contract is specified for contractors to guarantee their work execution and completion for a specific period. During this period, contractors shall guarantee work quality, and remedy any defects happening. If contractors do not reply employers in 7 days after employers inform contractors about defects, employers can let other contractors to fix problems instead, and all of these expenses are under the responsibility of contractor except any defects or problems caused by any unpredictable environmental effects.

Contractors shall insure work and items during work execution. The clause 14 of the contract specifies about insurance to work and equipment used in projects for any damage caused by unforeseeable condition. Furthermore, this insurance also covers people lives defected by accidents in work, or any defects to any public and private properties. Contractors shall spend on this insurance and prove it to employers, otherwise employers are capable to buy this insurance instead of contractor and reduce payments to contractors.

Contractors cannot breach any clauses of contracts. If contractors have done differently from what has been written in contracts, contractors shall fix problems due to this issue as soon as possible. Employers shall provide contractors an appropriate duration to fix problems. If contractors cannot achieve this obligation, employers can consider on terminating projects 30 days after informing contractors. This is mentioned in the clause 48.1.c of the contract. This process of project termination is also written in the clause 48.1.b of the contract when contractors' organizations is bankruptcy or face with any serious financial problems that cannot be solved.

The clause 25 of the contract requires contractors to have work programs which include schedule of work, preparation of work and material orders. These programs shall be updated frequently due to exact work progresses which are approved by employers during time mentioned in particular condition. Missing of this approving can let employers to delay payments for next payment and suspend this payment to the last payment. Even there are modifications of these programs, it will not affect any obligations of contractor. Furthermore, this modified programs shall mentioned their effects, changes and claims caused by this program modification.

The clause 9 of the contract is written in the purpose of ordering contractors to follow all instructions from employers. Contractors shall give employers rights to audit all financial documents and all documents related to projects, if there are necessary cases needed.

The clause 11 of the contract is specified the issue related to project transferring from one contractor to other contractors. Contractors cannot transfer their contracts to other contractors without employers' permission. For public projects, project transferring from current contractors to new contractors must be approved by the Ministry of Economic and Finance via the Department of Public Procurement.

In order to have sufficient information exchanges in projects, the clause 29 of the contract aims both contractors and employers to inform each other as soon as possible any condition that can cause project delay. It is contractors' obligation to minimize

effects of this obstacle to projects. In addition, contractors are preferred to estimate the magnitude of problems affecting projects according to real situations.

The clause 30 of the contract is mentioned more about how to have good information exchanges between contractors and employers. Due to this clause, contractors shall register with employers or employers' representatives, all receipts of materials or any expenses which are already used for work in any necessary time during contract implementing period.

In responding to laws of Cambodia, the clause 38 of the contract is mentioned the obligations of contractor to pay for all related taxes. Corruption or frauds made by contractors can lead employers to terminate contracts in 30 days after employers inform contractors. This is due to the clause 48.1.d of the contract.

5.1.2. Risks Allocated to Employer

Risks due to employers' behaviors and risks caused by engineers are internal risks which are allocated to employers in the CGC. There is no external risks which are allocated to employers in the contract.

Normally, employers shall pay contractors in the date specified in contracts. This statement is mentioned in the clause 19 of the contract as employers' obligations. About delay payments to contractors, three clauses are mentioned in the contract, and these clauses mean to allocate this risk to employers.

The clause 45.2 of the contract is specified for employers to pay contractors on time as specified in contracts, otherwise employers shall pay extra cost to contractors due to this late payment. This extra cost is equal to 0.05% of total cost for every day of late payment duration. In addition, this contract is also written about advanced payments that employers shall pay contractors on date specified in particular condition of contracts, if it is mentioned. Late in advanced payment can be a reason that contractors can receive compensation from employers. This is due to the clause 42.1.h of the contract.

In order to avoid any excuses of delay in final payments, the clause 44 of the contract is specified clearly the process of claiming and processing final payments in specific stages and duration.

Based on the clause 26 of the contract, employers can request contractors to complete work earlier than date that has been specified in contracts. If contractors accept this change, contracts shall be changed. Employers shall issue all of contractor's requirements for fastening this work. Employers can request contractors to changes the works. This is due to the clause 20 of the contract. Due to this clause, employers shall support contractors for any requirements necessary for this improvement. This risk is considered to be shared between contractors and employers.

Actions against the country laws due to actions of employer or any people who have contracts with employers except contractors are employers' risk. This is due to the clause 24.1.a of the CGC.

Designs are engineers' works and responsibilities. Since engineers have contracts with employers, any errors of designs or design documents from engineers are employers' responsibility. This is shortly mentioned in the clause 24.1.b of the contract.

5.1.3. Sharing Risks

Risks are seen to be shared between contractors and employers in the contract in some categories such as dispute resolution, risks caused by third parties and external risks. However, the risk of health or safety impact in and around construction sites is normally allocated to contractors, but in a particular condition, it is allocated to employers. These sharing risks will be described briefly.

This contract requires both parties to involve in disputes resolution. Negotiations are the primary method to use in solving disputes. However, if disputes cannot be solved by negotiations, the clause 49 of the contract gives equal right to both contractors and employers to have their own lawyers involving in conflicts resolution. An arbitrator will be chosen under the agreements of both parties. Without any solutions from these

two methods, court decisions are the final judgment on the issue. Due to these three processes, both parties are equally shared this risk.

Contractors shall need public authorities to approve on necessary documents for work. Due to the clause 22 of the contract, if there are requests from contractors for employers to help in getting approval from public authority, employers shall do it. However, employers can decide whether to help contractors or not. Unless these documents are requested to contractors by employers to get approval from public authorities, employers shall help contractors. Any delays caused by late in approving from public authorities, are considered as unforeseeable risks, and they are shared between contractors and employers.

Among all external risks, two risks are described to be shared in the CGC: unexpected bad weather and war threats. Unexpected bad weather can be considered as unforeseeable risk which is stated as employers' risk in the clause 14.1 of the contract. In addition, the clause 36.2 can be additionally indicate this risk as employers' risk because this clause take contractors out of the responsibility of fixing any defects caused by unexpected bad weather. However, the clause 46 of the contract requires contractors to involve in this risk's responsibility when this bad weather continues more than 84 days and can cause projects suspension. During this suspension, contractors shall take care of work, equipment and materials in sites. Contractors shall also suspend work in according to what has been informed by employers. However, contractors can get payments for all work completed before this suspension. As a conclusion, this risk is mostly allocated to employers and partly allocated to contractors which can be concluded as a sharing risk.

Construction projects will be affected by wars, if they are located in war zones. Negative effects to work, equipment, materials and lives can occur. These effects are allocated to employers as mentioned in the clause 24.1.b of the contract. Furthermore, not different from risk caused by unexpected bad weather, contractors shall take care of work, equipment and material in sites, and suspend work in according to instructions of employer when there is work suspension due to war threats. Due to

these two clauses, this risk can be considered as a sharing risk between contractors and employers due to different tasks of their responsibilities.

In order to keep construction sites safe and clean, the clauses 6 and 7 of the contract require contractors to take responsibility in keeping safety, security and clean environment in construction sites. Construction sites shall have enough safety signs, enough light, and fire prevention and protection actions. To have clean construction sites, contractors shall have good waste management during construction processes and shall clear sites after work completion. Contractors shall also avoid any environmental effects to surrounding environment. Moreover, contractors shall guarantee for security in sites and avoid any bad effects to surrounding environment especially public property. Any accidents or defects that affect people lives, equipment and works are the responsibilities of contractor. However, in order to take contractors in these responsibilities, employers must prove that these accidents or defects are contractors' mistakes. Even contractors shall be responsible in such of these issues, employers shall also take their responsibilities instead of contractor if such of these problems happen due to necessary work. Necessary work means the work that contractors cannot avoid to do. These are in according to the clause 24.1.a of the contract. In short, any defects to health or safety in and around construction sites are allocated to both contractors and employers in different condition. In normal condition, this risk is contractors' risk because it is contractors' mistakes. However, this risk is allocated to employers when contractors cannot avoid this mistakes due to necessary works.

5.1.4. Unclear Risk Allocation Clause

Clause 42 of the contract makes confusion about risk allocation. It is not clearly indicated about risk allocation. Risks in this category are mention in Table 5.1. These risks are all in the clause 42 of the contract. All of these risks are stated in the point 42.1 of the contract as the cases that contractors can claim for time extension and cost compensation from employers. Thus they are employers' risks. Moreover, the clause 42 of the contract also provides processes in how and what contractors can

claim due to these issues. However, in the section 42.2 of this clause, employers is given right in making decisions on the responsible party, the amount of project cost increasing and the duration of time extension. This point seem to guide oppositely from what is called contractors' risks.

In short, this clause provides condition and processes that contractors can claim for time extension and cost compensation due to some risks mentioned above. This statement means to allocate these risks to employers. In contrast, decisions on such of these issues depend on employers. This illogical way of risk allocation provides advantages to employers. It decreases the weight of risk responsibilities from employers. Thus, this risk clause can be concluded as unclear risk allocation clause.

5.2. Comparison of Risk Allocation between the Cambodian Government Contract with the FIDIC Contract

All of risk clauses written in the CGC exist in the FIDIC contract, but there are some risk clauses in the FIDIC contract do not exist in the CGC. In addition, some clauses of the CGC are shorter without enough detail comparing to the FIDIC Contract. While the CGC provides how to allocate risks, the FIDIC contract provides further details on more foreseeable condition that might happen related to risks, and gives the procedures for both parties to work related to risks for different condition. Moreover, some clauses of the CGC are not clearly written about risk allocation comparing to the FIDIC contract. In addition, the CGC gives employers advantages in making decision on risk responsibilities. This decision is about party who should take risks and amount of time and cost compensation, even risks are mentioned as employers' risks in the contract. All of these conclusion will be described briefly through comparison between the CGC and the FIDIC contract. This comparison is done for two different risk groups, internal risks and external risks.

5.2.1. Internal Risk

Internal risks are divided into 5 main categories which depend on the parties involving in projects such as: contractor, employer, engineer, subcontractor, and other, for the comparison.

In the FIDIC contract, all risks caused by contractors are under the responsibility of contractor. These risks and their related clauses are included in Table 5.1 in category of contractor's risks. In the CGC, risks caused by contractors are mostly allocated to contractors as the same as the FIDIC contract, except risk of health or safety or any negative effects in and around site which is unclear about risk allocation. However, not all risks mentioned in the FIDIC contract are mentioned in the CGC. They are also shown in Table 5.1.

Work termination for contractors' convenience is written in sub-clause 15.2.b of the FIDIC contract. This clause is written that *"the employer shall be entitled to terminate the contractor if the contractor: ... (b) Abandons the works of otherwise plainly demonstrates the intention not continue performance of his obligations under the contract..."* This part can indicate this risk as contractors' risk via the right of employer in terminating contract in such of this condition. Moreover, processes of this termination are also provided in this sub-clause.

Breach of contracts by contractors is written in two different sub-clauses as contractors' risk. At the beginning of sub-clause 4.1, it describe the general obligation of contractor in executing and completing the works in accordance with the contract and with engineer's instructions. In addition, sub-clause 1.12 is written that *"The contractor shall disclose all such confidential and other information as the engineer may reasonably require in order to verify the contractor's compliance with the contract"* this clause can indicate that contractors shall prove employers that contractors have followed what has been written in contracts.

Sudden bankruptcy of contractor is written in the sub-clause 15.2.e that *"The employer shall be entitled to terminate the contract if the contractor... (e) becomes*

bankrupt or insolvent, goes in to liquidation,...” Moreover, this sub-clause also provides processes of this termination also provided in this sub-clause. Due to this termination, this risk can be concluded as a sharing risk.

Act against the country laws by contractors is included into two different sub-clauses, and they mean to allocate this risk to contractors. Sub-clause 1.13 provides general obligation for contractors to comply with applicable laws in performing the contract. Furthermore, sub-clause 6.4 also indicate the obligation of contractor to follow the law in giving contractors’ personnel good work condition. This sub-clause is written that *“The contractor shall comply with all the relevant labor laws applicable to the contractor’s personnel, including laws relating to their employment, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights. The contract shall require his employees to obey all applicable laws, including those concerning safety at work.”*

Electrical, water, and other facility supplies for projects is written in sub-clause 4.19 as a contractors’ risk. It can be concluded as contractors’ risk because this sub-clause requires contractors to take responsibility in supporting these services. It is mentioned that *“The contractor shall...be responsible for the provision of all power, water and other services he may require. The contractor shall be entitled to use for the purposes of the works such supplies of electricity, water, gas and other services as may be available on the site and of which details and prices are given in the specification. The contract shall, as his risk and cost, provide any apparatus necessary for his use of these services and for measuring the quantities consumed...”*

Unclear or lack of contractor’s work warrantee can be considered as a contractor risk in the FIDIC contract due to sub-clause 11.1 which is written that *“...the contract shall (a) complete any work is outstanding on the date stated in a taking-over certificate, within such reasonable time as is instructed by the engineer,...”*

Health or safety protection on and off sites is mentioned as a contractors’ risk in several clauses in the FIDIC contract. One of them is sub-clause 4.1 which is mentioned that *“...The contractor shall be responsible for the adequacy, stability and safety of all site*

operations and of all methods of construction...” In addition, sub-clause 4.8 specifies clearly the contractors’ obligation in safety protection. Sub-clause 4.22 of the FIDIC contract puts contractors in the responsibility of keeping good security in site by mentioning that “... (a) *The contractor shall be responsible for keeping unauthorized person of site, and (b) authorized person shall be limited to the contractor’s personnel and the employer’s personnel...*” In addition, in according to sub-clause 4.23, more obligation for contractor to do on site for safety protection is included. It is specified that “... *During the execution of the works, the contractor shall keep the site free from all unnecessary obstruction, and shall store or disposed of any contractor’s equipment or surplus materials. The contractor shall clear away and remove from the site any wreckage, rubbish...*” Furthermore, sub-clause 6.11 adds another responsibility of contractor related to this risk by mentioning that “*The contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous conduct by or amongst the contractor’s personnel, and to preserve peace and protection of person and property on and near the site*”

For having healthy work condition, contractors shall protect environment in construction site. This is due to sub-clause 4.18 of the FIDIC contract. This sub-clause is written that “*the contractor shall take all reasonable steps to protect the environment (both on and off the site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations...*” In order to give contractors’ staffs and labors good and healthy accommodation, sub-clause 6.6 of the FIDIC is written in allocating this risk to contractors that “...*the contractor shall provide and maintain all necessary accommodation and welfare facilities for the contractor’s personnel. The contractor shall also provide facilities for the employer’s personnel as stated in the specification...*” Moreover, sub-clause 6.7 is mentioned that “*The contractor shall at the times take all reasonable precautions to maintain the health and safety of the contractor’s personnel...*” which indicates another responsibility of contractor for this risk.

Poor quality and incompetence of contractor is an important risk which written in many sub-clauses in the FIDIC contract to allocate this risk to contractors. Sub-clause 4.1

provides general obligations of contractor to give a qualified work. Moreover, the sub-clause 4.7 specifies particular obligation of contractor related to setting out. Furthermore, contractors shall assure all the work done by contractors. This is in according to sub-clause 4.9 which is mentioned that “The contractor shall institute a quality assurance system to demonstrate compliance with requirements of the contract...” Besides setting out, *“The contractor shall carry out the manufacture of plant, the production and manufacture of materials, and other execution of the works”*. This is due to the sub-clause 7.1 of the FIDIC contract which is related to this issue. Contractors shall start work on time as specified in contract in according to the sub-clause 8.1 “Commencement of Works”. Then, contractors must complete work on date specified in contracts. This is due to the sub-clause 8.2 of the FIDIC contract. Last but not least, Contractors shall conduct tests to prove their quality of work. This obligation is mentioned in the sub-clause 9.1 that “the contractor shall carry out the test on completion...”

Lack of labor forces/staff productivity is allocated to contractors as specified in the sub-clauses 6.8 and 6.9 of the FIDIC contract. The sub-clause 6.8 is mentioned in the purpose for contractors to have qualified contractors’ personnel. It is written that *“...Superintendence shall be given by a sufficient number of persons having adequate knowledge of the language for communications and of the operations to be carried out....The contract’s personnel shall be appropriately qualified, skilled and experienced in their respective trades or occupations. The engineer may require the contractor to remove (or cause to be removed) any person employed on the site or works, including the contractor’s representative if applicable...”* Moreover, clause 6.9 is added that *“The contractor shall submit, to the engineer, details showing the number of each class of contractor’s personnel and of each type of contractor’s equipment on the site...”*

Contractors fail to examine sites and their surrounding environment is a contractors’ risk. Sub-clause 4.10 of the FIDIC contract is specified this issue that *“...the contractor shall be deemed to have inspected and examined the site, its surroundings, the above data and other available information, and to have been satisfied...”*

Remedy defects within the reasonable time shall be done by contractors. This is due to some sub-clauses in the FIDIC contract. Sub-clause 11.1 is written that “... (b) *Execute all work required to remedy defects or damage, as may be notified by (or on behalf of) the employer on or before the expiry date of the defects notification period for the works or section...*” This defect notification period can also be extended due to the sub-clause 11.3. Furthermore, sub-clause 11.4 of the FIDIC contract specifies conditions that contractors fail to remedy any defects or damages within a reasonable time.

Risk related to employers’ equipment is stated in the sub-clause 4.20 of the FIDIC contract as a contractors’ risk. This clause mention two issues related to employers’ equipment. They are cost of using employers' equipment if employers lend their equipment to contractors and safety while operating or using these equipment. This clause is written that “... (b) *The contractor shall be responsible for each item of employer’s equipment whilst any of the contractor’s personnel is operating it, driving it, directing it or in possession or control of it. The appropriate quantities and the amounts due (at such stated prices) for the use of employer’s equipment shall be agreed or determined by the engineer... The contractor shall pay these amounts to the employer...*” This sub-clause means to allocate this risk to contractors.

By the way, the CGC allocates risks caused by contractors to contractors as mentioned in the previous section. However, not all risks mentioned in the FIDIC contract are mentioned in the CGC. These missing risks are shown in the Table 5.1.

Beside these missing risks, other risks except health and safety effects in and around construction sites are allocated to contractors in the CGC as described in the previous section of this chapter and also shown in the Table 5.1.

In the FIDIC contract, most of risks caused by employers are allocated to employers. These risks and their related clauses are included in the Table 5.1 in the category of employer’s risks.

Delay payment is allocated to employers in the FIDIC contract in accordance with the sub-clause 14.8. This clause is written that *“if the contract does not receive payment in accordance with sub-clause 14.7 [Payment], the contractor shall be entitled to receive financing charges compounded monthly on the amount unpaid during the period of delay... The contractor shall be entitled to this payment without formal notice or certificate, and without prejudice to any other right or remedy.”* In addition, contractors are possible to terminate contract due to this late payment. This is due to the sub-clause 16.2 in the section (c) which is mentioned that *“The contractor shall be entitled to terminate the contract if... (c) The contractor does not receive the amount due under an interim payment certificate within 42 days after the expiry of the time stated in sub-clause 14.7 [Payment] within which payment is to be made (except for deductions in accordance with sub-clause 2.5 [Employer’s Claims])”* These two sub-clauses can indicate this risk as an employer’s risk.

The sub-clause 15.5 of the FIDIC contract is written that *“The employer can be entitled to terminate the contract, at any time for the employer’s convenience, by giving notice of such termination to the contractor...”* This sub-clause gives the right to employers to terminate contracts by employer’s convenience. However, this risk is allocated to the employer because this sub-clause adds that *“After this termination, the contractor shall proceed in accordance with sub-clause 16.3 [Cessation of Work and Removal of Contractor’s Equipment] and shall be paid in accordance with sub-clause 19.6 [Optional Termination, Payment and Release].”*

Besides terminating contracts by employer’s convenience, engineers may also suspend work. The sub-clause 8.8 mentions about this issued that *“the engineer may at any time instruct the contractor to suspend progress of part or all of the work...”* this is an employer’s risk in accordance with the sub-clause 8.9 which is written that *“if the contractor suffers delay and/or incurs cost from complying with the engineer’s instructions under sub-clause 8.8..., the contractor shall give notice to the engineer and shall be entitled to sub-clause 20.1 [Contractor’s Claims] to: (a) an extension of time for any such delay... (b) Payment of any such cost...”*

A part of the sub-clause 3.1 about Engineer's Duties allocates the risk of late in approving to employers. This clause is mentioned about obligation of employer in giving approval on documents that *"... Whenever the engineer exercises a specified authority for which the employer's approval is required, then (for the purposes of the contract) the employer shall be deemed to have given approval..."*

Changes in work are allocated to employers. Any variations of work allow contractors to claim for time extension under the sub-clause 8.4 (a). This sub-clause is written that *"The contractor shall be entitled subject to sub-clause Moreover, the sub-clause 12.4 Omissions provides more detail about determination by engineers on cost flowing from [Contractor's Claims] to and extension of the time for completion if and to the extend that completion... by any of the following causes: (a) a variation (unless an adjustment to the time for completion has been agreed under sub-clause 13.3 [Variation Procedure]) or other substantial change in the quantity of an item of work included in the contract,"*. In addition, even employers can vary work and shall accept on time extension and cost compensation for variation, contractors can have their own evaluation and make agreements on their capabilities to do the work required for variations. In addition, contractors shall cooperate with engineers as much as possible to achieve variation cost in the purpose of cost saving. These are due to sub-clause 12.4 [Omissions] of the FIDIC contract.

Lack of project information is mentioned in some sub-clauses in the FIDIC contract as an employers' risk. The sub-clause 1.8 is written clearly about this obligation that *"The specification and drawings shall be in the custody and care of the employer..."* In addition, the sub-clause 4.10 requires employers to give contractors site data. This sub-clause is specified that *"The employer shall have made available to the contractor for his information, prior to the base date, all relevant data in the employer's possession on sub-surface and hydrological conditions at site, including environmental aspects. The employer shall similarity make available to the contractor all such data which come into the employer's possession after the base date..."*

Employers shall give contractors right to access to, and possession of, all parts of the site within the time (or times) stated in the Appendix to Tender. This is due to the sub-clause 2.1 of the FIDIC contract which can indicate this risk as an employers' risk. This sub-clause provides further condition to deal with this risk when the specific time of giving of access to site is not including in the Appendix to Tender. Moreover, a part of this sub-clause can additionally mean to allocate this risk to employers by mentioning that *"... If the contractor suffers delay and/or incurs cost as a result of a failure by the employer to give any such right or possession within such time, the contractor shall give notice to the engineer and shall be entitled subject to sub-clause 20.1 [Contractor's Claims] to: (a) an extension of time for any such delay... (b) Payment of any such cost plus reasonable profit..."*

Point (d) of the sub-clause 16.2 is written that *"The contract shall be entitled to terminate the contract if... (d) The employer substantially fails to perform his obligations under the contract..."* This statement can be shown that employers' breach of contracts is an employers' risk.

Any actions of employer against the country's law are employers' risks. Risk allocation of these risks can be implied from the sub-clause 1.13 which is written that *"... (a) the employer shall have obtained (or shall obtain) the planning, zoning or similar permission for the permanent works, and any other permissions described in the specification as having been (or being) obtained by the employer..."*

The other risk allocated to employers in the FIDIC contract is sudden bankruptcy of employer. The sub-clause 16.2 is written about this risk allocation that *"the contractor shall be entitled to terminate the contract if... (g) The employer becomes bankrupt or insolvent, goes into liquidation ..."* This part of the sub-clause provides right to contractors to terminate contract if employers become bankrupt.

Only two risks in this category are found in the CGC to be allocated to employers. First is delayed payments to contractors (clause 45.2), and second is act against the country laws (clause 24.1.a) as described in the previous section. Comparing to the FIDIC contract, some employers' risks do not exist in the CGC as shown in Table 5.1. In

addition, some risks in this category are found to be in different risk allocation with the FIDIC contract.

Both the FIDIC and CGC share the risk of late in solving litigation between contractors and employers. Both contracts are provided the methods for solving disputes through DAB which involves of one member from contractors' nominations, one from employers' nominations and the third one from agreements by both parties. Any disagreements or problems of any members in the board will affect the processes of solving disputes. Payment for this DAB is shared between both parties.

Lateness in solving disputes can cause projects delay. The FIDIC contract indicates to share this risk between contractors and employers. In the clause 20.3 of the FIDIC contract about *Failure to Agree Dispute Adjudication Board (DAB)*, both parties shall cooperate each other to form dispute adjudication board. This condition includes points related to appointment for all members of DAB, members' nomination for DAB from each party, agreements of both parties on the third member who is the chairman in DAB, and the failure in agreements on changing any members of DAB. The failure in completing these obligations will cause of appointing entities named in Appendix to tender. In addition, payments to appointing entities are shared between both parties. Furthermore, the sub-clause 20.4 of the FIDIC contract provides mechanisms of DAB in making decisions for solving disputes. It gives balanced right on decision making to both parties. Due to these two clauses, both parties are provided equal right and responsibilities involving in dispute resolution. Any delays caused by late in solving disputes can be concluded as the responsibilities of both parties.

While the FIDIC contract allocates most of risks in this category to employers, three risks are found to be unclear risk allocation in the CGC. They are lateness of approving documents for contractors, delay in obtaining site access and breach of contract by employers. As mentioned in the previous section, these three risks are stated as employers' risk that contractors can claim for time extension and extra cost. However, this clause gives advantages to employers in making decisions. Employers are provided

right to decide about parties who shall take responsibilities and amount of time and cost that can be claimed.

Since employers sign contract with engineers to work in projects, all of risks caused by engineers are under the responsibilities of employer which shall be written in contracts between contractors and employers. The FIDIC contract mentions risks in this category in three types of problem, defective designs in the sub-clauses 3.1 and 17.3, deficiency in drawing in the sub-clause 4.7 and lateness in issuing design documents in the sub-clause 1.9.

The sub-clause 3.1 has mentioned about employers' obligation in giving correct designs from qualified engineers. It is written that *"The employer shall appoint the engineer who shall carry out the duties assigned to him in the contract. The engineer's staff shall include suitably qualified engineers and other professionals who are competent to carry out these duties..."* It is employers' risk of defective designs as mentioned in the sub-clause 17.3 (g) that *"The risks referred to in sub-clause 17.4 below are... (g) Design of any part of the works by the employer's personnel or by others for whom the employer is responsible..."* The sub-clause 17.4 is about consequences of employer's risks which allow contractors to claim for time extension and payment.

Related to deficiency in drawing, the sub-clause 4.7 is mentioned this risk as employers' risk that *"... The employer shall be responsible for any errors in these specified or notified items of reference, but the contractor shall use reasonable efforts to verify their accuracy before they are used..."*

All design documents and drawings must be issued to contractors on time. These are due to the sub-clause 1.9 which is described that *"... If the contractor suffers delay and/or incurs cost as a result of a failure of the engineer to issue the notified drawing or instruction within a time which is reasonable and is specified in the notice with supporting details, the contractor shall give further notice to the engineer and shall be entitled subject to sub-clause 20.1 [Contractor's Claims] to: (a) an extension of time for any such delay,... (b) Payment of any such cost plus reasonable profit..."*

It should be noted that the designs of work might be partly done by contractors due to employers' requests. In the CGC, among all risks caused by designs, there are not risks caused by the designs of contractor. However, In the FIDIC contract, the risks caused by the designs of contractor are allocated to contractors for poor quality of contractor and contractors' incompetence. This is due to a part in the sub-clause 4.1 which is written that *"...If the contractor specifies that the contractor shall design any part of the permanent works, then unless otherwise stated in the particular conditions: ... (c) the contractor shall be responsible for this part and it shall, when the works are completed, be fit for such purposes for which the part is intended as are specified in the contract;..."*

Two risks caused by engineers are mentioned in the CGC. Firstly, deficiency in drawing is allocated to employers under the clauses 4.7 and 17.3 of the FIDIC contract. Both contracts allocate this risk to engineers or employers. They require employers to provide contractors, correct and detailed drawings which are appropriate for construction. Any failures of project, time delays or cost increasing are employers' or engineers' responsibility.

Secondly, the risk caused by late in issuing design documents to contractors is allocated to employers due to the clause 42.1(c) of the CGC. This clause allows contractors to have cost and time compensation. However, in the other section of this clause, it is written in unclear and confusing risk allocation. This risk is stated as employers' risk, but decisions on responsible party, and amount of time and cost compensation are made only by employers' judgment. These are reasons that this risk is allocated unclearly in the CGC.

In the FIDIC contract, risks made by subcontractors shall be discussed in to two separate scenarios, risks made by subcontractors and risks made by nominated subcontractors. Since subcontractors work based on contracts with contractors, risks made by subcontractors such as poor performance of subcontractors, and problems between main contractors and subcontractors are allocated to contractors. This is due to the sub-clause 4.4 which is written that *"... The contractor shall be responsible for*

the acts or defaults of any subcontractor, his agents or employees, as if they were acts or defaults of the contractors...”

However, for nominated subcontractors who are under contracts with employers, risks made by nominated subcontractors are shared between contractors and employers as shown in Table 5.1. In accordance with sub-clause 5.1, a nominated subcontractor is a subcontractor whom engineers instruct contractors to employ as a subcontractor. Thus, risks made by nominated subcontractors are shared between contractors and employers because nominated subcontractors are paid by employers, so any mistakes or poor performance of nominated subcontractors are the responsibility of employer. However, main contractors have obligations to control and evaluate the work of nominated subcontractors before getting payments from employers. The sub-clause 5.3 of the FIDIC contract has mentioned about this payment that *“The contractor shall pay to the nominated subcontractor the amounts which the engineer certifies to be due in accordance with the subcontractor ...”* In CGC, there is no risk related to subcontractors is mentioned.

Risks in the last category are risks caused by other parties beside the four parties mentioned above, and risks that happen due to relationship between all parties in projects. Some risks are allocated to contractors by the FIDIC contract as shown in Table 5.1.

Risks related to material supplies are found in the FIDIC contract related to three issues: delay in material supply, unclear or lack of material warranty from suppliers, unclear material specification. All of these risks are allocated to contractors. Related to delay in material supply sub-clause 4.16 [Transport of Goods] is written that *“Unless otherwise stated in the particular conditions: ...(b) the contractor shall be responsible for packing, loading, transporting, receiving, unloading, storing and protecting all goods and other things required for the works;...”*

Unclear or lack of material warranty is allocated to contractors in accordance with the sub-clauses 7.7. This sub-clause is mentioned about this issue that *“Each item of plant and materials shall, to the extent consistent with the laws of the country, become*

the property of the employer at whichever is the earlier of the following times, free from liens and other encumbrances: (a) when it is delivered to the site; (b) when the contractor is entitled to payment of the value of the plant and material under sub-clause 8.10 [Payment for Plant and Material in Event of Suspension].”

Material shall have clear information and specification. The sub-clause 7.2 of the FIDIC contract allocates this risk to contractor that *“The contractor shall submit the following samples of materials, and relevant information, to the engineer for consent prior to using the materials in or for the works: (a) manufacturer’s standard samples of materials and samples specified in the contract, all at the contractor’s cost, and (b) additional samples instructed by the engineer as a variation. Each sample shall be labelled as to origin and intended use in the works.”*

Corruption made by contractors in projects is allocated to contractors in the sub-clause 15.2 of the FIDIC contract. This clause is written about this allocation that *“The employer shall be entitled to terminate the contract if the contractor... (f) Gives or offers to give (directly or indirectly) to any person any bribe, gift, gratuity, commission or other thing of value, as an inducement or reward: (i) for doing or forbearing to do any action in relation to the contract, or (ii) for showing of forbearing to show favor to any person in relation to the contract,...”*

Some risks in this categories are shared between contractors and employers in the FIDIC contract.

Obtaining approval or consent from relevant authorities is written in sub-clauses 1.6, 2.2, 14.1, 17.5. The cost of stamp duties and similar charges imposed by laws in connection with contract agreements shall be borne by employers under the clause 1.6 [Contract Agreements]. It is written about this issue that *“... The cost of stamp duties and similar charges (if any) imposed by law in connection with entry into the contract agreement shall be borne by the employer”* In addition, employers are also required to provide reasonable assistances to contractors at the requests of contractor when contractors shall be responsible for any permits, licenses or approval required by the laws of the country as mentioned in the sub-clause 2.2. The sub-clause 2.2 is

written that *“The employer shall (where he is in a position to do so) provide reasonable assistance to the contractor at request of the contractor: ... (b) for the contractor’s applications for any permits, licenses or approval required by the laws of the country: (i) which the contractor is required to obtain under sub-clause 1.13 [Compliance with Laws], (ii) for the delivery of goods, including clearance through customs, and (iii) for the export of contractor’s equipment when it is removed from the site”*

In the sub-clause 17.5, employers shall indemnify and hold contractors harmless against and from any claims alleging an infringement. Infringement is defined in this sub-clause that *“Infringement means an infringement (or alleged infringement) of any patent, registered design, copyright, trade mark, trade name, trade secret or other intellectual or industrial property right relating to the works; and “claim” means a claim (or proceeding pursuing a claim) alleging an infringement.”* However, in according to this sub-clause also, this infringement shall be *“(a) an avoidable result of the contractor’s compliance with the contract, or (b) a result of any works being used by the employer...”*

In addition to this obligation, contractors is also required to take responsibility in getting approval or consent from relevant authorities. This is due to the sub-clause 14.1 of the FIDIC contract which is mentioned that *“Unless otherwise stated in particular conditions: ... (b) the contractor shall pay all taxes, duties and fees required to be paid by him under the contract, and the contract price shall not be adjusted for any of these costs except as stated in sub-clause 13.7 [Adjustment for Changes in Legislation]...”* Thus, this risk can be concluded as a sharing risk.

Related to insurance responsibility, there are some risks that shall be necessary for one or both parties to cover them by insurance. Insuring party can be contractors, employers and/or joint insurance. For insurance under the responsibility of a party, the FIDIC contract requires other parties to involve in the processes of checking and accepting criterions that insurance should be covered. This means that both parties are agreed and involve in sharing responsibilities for insurance to project risks. This

condition is provided by sub-clause 18.1 that *“... If the insuring party fails to effects or keep in force any of the insurances it is required to effect and maintain under the contract, or fails to provide satisfactory evidence and copies of policies in accordance with this sub-clause, the other party may (at its option and without prejudice to any other right or remedy) effect insurance for the relevant coverage and pay the premium due. The insuring party shall pay the amount of these premiums to the other party, and the contract price shall be adjusted accordingly...”*

In the CGC, 4 risks in this category are mentioned. Two of them are allocated to contractors, one risk is shared and the other one is unclear risk allocation.

Two risks are allocated to contractors. First risk is insurance responsibility. It is allocated to contractors due to the clause 14 of the CGC. This insurance covers insurance to equipment and materials, tool, lives of people in and around construction sites and accidents caused by work implementation. Employers shall buy insurance instead of contractor, if contractors miss to buy it. However, cost spending on this insurance will be deduced in payments to contractors.

Second risk in this category which is allocated to contractors is corruption in projects in the clause 48 of the CGC. This clause is mentioned only corruption made by contractors to any government officers which can lead employers to terminate contracts, 30 days after informing contractors. This risk is written in the CGC shorter comparing to the FIDIC contract about definitions of corruption, and the case of corruption caused by employers' personnel.

One risk that can be indicated to be shared in this category is obtaining approval or consent from relevant authority. The two contracts are allocated this risk in the same way by asking for involvement of both parties in getting approval from relevant authorities for necessary documents for projects.

Clauses 12 and 42 of CGC are written about problems between contractors and other contractors. Clause 12 of this contract requires contractor to cooperate with other contractors by providing space of work, tools and any necessary services. It should be

due to the work schedule of other contractors as specified in the special condition of contract. In addition, clause 42 of this contract allows contractors to get cost and time compensation if employers change schedule of other contractors, and this change affect to work of contractor. However, this clause 42 allocates risks unclearly by giving right on compensations to employers. In contrast, the FIDIC contract allocates this risk clearly to contractors. The sub-clause 4.6 of the FIDIC contract mentions that *“The contractor shall, as specified in the contract or as instructed by the engineer, allow appropriate opportunities for carrying out work to: ... (b) Other contractors employed by the employer...”* It also adds that service for other contracts may include the used of contractor’s equipment, temporary works or access arrangements which are the responsibility of contractor.

5.2.2. External Risk

External risks are divided in to 3 main categories for comparison: natural risks, political & social risks, and economic & legal risks. The FIDIC contract shares natural risks related to unexpected weather condition or unforeseeable physical condition between contractors and employers. The sub-clause 8.4 (c) of the FIDIC contract gives right to contractors to claim for time extension in completing work in the case that there are adverse climatic condition. It is written that *“The contractor shall be entitled to sub-clause 20.1 [Contractor’s Claims] to an extension of the time for Completion of the time for completion if and to the extent that completion... by any of the following cases: ... (c) Exceptional adverse climatic conditions...”* However, contractors shall be responsible for any effects from regular or foreseeable climatic condition. In addition, in according to the sub-clauses 17.3, 17.4, 19.1 and 19.4, contractors shall be entitled to the extension of time and cost compensation as the consequence of effects from unforeseeable natural forces to projects.

In short, natural risks are preferred by the FIDIC contract to be shared between contractors and employers by two different scenarios. Firstly, contractors can claim for time extension and cost compensation from in the case of unpredictable natural risks. Secondly, contractors shall themselves be responsible for any consequences for regular or predictable adverse climatic or geology risks.

In the CGC, the risk caused by unexpected bad weather is written as a sharing risk. Under the clause 14.1, contractors shall be entitled in taking care all tools, materials and equipment during any adverse climatic conditions. However, any defects to completed work caused by unforeseeable bad weather are employers' responsibilities due to the clause 36.3 of the contract. In addition, due to the clause 46 of this contract, contractors shall take care safety and manage to suspend work if there are any instructions from employers to suspend work due to serious weather condition. Therefore, employers shall pay contractors' work that are already completed before instructions has been announced. Due to these clause descriptions, the CGC shares this risk as what the FIDIC contract does.

Unforeseeable physical condition is another external risk in this category. Both contracts are mentioned this risk in their clauses in different risk allocation. In the same way as unexpected bad weather risk, due to unforeseeable condition, the FIDIC contract indicates this risk as a sharing risk. The sub-clauses 4.12 specifies risks caused by unforeseeable physical condition. This sub-clause defines physical conditions that *"... physical conditions means natural physical conditions and man-made and other physical obstructions and pollutants, which the contractor encounter at the site when executing the works, including sub-surface and hydrological conditions but excluding climatic conditions."* Conditions are named unforeseeable when experts cannot make any prediction of their risks occurrences. For this risk, this sub-clause allows contractors to claim for time extension and cost compensation under the sub-clause 20.1. It is written that *"... If and to the extent that the contractor encounters physical conditions which are unforeseeable, gives such a notice, and suffers delay and/or incurs cost due to these conditions, the contractor shall be entitled subject to sub-clause 20.1 [Contractor's Claims] to: (a) an extension of time for any such delay,... (b) Payment of any such cost, which shall be included in the contract price."*

In the CGC, this risk is also mentioned in the clause 14.1 to allocate to contractors. Furthermore, it is categorized as employers' risk due to the clause 42 of the contract as mention in the previous section. However, in other part of this clause, a statement indicates unclear risk allocation. This statement gives right in making decision to

employers about risk responsibility parties and amount of time and cost that shall be provided to contractors, even this risk is allocated employers. This risk clause in the CGC shall be modified for clear risk allocation by using the FIDIC contract clauses as references.

Based on the FIDIC contract, most of the risks related to political and social issues are allocated to employers. Under the sub-clause 17.3 and clause 19, the FIDIC contract allocate risks of war, public disorder, any criminal acts, health or negative effects by surrounding environment, and munitions of war and explosive materials to employers. Under the sub-clause 17.4, contractors shall be entitled to claim of time extension and cost compensation.

Risks related to conflicts due to the different cultures of labor forces, thefts and vandalism are allocated to contractors due to sub-clauses 4.22 and 17.2. The sub-clause 4.22 is written that *“Unless otherwise stated in the Particular conditions: (a) the contractor shall be responsible for keeping unauthorized persons off the site...”* Moreover, the sub-clause 17.2 specifies more about this risk that *“...If any loss or damage happens to the works, goods or contractor’s documents during the period when the contractor is responsible for their care, from any cause not listed in sub-clause 17.3 [Employer’s Risks], the contractor shall rectify the loss or damage at the contractor’s risk and cost, so that the works, goods and contractor’s documents conform with the contract.”*

Public authorities’ requirements for project suspension for a period of time are possible to happen in road construction projects. The sub-clauses 8.4 in the section (e) and 8.5 are written to instruct contractors to follow this request but allow contractors to claim for time extension. Anyway, these requirements from authorities must be unforeseeable. The sub-clause 8.5 has described in detail about delays caused by authorities as the employers’ risk that *“if the following conditions apply, namely: (a) the contractor has diligently followed the procedure laid down by the relevant legally constituted public authorities in the country, (b) these authorities delay or disrupt the contractor’s work, and (c) the delay or disruption was unforeseeable, then this delay*

or disruption will be considered as a cause of delay under sub-paragraph (b) of sub-clause 8.4 [Extension of Time for Completion].”

The CGC is only mentioned the risk caused by war threat for this risk category. It is written in the clauses 24.1.b and 46 of the contract. This risk is shared in the CGC. The clause 24.1.b indicates this risk as employers’ risk when there are effects of war to work, materials, equipment and tool. However, due to the clause 46 of this contract, contractors shall take care sites and suspend work according to employers’ instructions if there is serious condition of war that obstructs construction work. Moreover, contractors shall get payments for all works completed before instructions are informed. Based on these two clauses, this risk are shared in the CGC which is different from the FIDIC contract that employer are the only responsible party.

For economic risks about shortages of the availability of materials, equipment and manpower, the sub-clauses 4.1 and 6.1 can be inferred that these risks shall be shared between contractors and employers. Contractors shall provide good and enough sufficient materials, equipment and workmanship to achieve work successfully. This is due to clause 4.1 of the FIDIC contract which is written that “... *The contractor shall provide the plant and contractor’s documents specified in the contract, and all contractor’s personnel, goods, consumables and other things and services, whether of a temporary or permanent nature, required in and form this design, execution, completion and remedying defects...*” However, contractors can claim for extension of time under section (d) of the sub-clause 8.4 or unforeseeable shortages of materials, equipment and manpower availability. It is written that “*the contractor shall be entitled subject to Sub-clause 20.1 [Contractor’s Claim] to an extension of the time for completion if and to the extent that completion for the purposes of sub-clause 10.1 [Taking Over of the Works and Sections] is or will be delayed by any of the following causes... (d) Unforeseeable shortages in the availability of personnel or goods caused by epidemic or government actions...*”

For legal risk, under the sub-clause 6.11, contractors shall prevent unlawful, riotous or disorderly conducted by their personnel in or near sites which might cause disputes.

This clause is written that *“The contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst the contractor’s personnel, and to preserve and protection of persons and property on and near the site.”* In other way, risks resulted from the changes of the country laws which affect to projects are mentioned in the sub-clause 13.7. This clause allocates this risk to employers by writing that *“the contract price shall be adjusted to take account of any increase or decrease in cost resulting from a change in the laws of the country (including the introduction of new laws and the repeal or modification or existing laws) or in the judicial or official governmental interpretation of such laws, made after the based date, which affect the contractor in the performance of obligations under the contract...”* This allocation allows contractors to claim for time extension under the determination of engineer in according to the sub-clauses 3.5, 8.4 and 20.1.

No clause in the CGC are found related to economic and legal risks.

5.3. Conclusion

As a short conclusion of this chapter, not all risks written in the FIDIC contract present in the CGC. Some risks miss in the Cambodian contract compared to the FIDIC contract. Risks caused by contractors are allocated to contractors in both contracts. Among eight contractors’ risks which are included in both contracts, only health or safety protection in and around sites is allocated differently between the two contracts. It is unclear risk allocation in the CGC.

In contrast, risks caused by employers are less mentioned in the CGC comparing to the FIDIC contract. Among eleven risks in this category which all are mentioned in the FIDIC contract, only seven risks are mentioned in the CGC. Furthermore, among these seven risks, two risks are allocated to employers, and other two risks are shared as the same as the FIDIC contract. The other three risk are found in unclear risk allocation comparing to the FIDIC contract.

Both contracts allocate risks by engineers to employers because engineers are under contracts with employers. Only deficient of drawing is allocated in the same way

between the two contracts. Lateness in issuing design documents to contractors is not mentioned clearly about risk allocation. Subcontractors' risks are differentiated about risk allocation in the FIDIC contract between subcontractors and nominated subcontractors from employers. In contrast, clauses about subcontractors don't exist in the CGC. Other internal risks such as risks caused by third parties or risks related to involvement of both parties in projects are referred differently about risk allocation due to their different conditions.

Only few external risks are written in the CGC with similar risk allocation as the FIDIC contract. Among fifteen external risks, only three risks are written in CGC. Two risks are allocated as same as the FIDIC contract as sharing risk. The other one has unclear risk allocation clauses. Unexpected bad weather, health and negative effects by surrounding environment are allocated in the same risk allocation in both contracts. However, unforeseeable site condition is allocated unclearly in the CGC. In addition, other important economic and legal risks are missing in the CGC.

In general, while the FIDIC contract allocates most of these risks to employers, the CGC indicates unclear risk allocation. The CGC gives right to employers on making decisions about risk allocation. Other risks beside these two categories are allocated similarly between these two contracts. In addition, while the CGC normally provides shortly about risk allocation, the FIDIC contract provides more detail and processes of work in more foreseeable condition.

Table 5.1: Risk allocation in CGC and in FIDIC contract

	Internal Risks	FIDIC Clauses	CGC Clauses	Risk Allocation	
				FIDIC	CGC
Contractors	Work termination for convenience	15.2.b	47, 48.1.a,	C	C
	Breach of contract	1.12,4.1	47,48.1.c	C	C
	Contractors financial problem	15.2.e	48.1.b	C	C
	Act against the country law	1.13,6.4	38	C	C
	Electrical, water, and other facility supplies for project	4.19	No	C	No
	Unclear or lack of contractor's work warrantee.	11.1	18,36	C	C
	Health or safety effect or any negative effects in and around a site	4.1,4.8,4.18, 4.22, 4.23,6.6,6.7,6.11	6,7,13,1 4, 17, 16.2, 24.1.a	C	S
	Poor quality and incompetence of contractor	4.1,4.7,4.9,6.8, 6.9,7.1, 8.1,8.2,9.1	4, 5, 10, 15,23, 27, 31, 32,45.2	C	C
	Contractors fail to examine site and its surrounding environment	4.10	No	C	No
	Remedy the defect within the reasonable time	11.1, 11.3,11.4	34,35	C	C
Employers	Cost of using employers' equipment.	4.20	No	C	No
	Safety while operating or using employers' equipment	4.20	No	C	No
	Delayed payment to contractors	14.8,16.2 (c)	45.2	E	E
	Work termination for convenience	15.5	No	E	No
	Improper work suspension	8.8,8.9	No	E	No
	Late in approving documents	3.1	42.1(j)	E	N

	Changes in work	8.4 (a), 12.4, 13.3	26	E	S
	Lack of project information	1.8,4.10	No	E	No
	Delay in obtaining sites access	2.1	21, 42.1(a)	E	N
	Breach of contract	16.2	42.1(g), 42.1(i), 42.1(k)	E	N
	Act against the country law	1.13,6.4,17.5	24.1(a)	E	E
	Sudden bankruptcy of employer	16.2	No	E	No
	Delay in solving disputes	20.3,20.4	49	S	S
Engineer	Defective designs	3.1, 17.3	No	E	No
	Deficiency in drawing	4.7, 17.3	24.1(b)	E	E
	Design document is not issued on time	1.9	42.1(c)	E	N
Subcontractors	Poor performance of subcontractors	4.4,5.1,5.3	No	D	No
	Problem between main contractors with subcontractors	4.4,5.1,5.3	No	D	No
Others	Delay in material supply	4.16	No	C	No
	Unclear or lack of material warranty from supplier	7.7	No	C	No
	Unclear material specification	7.2	No	C	No
	Obtaining approval or consent from relevant authority	1.6, 2.2, 14.1, 17.5	22	S	S
	Insurance responsibility	18.1	14	S	C
	Corruption in projects	15.2	48.1.d	C	C
	Problems between contractors and other contractors	4.6	12, 42.1(b)	C	N
	External Risks	FIDIC Clauses	CGC Clauses	Risk Allocation	
				FIDIC	CGC
Natural Risks	Unexpected bad weather	17.3.h, 17.4, 19.1(v), 19.4	14.1, 36.2, 46	S	S

	Unforeseeable site condition	4.12	42.1.(e)	S	N
Political and Social Risks	War threat	17.3.a	24.1.b, 46	E	S
	Public disorder	17.3.c	No	E	No
	Criminal acts	17.3.b	No	E	No
	Conflict due to different in culture, theft and vandalism	4.22, 17.2	No	C	No
	Public authority requirement for temporary stop the work	8.5	No	S	No
	Munitions of war and explosive materials	17.3.d, 17.4	No	E	No
	Fusil	4.24	No	S	No
Economic and Legal Risks	Labor forces dispute	6.11	No	C	No
	Change in laws	13.7	No	E	No
	Inflation or currency fluctuation	13.8,14.15	No	S	No
	Shortages in material availability	4.1, 6.1, 8.4.d	No	S	No
	Shortages in manpower availability	4.1, 6.1, 8.4.d	No	S	No
	Shortages in equipment availability	4.1, 6.1, 8.4.d	No	S	No

Abbreviation • C: Contractors • N: Not clear risk allocation • S: Share
 • E: Employers • No: No risk clause • D: Discussion

CHAPTER 6

PROPOSAL OF RISK CLAUSE IMPROVEMENT IN THE CAMBODIAN GOVERNMENT CONTRACT FOR ROAD CONSTRUCTION PROJECTS

Risk clauses that are going to propose for their improvement are in the purpose of responding to risk factors effecting to public road construction projects in Cambodia. Therefore, the word “risk” used in this chapter refers to risk factors. Contract clauses, in the current general condition of CGC, shall be kept, added or modified based on the verifications of current contract clauses descriptions with problems happening related to each risk. Additional and modified clauses are considered based on FIDIC risk clauses. Current risk clauses will be kept unchanged if there is no problem happening related to them. In contrast, if risks happen in projects, but no contract clause is written about those risks, additional risk clauses should be added to the existing Cambodian government contract in responding to current problems happening in the projects. If there is no problem caused by any particular risks, additional clauses are not necessary to include in the contracts because it can avoid harm to business relationship caused by complex contract condition. Problems of risk occurring in the projects are indicators for risk modification. Problems will be checked whether clauses can deal with problems happening or not. If they are not able to handle the problems, clause modification should be included for responding to problems happening in projects by using FIDIC clauses as a reference. Lack of detail in contract clauses can be one of the reasons of non-effective risk clauses.

6.1. Unchanged Contract Clauses in the Cambodian Government Contract

If risk clauses existing in the contract but do not occur in projects, they are recommended not to modify. Among all risks caused by contractors, some risk clauses are in this category which do not need any modifications. These risks are shown in Table 6.3.

Some risks caused by employers are written in CGC, but they rarely happen in projects, and if they happen, they have low impact to projects. These risk clauses are not recommended to change since these changes have no effect to Cambodian road construction projects. These risk clauses includes the clauses 21 and 42.1.a. about Delay in obtaining sites. The respondents mention that most of contractor never start working late, but some contractors start to work too early. The clauses 42.1.a, 42.1.g, 42.1.l and 42.1.k about breach of contract by employers are not required any modifications since this risk never happens in projects. Act against the country law is a risk that is not considered as an important risk because it rarely happens, and the previous case occurring of this risk did not affect much to projects. Therefore, these clauses are not necessary to be modified in the contract. In according to the clause 49 of the CGC, it provides methods for solving disputes in projects between contractors and employers which are not much different from what are described by FIDIC contract clauses. In addition, due to non-important risk in projects, this clause in the CGC is not necessary for any modifications.

Not many risks caused by engineers are written in both the FIDIC contract and CGC. Deficiency in drawing is mentioned in the clause 24.1.b and late in issuing design document by the engineers is written in the clause 42.1.c of CGC. However, these two risks are not considered as critical risks due to their low probability of occurring and impacts to projects. Therefore, these risk clauses are not necessary to be changed in the contract.

Material quality is mentioned in the clauses 15 and 16 of CGC. Since there is no problem about material quality existing in road construction projects in Cambodia, it is not necessary to modify these two clauses. Some risks related to materials are not written in the contract, unlike the FIDIC contract such as delay in material supply, unclear or lack of material warranty from suppliers and unclear material specification. However, they don't cause any impacts to projects, so they are not necessary to include in the contract.

Insurance responsibility is needed to prevent any potential accidents and damage during work execution. Insurance shall be bought from insurance companies for any risks which are difficult to control by either parties. The clause 14 of the CGC states that insurance is the responsibility of contractor. This clause is specified about unavoidable accidents or damage. Contractors shall be responsible for these problems such as damage of equipment and materials caused by force majeure and any accidents which might harm lives and injure people during work execution. Due to respondents, there are not frequent and serious problems caused by insurance responsibility. Therefore, this risk clause shall not be changed.

External risks are less written in the CGC compared to the FIDIC contract, but comparing to problems caused by external risks impacting to projects, only few risks are missing. Public disorder, criminal acts, conflict due to different in culture, theft and vandalism, public authority requirement for temporary suspending work, labor forces dispute, change in laws and fusil are external risks that are not normally happen in projects. Even they do not exist in the CGC, these risks are not necessary to include in the CGC.

6.2. Additional Contract Clauses to the Cambodian Government Contract

6.2.1. Internal Risk

Facility supplies such as electricity and water are necessary for work execution. Water is critical materials which is difficult to find in rural area. Moreover, electricity is expensive. Due to these reasons, this risk impacts to cost and time of project in supplying water and electricity to projects. However, this risk is not written in the CGC. Depending on the FIDIC clause 4.19 about electricity, water and gas, besides allocating this risk to contractors, this clause gives more instructions to contractors. It shall include detailed quantity and cost of water or electricity which are available at site, and contractors is allowed by employers to use. A detailed table of quantity and cost shall be given specifically. Consumed quantities and the amount of such services shall be agreed or determined by engineers. These descriptions provide contractors a clear process to do more than just risk allocation.

Lack of project information normally results in contractors' problems in estimating quantity of work and project implementation. This risk is caused by the lack of project studies, unclear method statements from employers, no sources of project data or difficulties in conducting project studies, rush in project commencement due to political issues and lack of cooperation between contractors and engineers. In responding to this problem, the clause 4.10 about site data should be added into the CGC. This clause allocates this risk to employers. Employers shall provide related data such as sub-surface and hydrological condition at sites, including environmental aspects to contractors. However, contractors shall be responsible for interpreting all such data. Furthermore, contractor shall be deemed to have inspected and examined sites and the surrounding areas. This information can let contractors to have enough information in predicting risks, contingencies and other circumstances which may influence or affect tender work. In short, this risk is stated by this clause to be shared between both parties which can appropriately respond to problems happening in projects as well as the perception of both parties in responding to this risk. However, this risk clause might not be appropriate in responding the problem in rush in project commencement due to political effects. This issue is difficult to be controlled by risk allocation clause in contracts. Therefore, in order to avoid the effects of this risk in the future, contractors shall be better to avoid this kind of risk by not involving in the projects in such conditions.

Some clauses related to risks caused by employers should be added because these risks are noticeable in projects, but they are not written in the contract. Work suspension caused by contractors' changes of work often happens in projects. In addition, some of changing work in the Cambodian road construction projects are due to employers' purposes. Even this risk happens in current projects, there is no clause in the current CGC mentioning about this issue.

Due to the FIDIC contract, the clause 8.8 covers the risk of work suspension by engineers' instruction. This clause describes the right of employer to suspend projects at any times as needed by giving contractors proper reasons of suspension. In addition, during this work suspension, contractors shall store, protect and secure works against

any deteriorations, losses or damage. This clause should be added in the CGC to respond to the problems caused by work suspension. The clause 8.9 about consequences of suspension is another recommended clause. It gives right to contractors to claim for extra cost and time extension if contractors do not make any mistakes in taking care of works mentioned in the clause 8.8. However, contractors cannot get any compensations, if this suspension is caused by contractors' faulty designs, workmanship or materials. This point should be added to the CGC for responding to the problem of project suspension caused by the contractors. The clauses 8.10 and 8.11 provide work process to deal with payments process for plants and materials on the condition which there are the events of work suspension. It additionally provides way to prolong suspension, respectively. These two clauses can be shortened for the main points and added in to the contract.

Lack of project information is one of the most frequent problems which happen and impact to project objectives. Due to this reason, it is necessary to have contract clauses that can minimize impact of this risk. The clauses 4.6 and 4.10 of the FIDIC contract are considered to be effective to cover this risk. The clause 4.6 of the FIDIC contract requires employers to have good cooperation with contractors in facilitating contractors' studies and work execution. Moreover, the clause 4.10 of the FIDIC contract requires employers to provide all necessary information about construction sites to contractors for work estimation and work execution.

One risk caused by engineers that occurs in projects is defective designs. Defective designs are due to low quality of designers in providing good designs. Design error is possible to happen and affects project objectives even though it does not happen frequently. The clause 3.1 of the FIDIC contract describes briefly about engineers work and responsibility in projects. Moreover, the clause 17.3 of the FIDIC contract aims to allocate this risk to employers because engineers work as the representatives for employers. This clause, more or less, can be indicated clearly about the responsibility of employer to any effects caused by insufficient designs and design documents. Therefore, they are preferred to add in the contract for clear risk and risk allocation clause.

Poor performance of subcontractors is a noticeable problem in public road construction projects under the support of government budgets. Engineers report that some subcontractors do not work properly to satisfy requirements of work. However, the clauses related to subcontractors are not found in the CGC. Due to this reason, one part of the clause 4.4 of the FIDIC contract which is described about the allocation of this risk to contractors shall include in the CGC.

In other way, the clauses 5.1 and 5.3 of the FIDIC contract describes other options of subcontractors who is nominated by employers. The clause 5.1 gives definition of nominated sub-contractors by employers. If this case happens, nominated subcontractors' mistakes will be under the responsibility of employer. Moreover, the clause 5.3 also provides the procedures of work that contractors and nominated subcontractors shall work together, especially payments to nominated subcontractors. This payment must be approved by contractors. This procedure can let contractors to control nominated subcontractors and avoid careless work of nominated subcontractors. The clause related to nominated subcontractor should be a particular condition that shall be used only for projects which are involved by nominated subcontractors.

Since subcontractors is currently allowed to involved in public road construction projects, problems caused by subcontractors might happen due to lack in coordination between contractors and employers. Thus, this clause related to subcontractors from FIDIC shall be added in the CGC.

6.2.2. External Risk

Only few external risks are included in the CGC. However, other external risks are reported by the respondents as concerning risks that should be added in the contract. Among all categories of external risks, some of natural, political and social risks are not included in the CGC. However, they are not necessary to add in the contract because they rarely happen or are not strongly impact to projects. There are not any critical legal risks which are required clause modification or additional risk clauses. Explosive material is a social external risk that negatively affect projects, but it is not found in

the Cambodian contract. Only risks of war and radiation are mentioned in the CGC. In addition, while most of economic risks are critical in projects, they are not written in the contract. All of these conclusion will be described briefly.

Munitions of war and explosive materials are social risks that shall be checked with the FIDIC clauses. Munitions of war and explosive materials are the result of long time of civil war in Cambodia. This explosive materials are often met in Cambodian road construction projects, especially when projects are located in rural area. As the result, it can cause damage and safety effects. The clause 24.1.b of the CGC about employers' risks is written only the risks of war and radiation without mentioning about explosive material. In the FIDIC contract clause 17.3(d), this risk is indicated as employers' risk. It can allow contractors to claim for cost compensation and time extension from employers. Since explosive material is a risk which often meets in projects especially projects located in the past battle zones, the FIDIC contract clause about this risk shall be added in the CGC. In addition to the clause 17.3(d), the clause 17.4 of the FIDIC contract describes the consequences of this risk which can result in cost and time compensation. Thus, they are recommended to add in the CGC.

The clauses 13.8 and 14.15 of the FIDIC contract should be added in to the CGC to cover risks caused by inflation and currency fluctuation for contractors' benefit. The clause 13.8 of the FIDIC contract aims to adjust cost. This adjusted cost is due to the rise or fall in the cost of labor forces, goods and other inputs to works by the addition or deduction of cost determined by a formula. In addition, the clause 14.15 of the FIDIC contract provides the description of currency that should be used for payments. This clause also provides condition to deal with the problems of change in currency rate which is the problems existing in the Cambodian projects. These two contract clauses can be good enough for balanced risk allocation of inflation and currency fluctuation because cost can be both deduced and added due to exact economic situation which is unforeseeable by both parties.

Availability of manpower, materials and equipment should be covered by the clause 8.4 of the FIDIC contract. By the way, the clause 4.1 indicates contractors' obligation to supply manpower, equipment and materials in any possible ways to work. However

in the case of unforeseeable shortages of the availability of personnel or goods caused by epidemic or governmental actions, the clause 8.4 aims to share this risk to both parties. This clause gives contractors time extension for such condition. Thus, this clause shall be added in the CGC for fair risk allocation.

6.3. Risk Clause Modification in the Cambodian Government Contract

Some internal risks caused by contractors are required to check specifically for their sources and impact of risk because they exist in the contract clauses, but problems still happen in projects. This means that problems might not be possible to cover by contracts or they cannot be solved by just including them in contract clauses. This checking aims to know the possibilities of current contract clause to solve the problems through their risk allocation clauses. Then modification of contract risk contract clauses is proposed based on the concept of balanced risk clause allocation from FIDIC for those risk factors which are possible and beneficial to cover by the contract. For those risks factors that are impossible to cover by contract clauses, discussion will be provided.

Financial problems are frequent problems of local contractors that normally happen in big public road construction projects. In the clause 43 of the CGC, retention 10% of total project cost is taken out of payments to contractors to prevent the effect of contractor financial problems to project. In addition, due to the clause 48.1.b, in the case of contractor's bankruptcy, employers shall consider in terminating projects 30 days after giving notices to contractors about this issue. Not different from CGC, in the clause 15.2 of the FIDIC contract, contractors' bankruptcy can lead to project termination. As a conclusion, the CGC is mentioned enough on allocation of this risk. Moreover, when looking deeply to the reason of this risk happening, late payment to contractors is a main reason of contractor financial problems in projects. Therefore, this contract cannot be terminated by employers, but work might be suspended if contractors have no ability to solve this financial problem. In order to avoid problems caused by this risk, delay payments to contractors should be solved, and it will be discussed in the risk of delay payments.

In addition, besides contractors' bankruptcy, some contractors face with financial problems at the beginning of project execution while contractors do not receive any payments. This problem can cause late in starting work. Since this problem is due to contractors, contractors shall take responsibility. Contractors shall prove employers their financial capacity to support the work during the initial stage before getting first payment.

Even the CGC is written about issues related to the acts of contractor against the country laws; it does not respond to problems occurring in projects. While the clause 38 of the CGC is written for instructing contractors to pay tax, problems in projects are acts of contractor in using local people's lands without permission and effects of project to heritage areas. The FIDIC clause 1.13 about compliance with Laws is mentioned this issue very short but enough to cover the problems. It is written in general that contractors shall comply with applicable Laws of the country in completing contracts. This clause alone can cover the two problems happening in projects by judging of contractor's faults based on what has been written in Cambodian laws. In addition, the clause 6.4 of the FIDIC contract specifies more clearly about necessity in applying the labor law to projects. More than the clause 38 of the CGC, the FIDIC clause 17.5 about intellectual and industrial property rights is mentioned more about obligations of contractor and employers for any patents, registered designs, copyrights, trademarks, trade names, trade secret or other intellectual or industrial property rights relating to works. However, these are not problems used to happen in projects which requires to mention in the contract.

Frequent problems of health or safety effects in and around road construction sites are traffic jams, traffic accidents, air and noise pollution to surrounding environment especially to passengers and local people living along road construction sites. This risk is taken much attention through many risk clauses in the CGC such as the clauses 6, 7, 13, 14, 16.2, 17. These clauses are written clearly and similarly with the FIDIC clauses about this risk by allocating this risk to contractors. Due to these clauses, contractors have obligations to have good regulations and actions to keep working places safe and clean. In addition, contractors are required to be responsible for any effects to lives

and health of people in and around construction sites caused by work execution. However, the clause 24.1.a of the CGC is written about other condition of safety and health effects due to the necessities of work or the employers' mistakes acting against the laws or regulations. This risk due to this condition is allocated to employers. Even the problems caused by this risk are mentioned, there are many complaints of contractor who have low capacities in solving these problems in according to contracts. However, in according to contractors, in Cambodia, it is difficult for contractors to work alone in solving the problems of traffic jams along road construction sites, especially in rush hours in Phnom Penh. Contractors prefer cooperation from the government especially local authorities and also passengers to involve in solving the problems of traffic jams. Thus, this issue does not require any clause improvement in contracts, but it requires good cooperation from employers and local authority to solve the problems for passengers and people living around construction sites.

Poor quality of contractor is a concerned problem in public construction projects. Many clauses in the CGC as shown in Table 5.1 are directly and indirectly indicated about the quality of contractor's work. These clauses in CGC aim to put contractors in the obligations of finishing projects on time with the good quality of work and cost saving. These clauses aim contractors to have on-time project completion, quality of labor forces and materials, specifications that must be followed, and the procedures of work in order to achieve good quality of work and finish work on time. However, comparing to problems happening in projects, two problems cannot be covered by these clauses.

Poor quality of contractor can be partly caused by lack of competition in selecting qualified contractors and poor quality of contractor in working caused by rush work completion. This rush work completion is due to effects of political issues. These two problems cannot be controlled by the existing clauses. By comparing to the FIDIC contract clauses, many clauses are also mentioned in the purpose of promoting good quality of contractor's work to finish projects on time with cost saving. These clauses of the FIDIC contract are impossible to cover the two problems happening in projects. According to public officers, these two problems should be solved by other ways

besides using contracts. Procurement practice should be improved and strengthened in selecting good contractors with good quality of work. In responding to this issue, the numbers of competitive biddings involving by private sectors is increasing with stricter selection criteria and processes. Poor quality of contractor is expected to decrease through this change of procurement policy. In order to solve the second problem, contractors should avoid accepting projects which are required to start and complete rapidly, if contractors do not want to face with difficulties and take responsibility of this risk. It will be more difficult for contractors to manage this risk than to avoid it since they are unforeseeable and difficult to negotiate about these issues with government sectors who can be really affected by politic.

In order to achieve the good quality of work, contractors shall have enough qualified staffs. However, in according to contractors, contractors' labor forces and staffs are not qualified enough comparing to work load, especially local contractors. The clause 10 of the CGC is written to require contractors to have enough qualified staffs with enough experience to work in projects. In addition, this clause also describes the right of engineer to change and approve to accept contractors' personnel who take role in projects with indication of appropriate reasons. Comparing to the FIDIC contract, the clauses 6.8 and 6.9 of the FIDIC contract are mentioned not different from the CGC. These clauses instruct contractors to have enough numbers of qualified, skilled and experienced staffs to involve in work. The right and procedures of engineer to replace contractors' staffs are also presented. However, the FIDIC contract provides some exact reasons that employers can use to remove contractors' staffs. These reasons should be included in to the CGC in order to have a clear description on condition that contractors' staffs should be removed. When clear reasons can be found about such this risk in contracts, disputes possibility might be decreased.

Among all of internal risks caused by employers, some risks shall be checked in detail about the sources of risks for modification. However, some sources of risks might not be possible to cover by contracts if they are due to government policy. Due to these two reasons, discussions are required for some risks such as delay payments, employers late in approving documents for contractors and changes in work.

Delay payment is a critical risk which frequently happens in public road construction projects. Four main sources of this risk are contractors late in submitting claim documents, long processes of approving payments, lack cooperation between contractors and employers in payment process and limitation of government budgets. Related to the first reason, both contracts have been mentioned procedures for contractors to do in requesting payments. Thus, these problems are the problems of contractor themselves that cannot prepare documents on time. However, it is not the main reason of delay payments. The second reason is due to the ineffective policy of work in the public Ministries in Cambodia. However, both contracts are mentioned about cost compensation that contractors can get due to the duration of delay payments of employer, so contractors can use this clause to claim for cost compensation. Not much different from the first reason, for the third reason, both contracts provide enough procedures for both parties to do in payment processes. So if either party acts wrong comparing to this process, it is the responsibility of that party. The fourth reason is an internal government policy in preparing their finance. However, if delay payments occur caused by this limited budgets, employers shall pay contractors cost compensation due to late payments as stated in contracts. Looking through problems and all related risk clauses in the CGC, risk factors are already covered by the clauses. Thus, it can be assumed that problems occurring is not due to lack or unclear contract clauses in contracts, but it is due to ineffectiveness of contract practice in projects.

Late in approving documents requested by contractors really affect the time of project completion due to the long processes for approving in the Ministries. In the CGC, late in approving of contractor's documents is little mentioned. It mentions about delay by employers in approving contractors' requests for payments without including the reasons of delay in the clause 42.1(j). Problems of this issue is about policy in working in the Ministries that cannot be improved by contract clauses. However, processes of approving are improving and shortening now in the Ministries. The problems of corruption in projects are mentioned in the clauses of corruption. Furthermore, the

clause 44 of the CGC is also written by describing schedules for final payments, so clause modification is not required for approving payment.

Approving can be approving of changes and approving of payments. Clear schedules and processes of approving changes are written clearly in the clause 13.3, and payments are written in the clauses 14.6 and 14.13 of the FIDIC contract. There is no clause described about the change processes in the CGC.

One purpose of employer's change of work is to avoid problems and accelerate the processes of work. Changes of work caused by these reasons is mentioned in both the CGC and FIDIC contract. The clause 26 of the CGC is written about employers' requests to contractors for finishing work before the date that has been specified in contracts. However, contractors can accept or do not accept this request. Thus, it is contractors' responsibilities, if problems happen caused by this work acceleration. Long processes of approving changes of work is another issue of this risk which will affect strongly to the time of project completion. However, this risk clause cannot be found in the CGC. In the clause 13.3 of the FIDIC contract, changes can be done in a process which is specified in an exact schedule. By the way, this risk clause about this issue in the CGC cannot be used for minimizing this risk effects to projects. Long processes of approving changes are due to work policy in the Ministries that should be improved. Engineers shall issue method statements to contractors for work execution.

Unclear method statements can cause contractors failure to plan work and result in change of work. No clause in the CGC is stated about this problem. In the FIDIC clause 8.3 program, contractors shall submit to employers all related documents of contractor's work, sequences and timing of inspections and tests, methods of construction in the major stages with estimated work inputs for each major stages. This clause also provides a set of sequence that both parties shall involve in implementing this clause. Therefore, this clause is preferred to add in the CGC for clearer work program to avoid changes in work caused by unclear method statement.

Beside risks caused by both parties, risk checking and modification are also done for risks caused by third parties or risks caused by poor cooperation between both parties.

They shall be checked for modification because even they are found in the CGC, these risks can still negatively affect projects without appropriate risk allocation clauses in contracts. These risks are related to late of approval by public authority, corruption in projects and problems between contractors and other contractors.

Obtaining approval from relevant authorities are necessary for some particular works. Both the CGC and the FIDIC contract are mentioned about this risk. The Clause 22 of CGC puts employers in obligations to help contractors for getting approval from relevant authorities, if there are any requests from contractors. The FIDIC clause 2.2 is mentioned not differently from the CGC clause about employers' obligation in providing reasonable assistance to contractors at the requests of contractor in getting approval from authorities. However, problems still exist in some projects due to late in approving by local authority. In according to engineers, even the Ministry of Public Works and Transports tries to help contractors in fastening approval from local authorities, late approval can happen due to political issues and poor administration work of local authorities. Thus, the clause 22 of the CGC can affect employers. It requires employers to help contractors getting approval from local authority. However, local authority himself is normally late in giving this approval. This source of problem is an external effect to public road construction projects in Cambodia.

Corruption in projects is a concerned risk in public road construction projects. Both the CGC and FIDIC contract have mentioned about this issue in their risk clauses. The clause 48.1.d of the CGC allows employers to terminate contracts, if employers find out that contractors make any corruptions in projects. Not different from the CGC, the clause 15.2 of FIDIC contract allows employers to terminate contracts in the same way as what has been mentioned in the CGC. However, the FIDIC contract provides clearer descriptions about corruption definitions in projects. Corruption is defined as actions of contractor to give or offer to give to any persons any bribes, gifts, gratuities, commissions or other things of value. These actions are done in the purpose to do or forbear to do any actions in relation to contract or for showing or forbearing to show favor or disfavor to any persons in relating to contracts. This clause does not affect only contractors, but also all contractors' personnel or subcontractors. Looking

through the causes of corruption in projects, corruption is done in the purpose of getting projects and having good cooperation between contractors and employers. By the comparison of the FIDIC contract and CGC and problems occurring in projects about corruption, clearer definitions of corruption in the FIDIC contract should be added in the CGC. However, this additional definition is useless if government do not strengthen anti-corruption policy and practice in public procurement. In other word, this risk shall be more affective to be covered by strengthening work transparency in public procurement work rather than improving contract clauses.

Corruption is also possible to happen in contractors' organizations. Corruption happens in contractors' organizations in the processes of recruitment staffs. Unqualified staffs might be recruited, and their poor performance might negatively affects projects. However, this issue shall not be covered by corruption clauses because it shall be already implied by risk clauses related to contractors' poor performance caused by the poor quality of contractor's staffs.

Projects, especially road construction projects, might be involved by more than one contractors. All contractors in projects are required to have good cooperation and support each other for work execution. This is what both contracts are written in their contract clauses. However, while the FIDIC contract is mentioned in short about cooperation that should be done between a contractor and other contractors working in a project, the CGC provides more description on how a contractor should do to support other contractors in work processes. Moreover, the CGC provides compensation to contractors for any requests of engineer to a contractor in order to help other contractors. By these comparison and verification with problems occurring in projects, CGC clauses are enough to cover the problems. Furthermore, due to a contractor, this risk rarely happens and does not impact much to projects. As a conclusion, this risk clause is preferred to keep in the CGC without any modifications.

Table 6.1: Sources of internal risks

Internal risks	Sources of risk				
	Project level			Contractors' Organization	Public Agency
	Contractor	Employer	Third party		
1. Delay payments	√	√			√
2. Work suspension	√	√		√	
3. Changes in work	√	√			
4. Lack of project information	√	√			
5. Poor quality of contractor	√				√
6. Design problem			√		
7. Facility supplies	√				
8. Subcontractors problem	√		√		
9. Contractors financial problem				√	√
10. Corruption in project				√	√
11. Late in approving document					√
12. Quality of consultant		√			
13. Effects to surrounding environment	√				
14. Problem between contractors and contractors			√		
15. Low quality of consultant			√		

External risks shall be normally discussed in two scenarios, foreseeable and unforeseeable risks. These scenarios shall be used for considering on risk allocation because external foreseeable risks normally are allocated to contractors or employers, but unforeseeable external risks are preferred to share, based on the concept of the FIDIC contract. This risk clause improvement will be explained in different categories such as natural risks, political and social risks, and economic and legal risks. However, economic and legal risks are not exist in the CGC which shall be added, and they already discussed in the previous section about additional risk clauses.

Among natural risks, unexpected bad weather sometimes happens in road construction projects. This is the reason that most of public road construction projects are not started in raining season. Unexpected bad weather in road construction projects in Cambodia can be heavy rain, storms, especially floods which can cause projects to delay for long period of time. Related to this problem, the CGC clauses 14.1 and 36.2 require contractors to be responsible for any damage of contractor's equipment or materials caused by this bad weather. Contractors shall have cost compensation for fixing the damage occurring to completed work by unexpected bad weather. In according to the clause 46 of the CGC, if bad weather condition stays longer than 84 days, contract might be terminated by employers, and contractors can get the payments of completed works.

In the FIDIC contract, the clauses 17.3 and 17.4 are written to specify this risk as an employers' risk. In addition to the CGC, the FIDIC contract allows contractors to report engineers, all contractors' losses caused by unexpected bad weather for claiming time and cost compensation. The clause 19.4 also gives the processes of informing employers about this force majeure. The FIDIC contract isn't mentioned the cases of project termination by unexpected bad weather like the clause 46 of the CGC is written. However, based on the comparison between two contracts, the CGC is lack of descriptions about unexpected weather risk. It should be added the procedures that contractors shall inform engineers about unexpected bad weather. However, the CGC is written in more detail than the FIDIC contract about project termination caused by this risk.

Unforeseeable site condition is another natural risk. Main issue in this risk is unexpected changes of soil layers. This risk can cause mistakes in project estimation which increases the scope, cost and time of work completion. Even soil tests are done, soil layers in some areas might be much changed for a short distance. Soil tests cannot absolutely give exact information about underground condition. Soil layers can vary during long duration between project study times and project execution times. Some projects might take one to two years after project studies to start implementing. As a result, site condition might be changed and can increase or decrease the scope of work.

Due to unexpected bad weather, contractors shall be responsible for any damage of contractor's equipment and materials caused by the unforeseeable site condition, in according to the CGC clauses. Particularly, based on the clause 42.1.e of the CGC, contractors shall have cost compensation for any changes of soil layer that are difficult to estimate and unexpected to happen. However, this clause 42 gives right to employers on making decision about which party should take these responsibilities, and how much should be compensated. This clause is confusing and unfair for risk allocation. By the way, the FIDIC contract gives clear and detail definition about unforeseeable site condition in the clause 4.12.

Moreover, contractors shall give notices to engineers about this unforeseeable condition with appropriate reasons for requesting instructions from engineers. If there are any variations due instructions of engineer, contractors can claim employers cost compensation and time extension.

As a conclusion, the FIDIC contract provides clearer procedures for contractors to prove engineers about unforeseeable condition, and for engineers, the ways to verify this issue before making decisions on variations and approval determination. In contrast, the CGC gives unclear and unfair risk allocation on such of this issue to contractors by giving an advantage to employer in decision making. Contractors' claim and right of employer in making decision on the claim seems to contrast with each other. Due to these reasons, the CGC should be modified by the FIDIC contract clause in order to give practitioners clearer information related to condition and procedure in coordinating work related to unforeseeable site condition. Procedure in informing unexpected physical condition and compensation shall be modified in the CGC by following related clauses in the FIDIC contract. This modification also clarify risk allocation in this clause.

Table 6.2: External risk characteristic

	External risks	Foreseeable	Unforeseeable
Political and social risk	1. Explosive materials		√
	2. Public disorder		√
	3. Delay in obtaining approval from authorities	√	
Economic risk	4. Inflation	√	√
	5. currency fluctuation	√	√
	6. Shortages of materials	√	
	7. Shortages of manpower	√	
	8. Shortages of equipment	√	
Natural risk	9. Bad weather	√	√
	10. Unforeseeable site condition		√

6.4. Conclusion

The comparison between risk allocation clauses in the FIDIC contract with the Cambodian contract clauses and with problems occurring in projects results in additional risk clauses, risk clause modifications and risk clauses that are not required to modify. Moreover, even some risks do not present in the Cambodian contract comparing to the FIDIC contract, they are not necessary to add in the contract since they do not cause problems to projects.

Some risks are referred to add in the CGC because there are problems caused by these risks, but there are not any clauses related to them in the contract. Clauses related to these risks in the FIDIC contract are used as references for proposing new clauses in the CGC.

For risks that are allocated differently between the CGC and the FIDIC contract, clause details are checked. Problems happening in projects are indicators in this checking. Different or unclear risk allocation clauses are modified due to the FIDIC contract clauses, otherwise they can make readers confusing about risk allocation and cannot cover problems happening in projects.

Even some risks are allocated in the same way in both contracts, problems still occur from these risks, so further details shall be checked for special condition and details of current clauses related to problems occurring. Some risks shall be taken attention especially in contracts. However, some risks or parts of them are difficult to be covered by contracts when they are related to government policies. Delay payments, changes in work, delay in obtaining sites, late in approving document are risks that really affect to the time of project completion, but they are difficult to deal by contract clauses because they are caused by long and complicating levels of approval in the two Ministries. Some risks such as work suspension, delay in obtaining the site, contractors financial problem and corruption in project, are somehow caused by private contractors' internal problems. These issue can be indicated from contract clauses in the section of contractor's responsibilities. In addition, some internal risks such as lack of project information, poor quality of contractor, design problems, and facility supplies occur due to external factors, so they shall be carefully considered on responsible parties or sharing to both parties.

All external risks come from the effects of environmental, political, social, and economic issues. They cannot be controlled by either parties. They can be categorized into two groups, foreseeable and unforeseeable risks. This dividing provides idea on how to allocate these risks. Based on the FIDIC contract concept, foreseeable risks shall be allocated to contractors or employers, and unforeseeable risks shall be shared. Delay in obtaining approval from authorities, pollution or bad effects from surrounding, shortages of materials, manpower and equipment are foreseeable risks that shall be allocated to contractors because contractors can realized them during bidding stage. Moreover contractors can estimate an appropriate bidding cost by including contingency that is proper to cover these risks. Explosive materials, risk caused by public authority, public disorder, inflation currency fluctuation and unforeseeable site condition, are external risks found to be unforeseeable by both parties that should be shared. Furthermore, bad weather can be somehow foreseeable and unforeseeable, so it shall be allocated differently based on the condition of this risk in projects.

Table 6.3 shows all the proposed risk clause improvement guideline for the general condition of public road construction contract under support of government budgets.

This proposed contract clauses are appropriate to use with public road construction projects under the supports of government budget and under the responsibility of the MPWT. In Cambodia, even there are public road construction projects in the MRD, this guideline is not appropriate to use in such of these projects. The MRD is responsible for public rural road construction projects, while the MPWT is responsible for public road construction of national roads and roads in the city area. Projects in these two ministries might have different project characteristics as well as risks occurring in these two projects due to different surrounding environment and size of work. Thus, this proposed contract improvement might not respond to some particular risks in the projects in the MRD.

Furthermore, different ministries might have different policy and practice in working. These differences will result in different ways to form construction contracts because construction contracts for any particular projects shall be appropriate with the practices in these projects. Thus, this guideline might need another modification in according to the current practice in the MRD, if this guideline is aimed to use for public road construction projects in the MRD.

Table 6.3: Proposed improvement for public road construction contract under support of government budgets

	Internal Risks	Proposed contract Improvement	Detail of proposed contract improvement
Contractors	Work termination for convenience	NC	Current clauses shall not be changed
	Breach of contract	NC	Current clauses shall not be changed
	Contractors financial problem	CP	<ul style="list-style-type: none"> Contractors' financial preparation before starting work shall be added in the contract.
	Act against the country law	CP	<ul style="list-style-type: none"> Clause 1.13 of the FIDIC contract clause shall be added
	Electrical, water, and other facility supplies for project	A	Clause 4.19 of FIDIC shall be added
	Unclear or lack of contractor's work warrantee.	NC	Current clauses shall not be changed
	Health or safety or negative effects effect in and around a site	CP	<ul style="list-style-type: none"> Cambodia contract is mentioned enough about this issue. Problem might be decrease when there is cooperation from local authority.
	Poor quality and incompetence of contractor	CP	<ul style="list-style-type: none"> FIDIC clause 4.4, 5.1 and 5.3 related to subcontractors FIDIC clauses 6.8 and 6.9: employers' right in requesting for contractors' staff changing by including the reasons which can lead

			to these requests shall be added
	Contractors fail to examine site and its surrounding environment	A	Clause 4.10 of FIDIC shall be added
	Remedy the defect within the reasonable time	NC	Current clauses shall not be changed
	Cost of using the employers' equipment if employers lend employers' equipment.	NA	This risk clause is not necessary
	Safety while operating or using the lending employers' equipment	NA	This risk clause is not necessary
Employers	Delayed payment to contractors	CP	<ul style="list-style-type: none"> Problems of this risk is due to ineffectiveness of contract practice not contract clause.
	Work termination for convenience	NA	This risk clause is not necessary
	Improper work suspension	A	Clauses 8.8 and 8.9 of FIDIC shall be added
	Employers late in approving documents for contractors	CP	<ul style="list-style-type: none"> Clause 13.3 of FIDIC related to process of change of work shall be added
	Changes in work	CP	<ul style="list-style-type: none"> Clause 8.3 of FIDIC contract about work program that contractors shall submit to employers shall be added in the contract. Clause related to involvement of employer in project study shall be added in the contract.
	Lack of project information	A	Clauses 4.6 and 4.10 of FIDIC shall be added

	Delay in obtaining sites access	NC	Current clauses shall not be changed
	Breach of contract	NC	Current clauses shall not be changed
	Act against the country law	NC	Current clauses shall not be changed
	Ambiguity or not understandable contract clause	NA	This risk clause is not necessary
	Sudden bankruptcy of employer	NA	This risk clause is not necessary
	Delay in solving disputes	NC	Current clauses shall not be changed
Engineers	Defective designs	A	Clauses 3.1 and 17.3 of FIDIC shall be summarized added
	Deficiency in drawing	NC	Current clauses shall not be changed
	Design document is not issued on time	NC	Current clauses shall not be changed
Subcontractors	Poor performance of subcontractors	A	Clauses 4.4, 5.1 and 5.3 of FIDIC shall be added
	Problem between main contractors with subcontractors	NA	This risk clause is not necessary
Others	Delay in material supply	NA	This risk clause is not necessary
	Unclear or lack of material warranty and specification from supplier	NA	This risk clause is not necessary
	Obtaining approval or consent from relevant authority	CP	<ul style="list-style-type: none"> Risk clause is not necessary to this risk because the current contract is mention enough for obligation of contractor and employers, but problems occur is due to authority. Therefore cooperation from public

			authority is necessary than contract clause improvement for solving problems caused by this risk.
	Insurance responsibility	NC	Current clauses shall not be changed
	Corruption in project	CP	<ul style="list-style-type: none"> Detail definition of corruption from the clause 15.2 of FIDIC shall be added for clearer clause in the CGC.
	Problems between contractors and other contractors	CP	<ul style="list-style-type: none"> Current clauses give enough detail more than what the FIDIC has included. Problem of this risk may be due to efficiency of contract practice.
External Risks		Proposed contract Improvement	Detail of proposed contract improvement
Natural Risks	Unexpected bad weather	CP	<ul style="list-style-type: none"> CGC is lack of descriptions about unexpected bad weather risk that should be added about the procedures that contractors shall inform engineers about unexpected bad weather.
	Unforeseeable site condition	CP	<ul style="list-style-type: none"> The Cambodian contract gives unclear and unfair risk allocation on such of this issue, so this clause shall be modified according to the FIDIC clause 4.12 for clear risk allocation.
Political and Social Risks	War threat	NC	Current clauses shall not be changed
	Public disorder	NA	This risk clause is not necessary
	Criminal acts	NA	This risk clause is not necessary

	Conflict due to different in culture, theft and vandalism	NA	This risk clause is not necessary
	Public authority requirement for temporary stop the work	NA	This risk clause is not necessary
	Munitions of war and explosive materials	A	Clauses 17.3(d) and 17.4 of FIDIC shall be added
	Fusil	NA	This risk clause is not necessary
Economic and	Labor forces dispute	NA	This risk clause is not necessary
Legal Risks	Change in laws	NA	This risk clause is not necessary
	Inflation or currency fluctuation	A	Clauses 13.8 and 14.15 of FIDIC shall be added
	Shortages in material availability	A	Clause 8.4(d) of FIDIC shall be added
	Shortages in manpower availability	A	Clause 8.4(d) of FIDIC shall be added
	Shortages in equipment availability	A	Clause 8.4(d) of FIDIC shall be added

Abbreviation

- A: Additional risk clause
- NC: No change risk clause
- CP: Check risk clause with problems
- NA: No additional clause is required

CHAPTER 7

VERIFICATION OF PROPOSED CONTRACT IMPROVEMENT

The proposed contract improvement guideline aim to improve the current general condition of contract. This proposed contract clauses will be more appropriate than the current one to cover risk factors happening in public road construction projects under the support of government budgets in Cambodia. This contract improvement is based on the FIDIC contract which is well known for its balanced risk allocation. Therefore, this proposed contract clauses shall be fair for all parties in projects and appropriate to use in any possible condition for both foreseeable and unforeseeable condition.

Even this proposed contract improvement is appropriate to use in according to international standard, it does not mean that it is appropriate to use in Kingdom of Cambodia. They cannot be used if they have conflicts with laws or internal regulations for public procurement or general practices of public road construction under the support of government budgets in Cambodia. The proposed contract clause improvement which conflicts with Cambodian related laws are identified, and they will not include in this proposed contract improvement. Moreover, the IRRGPP published by Ministry Economic and Finance for all public procurements will be used instead of the FIDIC contract, if they are mentioned differently for the same risk. This usage will make the proposed contract improvement to be more appropriate for Cambodian public procurement.

Furthermore, some proposed contract clauses shall be cancelled or shall be modified due to the capability of using these clauses in current practice. This verification is done through interview with experienced private contractors and public officers working in public road construction projects under the support of government budgets and lecturers specialized in construction laws and contracts.

7.1 Verification with Cambodian Related Laws and regulations

Laws and regulations in Cambodia which are related to construction and contracts are reviewed. These laws and regulations are the Civil Code of Kingdom of Cambodia published in 2003, the labor forces law in 1997, the road law in 2014 and the Implementing Rules and Regulations Governing Public Procurement (IRRGPP) in 2010.

Due to the results of the previous chapter, some risk clauses are not necessary to add or modify in Cambodian contracts because they are effective enough to cover problems happening in projects. These risks don't require modification and are not found in any laws and regulations of Cambodia. The rest of risk clauses in this category are additionally supported by laws and regulations of Cambodia.

Proposed risk clauses that are not found in all related laws and regulation can be used without any concerns of their conflicts with laws and regulations. Beside these risks, other risks that are mentioned or partly mentioned or can be implied from laws shall be checked for any conflicts to laws. Any proposed contract clauses that have conflicts with related laws are impossible to use.

Furthermore, besides checking conflicts with laws of the country, regulations from the MEF are references to use for risk clause modification. All public procurement under the support of government budgets provided by Ministry of Economic and Finance shall follow regulations instructed by this ministry. Then this checking and modification are discussed with lecturers specialized in laws especially construction laws in Cambodia. This verification will make result more confidential to use by avoiding mistakes made by author.

After checking and verification with laws, regulations as well as with law lecturers, there are not any conflicts of laws to the proposed contract clauses, but these laws are additionally support proposed contract clauses. The results of these verification and modification are shown in Table 7.1.

Related to contractors' financial problem, both the CGC and the FIDIC contract are mentioned about the possibility of contracts termination by employers if contractors

are bankruptcy. To avoid project termination caused by contractors' financial problem, part 1-5.3.c in the Appendix 3.D of IRRGPP shall be beneficial to use. This section requires contractors to give to employers evidences about contractor financial support which is available for implementing work in the first three months. This clause shall be a better for guarantee that contractors are possible to work before getting first payment. However, this issue shall be better to put in the instruction to bidder during the bidding stage.

Health or safety protection in and around sites are found to be mentioned in many clauses of the Civil Code. Clause 666 of the Civil Code is written about obligations of employer to take care and protect worker lives and health from any possible dangers in working places. Moreover, the clause 668 of the Civil Code requires employers and contractors to follow additionally to all provisions of the labor law for safety and health protection of people in and around working places. In addition to these two clauses, the chapters 8 and 9 of the labor law are written in detail about obligations of employer in taking care hygiene and safety in working places, to avoid and to be responsible of work accidents during work execution. Based on these law analyses with verification by law lecturers, these two clauses are parallel to what has been written in the current contract. Furthermore, the section 3.16. 2.7(6) of the IRRGPP is written about compensation that contractors can get if additional work is requested to contractors to do in the purpose of safety protection. This clause is better to add in the contract for clearer risk allocation. However, it is not necessary to add when there is no such of this issue used to happen in projects.

The quality of contractor's work is an important factor to consider in construction projects. Thus, many clauses are mentioned related to quality contractors' work. Many of clauses in laws and regulations are also found in relating with this issue. The clause 658 of the Civil Code is written about the reduction of contract cost if contractors cannot complete projects on the time specified in contracts. This issue is also written clearly in the CGC. However, there is no conflict between the current contract and this code. In addition, this clause gives more support to this clause. Furthermore, the sections 3.14.10, 3.15.2, 3.16.2.2 and Appendix 3D in the part 1-5.3.d of the IRRGPP

describe about procedures and responsibilities of contractor in order to provide employers good work processes, good work quality, work verification, otherwise there will be cost reduction or project termination. These statements of the IRRGPP are possible to add in the current contract for better risk allocation.

The FIDIC contract clause 4.10 is proposed to add in the CGC to specify clearer about risks related to contract's failures in examining site and its surrounding. This clause is found to be more supported by the IRRGPP in the Appendix 3D-Part 1-6. This section requires all contractors to have their own site visits during bidding stage to find out any related information for preparing and implementing work.

Change in work is a concerned problem in public road construction projects in Cambodian, but they have not been mentioned enough in the contract. Procedures and compensation due to changes of works from the FIDIC contract clauses are proposed to add in the contract. However, the IRRGPP 3.16.2 describes briefly about procedures, condition and compensation or changes of work in projects. Thus, it is prioritized to use instead of the FIDIC contract. The clause 13.3 of the FIDIC contract about late in approving changes of work is also proposed to add in the contract for clearer risk clause, and this additional clause is not found in any laws and regulation of the country. Furthermore, two problems are found to be the problems of changing work. They are unsatisfied method statement and lack of detail in project studies. In responding to these two issues, the FIDIC contract clauses related to programs that contractors shall submit to employers and involvement of employer in project studies are proposed to add in the contract. They are not found in any laws and regulations of Cambodia.

Corruption in projects is mentioned in the CGC while it is possible to happen in projects. The FIDIC contract and the CGC are both mentioned about contract termination if corruption is found, but the CGC provides shorter descriptions on corruption comparing to the FIDIC contract. Thus, the FIDIC contract clauses are proposed to add in current clauses of the CGC. By checking through the IRRGPP, the

section 1.5.6.7 of this regulation provides detailed definitions and information of corruption in public procurement, so it is preferred to use instead of the FIDIC contract.

Unforeseeable site condition is a frequent risk that is unavoidable in road construction projects. Even this clause seems to allocate to employers in the CGC as same as the FIDIC contract, the clause 42 of the CGC makes this allocation confusing because it provides right of making decision about compensation to employers. This is a reason that this clause modification is proposed for clearer risk allocation. After checking through the Cambodian related laws and regulations, the section 3.16.2.7 (5) of the IRRGPP provides a clear descriptions about compensation that contractors shall get in the case of unforeseeable soil condition which can lead to wrong project estimation and calculation. Due to this finding, this clause shall be modified based on the IRRGPP clause instead of the FIDIC clauses. This regulation aims to share this risk between both parties with clearer clause descriptions comparing to current clause, especially about risk allocation.

Table 7.1: Proposed contract clauses improvement verification with Cambodian related laws and regulations

Internal Risks	Contract clause improvement	Cambodian Laws and Regulations	Verification
Improper work suspension	Clause 8.8, 8.9 and 8.10 of FIDIC shall be added	Not Found	Not found
Contractors financial problem	Clause about retention shall be added	<ul style="list-style-type: none"> • IRRGPP 3.15.2.2. • IRRGPP 3.15.2.5 • IRRGPP Appendix 3D-Part 1-5.3.c 	IRRGPP Appendix 3D-Part 1-5.3.c should be added in contract.
Electrical, water, and other facility supplies for project	Clause 4.19 of FIDIC shall be added	Not Found	No conflict
Poor quality and incompetence of contractor	<ul style="list-style-type: none"> • FIDIC clause 4.4, 4.5 and 5.2 related to subcontractors 	<ul style="list-style-type: none"> • Clause 658 of Civil Code • In IRRGPP 3.14.10 • In IRRGPP 3.15.2 	No conflict

	<ul style="list-style-type: none"> • Clear definition of corruption shall be added • FIDIC clause 1.12 and 4.9 • FIDIC clause 6.8 and 6.9 related to contractors' staff and labor forces in project shall be added 	<ul style="list-style-type: none"> • IRRGPP 3.15.2.5 • IRRGPP 3.16.2.2 and 3.16.2.3 • IRRGPP Appendix 3D-Part 1-5.3.d 	
contract's failure in examining site and its surrounding	Clause 4.10 of FIDIC shall be added	IRRGPP Appendix 3D-Part 1-6	No conflict
Delayed payment to contractors	Compensation due to employers' late payment to contractors shall be added in the contract.	<ul style="list-style-type: none"> • IRRGPP 3.15.2.3 • IRRGPP 3.15.2.5 	No conflict
Improper work suspension	Clause 8.4, 8.8, 8.9 and 8.10 and 16.2 of FIDIC shall be added	Not found	Not found
Employers late in approving documents for contractors	<ul style="list-style-type: none"> • Clause 13.3 of FIDIC related to process of change of work shall be added 	Not found	Not found
Changes in work	<ul style="list-style-type: none"> • Clause 8.3 of FIDIC contract about work program that contractors shall submit to employers shall be 	IRRGPP 3.16.2	IRRGPP 3.16.2 should be used instead of clause 13.3 of FIDIC about the procedure, condition and compensation of

	added in the contract.		change work in a project.
	<ul style="list-style-type: none"> Clause related to involvement of employer in project study shall be added in the contract. 		
Lack of project information	Clause 1.8, 4.6 and 4.10 of FIDIC shall be added	Not Found	Not found
Defective designs	Clause 3.1 of FIDIC shall be summarized added	Not Found	Not found
Poor performance of subcontractors	Clause 4.4 and 5.2 of FIDIC shall be added	Not Found	Not found
Obtaining approval or consent from relevant authority	Risk clause is not necessary to this risk because problem cannot be covered by contract clause.	<ul style="list-style-type: none"> IRRGPP 3.16.2.7 (7) 	<ul style="list-style-type: none"> Time compensation from the regulation should be added in to contract clause to provide clear statement about this risk sharing.
Corruption in projects	Definition of corruption should be mentioned clearer in the contract.	<ul style="list-style-type: none"> IRRGPP 1.5.6.7 IRRGPP 9.1 	<ul style="list-style-type: none"> Additional description about corruption from the IRRGPP 9.1 shall be added in Contract instead of FIDIC clause
Unexpected bad weather	Clauses in FIDIC contract related to cost and time compensation due to unexpected bad	<ul style="list-style-type: none"> Not Found 	<ul style="list-style-type: none"> Not Found

		weather shall be added in contract.		
Unforeseeable site condition		Clear description about sharing unforeseeable site condition risk between contractors and employers shall be used to modify unclear risk allocation of this risk.	• IRRGPP 3.16.2.7 (5)	• Contract clauses about this risk shall be modified by IRRGPP and FIDIC contract
Munitions of war and explosive materials		Clause 17.3.d and 17.4 of FIDIC shall be added	• Not Found	• Not Found
Inflation or currency fluctuation		Clause 13.8 and 14.15 of FIDIC shall be added	• Not Found	• Not Found
Shortages material availability	in	Clause 4.1 and 8.4.d of FIDIC shall be added	• Not Found	• Not Found
Shortages manpower availability	in	Clause 4.1 and 8.4.d of FIDIC shall be added	• Not Found	• Not Found
Shortages equipment availability	in	Clause 4.1 and 8.4.d of FIDIC shall be added	• Not Found	• Not Found

7.2. Verification with Current Practice of Public Road Construction Projects in Cambodia

Verifications with current practices of road construction in Cambodia under the support government budgets is done through interviews. This interviews were conducted with 3 selected respondents. The first and second respondent are the previous respondents in the chapter 5. The third respondent is a project manager in a private company which involves much in public road construction projects using government budgets. This

project manager's role is a coordinator for all public road construction projects of her company, so she knows much about work processes and condition of work in public projects.

The respondents are required to give their agreement on the proposed risk clause improvement for both additional and modified clauses. They can agree or not agree or partly agree to the additional and modified clauses. In addition, they are asked to give appropriate reasons to support their answers. Results of this verification are summarized in Table 7.2.

Proposed risk clause about work suspension by employers' convenience is mostly agreed by all respondents to add in the contract due to balanced risk allocation concept in this clause. However, it is difficult to fix duration for the processes of getting approval on permission for suspension or duration that employers shall reply contractors in public construction projects in Cambodia. There is no policy in government procurement in fixing any durations of approving, and normally it takes long time to approve for public projects due to long and complicated approving processes.

In addition, contractors can terminate contracts 28 days after there is no reply from employers to requests from contractors for restarting work. This point is considered by the respondents to be available to use. However, in current practice, this termination rarely happens. Both contractors and employers try to avoid any project termination that can negatively affect their relationship in current projects as well as future business opportunities. Contractors prefer to get payments on completed work rather than to terminate contracts, and then agree to start working again whenever employers allow to restart working. In short, project suspension due to employers' conveniences is possible to add in the contract. Moreover, contractors shall request to employers to restart working, and employers shall reply contractors during appropriate period. Project termination due to long project suspension is considered to be possible to input in this clause. However, in practice, it is preferred not to mention because it is useless comparing to relationship and business opportunity strengthening.

Related to contractors' financial problem, all respondents agreed that contractors shall show employers financial evidences. This financial preparation shall be enough for starting work before getting payments. It is proposed by the first respondent about the amount of budget preparation that should be 10% of project cost. However, due to the IRRGPP, this description shall be mentioned in instruction to bidder during bidding stage. Therefore, it might not necessary to include it in the contract clause since it is written and implemented in bidding stage.

All facility supplies, especially water and electricity, are under the responsibilities of contractor. It is agreed by all respondents about this clause improvement. In addition, contractors is possible to use all employers' facilities available in sites. However, all respondents also agree that contractors shall pay employers for these facilities in the cost specified in contract.

Subcontractors are agreed to involve in public road construction projects. However, the third respondent refers to write this clause in short by mentioning only the obligations of employer to all subcontractors' activities, and rights of employer to request for removing unqualified subcontractors. It is not necessary for contractors to get permission from employers to choose subcontractors as mentioned in the FIDIC contract. Moreover, date of subcontractor work commencement is not required to inform employers since any problems of subcontractors that can cause time delay is already mentioned as contractors' mistakes.

All contractors' staffs and representatives can be changed if there are any change requests from employers during specific time with appropriate reasons. This contract clause is fully agreed by all respondents due to its clear, fair and acceptable for both parties to do.

In government projects, time can be extended due to variation of work from employers, but cost normally cannot be varied due to annual limited budget of government budget for every projects. This is a reason that all public construction projects under the supports of government budgets are impossible to have contingencies. In according to the second respondent who is from government sector,

duration cannot be fixed as mentioned in proposed contract clauses for approving these variations due to long process of approving project variations. This approval variations would be approved by two Ministries, the Ministry of Public Works and Transport and the Ministry of Economic and Finance. This approval requires at least one month. Particularly, contractors shall claim for time variations one month before the work completion date specified in contracts. This duration is the sum of all duration requested in the whole project time by mentioning specific reasons for each request. During this last month, government sector shall consider and approve time extension due to variation, so that contractors can extend date of project completion.

Compensation can be claimed by contractors in many reasons. However, only additional time is possible to claim when extra cost is impossible to claim. This is due to fix project cost and limited annual budgets for public projects under the support of government budgets. Risks that contractors can request compensation are risks caused by other parties, force majeure and employers' risks. However, among all proposed condition, some condition that requires cost compensation are impossible due to reasons mentioned above. They are extra tests, unforeseeable changes of site condition or explosive materials. Process of asking time extension for these risk shall follow the steps mentioned in the previous section.

Both contractors and employers shall be responsible for finding any information related to projects for project designs and project execution. This statement is agreed by all respondents to include in contracts. Employers shall provide as much as possible all information related to structures, soil condition, electrical and water systems as well as environmental condition. By the way, contractors shall also do site visits for verifying any possible information necessary for project studies and execution. Moreover, both parties shall work together and cooperate with local authorities and all related parties in studying, implementing and solving problems in projects caused by the lack of project information.

Problems caused by wrong designs, even caused by designers or caused by changes in site condition, are possible for getting time extension. However, cost compensation is impossible to claim due to the same reason mentioned above. This is a really

concerned problem that contractors have met. Contractors shall consider on how to compensate work in according to wrong in designs and changes in site condition. The other parts of proposed contract clause for this risk are agreed by all respondents.

Corruption clauses are written in short in the Cambodian general condition of contract. However, proposal on the extension of this clause is considered not necessary because it is already much mentioned in instruction to bidder during bidding stage, even it is shortly mentioned in the contract. This instruction can equally impact to all parties in projects especially contractors. This clause will affect contractors and employers who involve in any corruption, frauds, conspiracies or compulsions in projects.

Among all external risks, all respondents agree on different risk allocation for foreseeable and unforeseeable risks especially for bad weather condition and physical condition changes. Foreseeable risk shall be mostly allocated to contractors. Unforeseeable risks which cannot be predicted even by experienced contractors and experts shall be shared. However, contractors cannot claim for cost compensation due to financial management policy in public procurement. Only time compensation is possible to claim.

Related to currency payment, government normally pays private contractors in Cambodian currency (Khmer Riel). Even contractors spend in the market in different currency such as in US dollar that is normally used in Cambodia market, it is impossible to increase or decrease the payments caused by differences of exchange rate between these two currencies.

Variation of material cost during work execution time is proposed to include in contracts for increasing or decreasing of project cost due to this variation. However, it is impossible to input this issue in the contract of public construction projects under government budget support because of limited annual budgets availability for every ministries. Moreover, the third respondent mentions that it might take time to spend on discussion and making decision about this issue, so contractors themselves do not want to waste time on such of this difficult process. Thus, even this clause is fair and beneficial for both contractors and employers, due to reasons from both public party

and private party, they prefer not to include this clause in contracts and aim to take responsibility for this risk themselves.

Not different from weather and physical condition risks, risk allocation about availability in market of materials, manpower and equipment shall be considered based on foreseeable and unforeseeable condition of their availability. If their availability in market such as lack of skilled labor forces or lack of heavy equipment in Cambodia are known, contractors shall themselves take responsibility. However, in some unpredictable condition of social or political issues affecting labor forces, materials or equipment availability in the country, contractors shall get compensation. However, only time compensation is allowable.

7.3. Conclusion

Among laws and regulations proposed for risk clauses verification, Civil Code, Labor Law and IRRGPP are found in relating with proposed contract clause improvement. Road law is not found to have any relationships with proposed contract clauses because this law aims to rule passengers and people living along public roads, but it is not related to public procurement for public road construction. Some risks are not required for any modifications or additional clauses, but they are additionally found to be supported by Cambodian laws and regulation. Moreover, modification or additional risk clauses are found to have no conflicts with Cambodian laws and regulations, but more support is found instead. Furthermore, instead using the FIDIC contract clauses to change or add in the Cambodian contract clauses, the IRRGPP clauses are prioritized to use instead of FIDIC contract clauses for some risks in the Cambodian public road construction contract under the support of government budgets.

Most of the proposed clause improvements are agreed by the respondents. However, some proposed clauses are not agreed by the respondents, especially issues related cost increasing or deduction. The reason is due to limited budgets for public projects. Moreover, clauses related to project termination are appropriate to put in the contract, but in practice, both parties rarely terminate the contract because they prefer to keep

good business relationship with each other. Clauses related to corruption and contractors financial guarantee are preferred to include little in contracts since they are mentioned much in instruction to bidders during bidding stage. Steps and their duration in the process of approving claim for time extension shall be modified to be appropriate for current Cambodian government work practices.

Table 7.2: Summary of verifications and recommendations from practitioners and experts on proposed contract improvement

Internal Risks	Contract clause improvement	Verification with laws	Verification by Practitioners and Experts
Improper work suspension	The clauses 8.8, 8.9 and 8.10 of the FIDIC contract shall be added	Not found	<ul style="list-style-type: none"> • Additional clauses are agreed • However, duration cannot be fixed as the FIDIC contract • Payments to contractors for completed work are preferred in practice, rather than terminating contract due to long work suspension by employers
Contractors financial problems	Clause about retention shall be added	The IRRGPP Appendix 3D-Part 1-5.3.c should be added in contracts.	<ul style="list-style-type: none"> • This issue shall be mentioned in bidding instruction, so it is not necessary to mentioned in the General condition of contract. Normally 10% of total project cost is recommended by public officer for retention.
Electrical, water, and other facility supplies for projects	Clause 4.19 of FIDIC shall be added	No conflict	<ul style="list-style-type: none"> • Additional clause is agreed
Poor quality and incompetence of contractor	<ul style="list-style-type: none"> • The FIDIC clauses 4.4, 4.5 and 5.2 related to subcontractors 	No conflict	<ul style="list-style-type: none"> • This clause is preferred to mention in short by including only the obligations of employer to all contractors activities and results and right of employer to request for removing unqualified

	<ul style="list-style-type: none"> • Clear definition of corruption shall be added • The FIDIC clauses 1.12 and 4.9 • The FIDIC clause 6.8 and 6.9 related to contractors' staffs and labor forces in projects shall be added 		<ul style="list-style-type: none"> • contractors' staff or labor forces. • Date of subcontractors work commencement is not necessary to include in the contract.
contract's failure in examining sites and their surrounding	The clause 4.10 of the FIDIC contract shall be added	No conflict	<ul style="list-style-type: none"> • Additional clause is agreed
Delayed payments to contractors	Compensation due to employers' late payment to contractors shall be added in the contract.	No conflict	<ul style="list-style-type: none"> • Due to limited annual budgets for government projects, only time compensation is possible.
Employers late in approving documents for contractors	The clause 13.3 of the FIDIC contract related to processes of changes of work shall be added	Not found	<ul style="list-style-type: none"> • Only time compensation is possible. • Total time extension shall be claimed 1 month before project completion as the total time of each time extension case by including appropriate reasons.
Changes in work	<ul style="list-style-type: none"> • The clause 8.3 of the FIDIC contract about work programs that contractors shall submit to employers 	The IRRGPP 3.16.2 should be used instead of the clause 13.3 of the FIDIC contract about the	<ul style="list-style-type: none"> • Due to limited annual budgets for government projects, only time compensation is possible to input in contracts. • Total time extension shall be claimed 1 month before project completion as the

	shall be added in contracts.	procedures, condition and compensation for changes in work in projects.	total time of each time extension case by including appropriate reasons.
	<ul style="list-style-type: none"> Clause related to involvement of employer in projects studies shall be added in contracts. 		
Lack of project information	The clauses 1.8, 4.6 and 4.10 of the FIDIC contract shall be added	Not found	<ul style="list-style-type: none"> Additional clause are agreed
Defective designs	The clause 3.1 of the FIDIC contract shall be summarized and added	Not found	<ul style="list-style-type: none"> Additional clause is agree Only time compensation is possible to include for this risk.
Poor performance of subcontractors	The clauses 4.4 and 5.2 of the FIDIC contract shall be added	Not found	<ul style="list-style-type: none"> Additional clauses are agreed
Obtaining approval or consent from relevant authorities	Risk clause is not necessary to add in contracts for this risk because problems caused by this risk cannot be covered by contract clauses.	<ul style="list-style-type: none"> This risk clause is not necessary to add in contracts. 	<ul style="list-style-type: none"> This risk clause is not necessary to add in contracts.
Corruption in projects	Definition of corruption should be mentioned clearer in contracts.	<ul style="list-style-type: none"> Additional description about corruption from the IRRGPP 9.1 shall be added in Contracts instead of the FIDIC contract clauses 	<ul style="list-style-type: none"> Proposal on extension of this clause is considered to be not necessary because even this risk is shortly mentioned in the current contract, it is much mentioned in instructions to bidder in bidding stage.

External Risks	Contract clause improvement	Verification with laws	Verification by Practitioners and Experts
Unexpected bad weather	Clauses in the FIDIC contract related to cost and time compensation for any effects caused by unexpected bad weather shall be added in contracts.	<ul style="list-style-type: none"> • Not Found 	<ul style="list-style-type: none"> • Contractors cannot claim for cost compensation due to annual limited budget policy in public procurement, but time compensation is possible to claim.
Unforeseeable site condition	Clear description about sharing unforeseeable site condition risk between contractors and employers shall be used to modify unclear risk allocation of this risk.	<ul style="list-style-type: none"> • Contract clauses about this risk shall be modified by the IRRGPP and the FIDIC contract clauses 	<ul style="list-style-type: none"> • Agree for modification • However, contractors cannot claim for cost compensation due to annual limited budget policy in public procurement, but time compensation is possible to claim.
Explosive materials	The clauses 17.3.d and 17.4 of the FIDIC contract shall be added	<ul style="list-style-type: none"> • Not Found 	<ul style="list-style-type: none"> • Agreed to these additional clauses • Time extension is possible to claim, but not cost
Inflation or currency fluctuation	The clauses 13.8 and 14.15 of the FIDIC contract shall be added	<ul style="list-style-type: none"> • Not Found 	<ul style="list-style-type: none"> • It is impossible to increase or decrease cost of project due to the variation of currency exchange rates, or variation of material cost
Shortages material availability	The clauses 4.1 and 8.4.d of the FIDIC Contract shall be added	<ul style="list-style-type: none"> • Not Found 	<ul style="list-style-type: none"> • Agreed to these additional clauses • Time extension is possible to claim, but not cost
Shortages manpower availability	The clauses 4.1 and 8.4.d of the FIDIC contract shall be added	<ul style="list-style-type: none"> • Not Found 	<ul style="list-style-type: none"> • Agreed to these additional clauses • Time extension is possible to claim, but not cost
Shortages equipment availability	The clauses 4.1 and 8.4.d of the FIDIC shall be added	<ul style="list-style-type: none"> • Not Found 	<ul style="list-style-type: none"> • Agreed to these additional clauses • Time extension is possible to claim, but not cost

CHAPTER 8

SUMMARY AND CONCLUSIONS

8.1. Summary

Cambodia is a developing country with a large number of construction projects, especially infrastructure projects. While many road construction projects are supported by donor budgets, projects supported by government budgets are increasing. In the previous practice, only negotiation contracts with public contractors are used with this kind of project. However, this type of procurement has impact on the quality of work. Thus, in the last few years, competitive bidding with private contractors' involvement is introduced to public road construction projects under the support of government budgets. This change of procurement practice requires better contract clauses which are balanced in risk allocation between public employers and private contractors.

The MEF has established a regulation as well as general condition of contract to apply in all public procurements under the support of government budgets. However, this contract model shall be modified to use appropriately for specific procurement types and project characteristics, especially about risk allocation. This study focuses on competitive bidding procurement with private sector involvement in public road construction projects under the support of government budget. This research aims to improve the general condition of the public contract from the MEF for balanced risk allocation and appropriate for public road construction projects under the support of government budgets in the MPWT.

Based on this main objective, this study starts by investigating risks, sources of risks and their impact to time, cost, quality and scope of project. Interviews are conducted with both public agencies and private contractors. These interviews give detailed information about risks that happen in projects. This information about risks in road construction projects in Cambodia is a source of information which is useful for forming effective contracts.

25 risks are found to happen in public road construction projects in Cambodia in the MPWT. Among these risks, there are 15 internal risks and 10 external risks. The internal risks can be risks from projects, from contractors' organization, from public agency and from the external effects. Four sources of external risk in Cambodian public road construction projects are politic, nature, economy and society. Among these 25 risks, 23 risks impact to the time of project, 18 risks impact to the cost of project, 11 risks impact to the quality of project, and only 4 risks impact to the scope of project.

After collecting risks and their related information, risk description as well as their allocation clauses are identified in the general condition of contract published by the MEF. This identification is based on author's analysis due to his knowledge with practitioners' verification. Then these risk allocations are compared with the FIDIC contract about risk allocation.

Four types of risk allocation are found in the CGC, risks allocated to contractors, risks allocated to employers, sharing risks and unclear allocation risks. Risks are allocated to contractors due to contractor's behavior, material and equipment supplies, work coordination and information exchange and corruption in projects. Risks are allocated to employers due to employers' behavior and engineers' mistakes. Risks are shared in CGC for risks caused by the third parties and risks caused by unforeseeable external effects. Beside these three kinds of risk allocation, unclear risk allocation is also found in the CGC, especially in the clause 42 of the CGC.

Results of risk allocation identification and comparison show that most of contractor's risks in the FIDIC contract are written in the CGC. Moreover, both contracts allocate most of risks caused by contractors to contractors. Only a risk in this category, health or safety protection in and around sites, is unclear about risk allocation in the general condition of contract.

Not many employers' risks are mentioned in the CGC. In addition, while the FIDIC contract indicates risks caused by employers to employers, the CGC gives unclear risk allocation for most of risks in this category. Furthermore, the CGC provides advantages to employers in making decision on compensation for these risks, even they are stated

as employers' risks. Risks caused by engineers are employers' risks as both contracts are indicated. Risks caused by subcontractors are not included in the CGC. Some risks caused by third parties are referred differently about risk allocation due to their different condition of risk allocation in both contracts.

Only few external risks are written in the CGC comparing to the FIDIC contract as well as external risks which happen in projects. Unexpected bad weather, explosive materials, health and negative effects by surrounding environment are allocated in the same way between the two contracts, except unforeseeable site condition which is not written clearly about risk allocation in the CGC. Other risks such as inflation and shortages of in materials, manpower and equipment availability are noticeable risks in public road construction projects in Cambodia, but they do not exist in the CGC.

There are four scenarios of proposed contract improvement. They are unnecessary risk clauses, unchanged risk clauses, additional risk clauses and modified risk clauses. 14 risks are not found in the CGC which are not necessary to add in the contract because they are not risks which exist in public road construction projects in Cambodia or have strong effects to projects. Current clauses in the CGC related to the 11 risks are not required any modification because they are enough to cover risks in projects. Risks that are found in projects but do not exist in the contract will be proposed for their additional clauses based on clauses in the FIDIC contract.

Other scenario of contract improvement is related to risks that cause problems in projects even there are risk clauses in the contract. The problems refer to two questions. The first question is "Can current contract clauses cover all risk factors and their impact in projects?", and the second question is "Does unbalanced or unclear risk allocation exist in the current contract clauses?" These problems shall be solved in the contract clauses by including clear risk allocation, otherwise disputes are possible to happen. Firstly, risk allocation in the CGC are compared with those in the FIDIC contract. Then, problems are verified by comparing clause description in both contracts. These comparison aims to find any weak points of the general condition of contract of the CGC in responding to problems occurring in projects. Then the clauses

are modified by using the FIDIC contract clauses which are considered as clear clause description and balanced risk allocation. However, some risk sources are impossible to solve by just putting them into contracts when they are related to government policy. However, some risks caused by contractors' organizations, employers' or contractors' mistakes are appropriate to add or modify in the general condition of contract of the CGC.

After analyzing risks happening in projects and comparing with the Cambodian and FIDIC contract clauses, not all risk conditions are possible to add or modify in the CGC. Internal risks are in such of this condition due to their sources. If the sources of risks are related to government policy, they are useless to mention them in contracts. However, other internal risks made by contractors, public employers or any other parties are possible to add or modify due to problems happening. In addition, for risks caused by external effects, these risk allocation shall be considered in terms of foreseeable or unforeseeable risks. Foreseeable risks shall be allocated to either party, and unforeseeable risks shall be shared.

In the last step, in order to make sure that all additional and modified clauses are possible to use in Cambodia, especially in Cambodian public road construction projects under the support of government budgets, verifications are done. First verification is done with Cambodian related laws for finding out any conflicts of the proposed contract improvement with related laws. Furthermore, another verification is done with regulation from the MEF called Implementing Rules and Regulations Governing Public Procurement (IRRGPP). If there are differences between proposed clauses from the FIDIC contract and regulation statements, the statements from the regulation are prioritized to use. The third verification is done with practitioners, and with law and construction contract lecturer via interviews. The purpose of this verification is to verify with the respondents' perception whether all proposed risk clause improvement is possible and appropriate to use in the current practice or not.

Two laws are found in related to the construction contracts. They are civil code in the chapter 8 about contract for work, and Labor law related to the responsibility of

contractor in giving health and safety protection in and around work site. There is no conflict between the proposed contract improvements with these laws. For the verification with the regulation, some modifications on the proposed contract improvement are done in according to this document. Most of these modifications are about processes of work which written in the regulation differently from those which are proposed from the FIDIC contract.

From respondents' perception, some criteria are impossible to include in contracts of public road construction projects under government budgets support. First is cost compensation that cannot be claimed due to annual limited budgets from the government for all public procurement. Secondly, clauses related to corruption and contractors' financial guarantee are preferred to include little in contracts since they are mentioned much in instruction to bidder during bidding stage. Some duration from the FIDIC contract shall be changed in according to regulation and current practices.

8.2. Conclusions

In public road construction projects in Cambodia, some risks are found as important risks. They shall be taken attention due to their effects to project objectives. Both internal and external risks mostly affect the time and cost of project. Some risks affect to the quality of project, but only few risks affect to the scope of project.

The current contract clauses in the CGC are not enough to cover all risks happening in contraction projects, especially employers' behavioral risks and external risks. In addition, unclear risk allocation is a concerned issue which in found in the CGC clauses. Unbalanced risk allocation clauses also exist in the CGC. This contract gives advantages to employers in making decision about compensation. In contrast, FIDIC contract clauses give clear and balanced risk allocation between the two parties. Moreover, the FIDIC contract provides extra condition to deal with risks better than the CGC. Possibility of disputes might increase between public employers with private contractors, if these clauses in the CGC are not modified for balanced and clear risk

allocation. Thus, the FIDIC contract clauses are good references for improving risk clauses in the CGC for balanced risk allocation.

Some current risk clauses in the general condition of the CGC gives enough details, and there are not problems caused by these risks in projects. Thus, they should be kept without any modifications. Some risks are not necessary to add in the CGC because they don't affect or little affect to projects. In contrast, some risks shall be added in the CGC since they are critical risks, but they miss in the contract.

Some problems still occur from some internal risks in projects even there are contract clauses related to them. Thus, they are proposed for risk clause modification due to the problems that are found in related to them. The appropriate clauses from the FIDIC contract related to those issues are proposed. These new clauses will improve current clauses to be clearer and in more detailed about risk allocation. However, not all problems can be responded by this improvement. Any clauses which conflict with government policy for public procurement are impossible to input in the government contracts.

All external risks are possible to add or modify in the CGC for both foreseeable and unforeseeable risks. Risks that contractors can predict at bidding stage shall be allocated to contractors. However, unforeseeable risks should be shared. By the way, some risks can be somehow foreseeable and unforeseeable, so they are separated in these two condition for risk allocation in contract clauses.

No conflict with laws is found from proposed contract clauses, but modification is done in according to the regulation. From respondents' perception, not all proposed contract clauses are possible to use in the current practice for this kind of project. Some criterions are impossible to include in contracts of public road construction projects under government budgets support when they have conflicts with government policy or current practices of the projects. Some processes proposed from the FIDIC contract clauses are changed in according to regulation and current practices.

As the result, this research provides knowledge about risk to contracting parties in construction projects, especially risk written in public construction contracts. This improvement also suggests additional contract clauses that should be included in the existing contract. Modified risk clauses for Cambodian public construction contracts are beneficial for both contractors and employers due to their effective and balanced risk allocation. The interpretation of results will allow contracting parties to focus on which risks they should focus on in projects.

The risk allocation in the modified contract will be more appropriate to use than the current one. As risks are appropriately allocated, the chance of conflicts between contractors and employers will decrease. It responds to the main objective of this study which aims to propose a balanced risk allocation contract for the design-bid-build procurement between private contractors and public employers.

Due to the comparison and modification of the CGC with the international standard forms of contract, the new contract can be more appropriate to use for both national and international projects. This guideline might not only be beneficial for public procurement will local contractors, but also with foreign contractors. Foreign contractors might involve in this public procurement in the future, especially after the ASEAN Economic Community integration in 2015.

This research shall be the first research about risks and risk allocation in Cambodian construction projects. It can be a benchmark for other researchers who want to investigate risks and construction contracts in Cambodia. However, this research has some limitations such as limited numbers of project and respondents in both public and private parties. In addition, this study focuses only for public road construction projects under the supports of government budgets. Even it might be first research in this field, it might be a good introduction for further researches in the future. Future researches shall focus on other kinds of project in Cambodia for both private and public procurement beside road construction projects. Other types of research methodologies both qualitative and quantitative research methods shall be used.

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APPENDIX A
RELATED FIDIC AND CAMBODIAN GOVERNMENT CONTRACT CLAUSES
FOR RISK CLAUSE MODIFICATION

Table A.1: Related FIDIC and CGC clauses for risk clause modification

Note:

Internal risks

- I1: Contractors' financial problems
- I2: Act against the country laws
- I3: Health or safety or negative effects in and around sites
- I4: Poor quality and incompetence of contractor
- I5: Delay payments to contractors
- I6: Employers late in approving document for contractors
- I7: Change in work
- I8: Obtaining approval from relevant authority
- I9: Corruption in projects
- I10: Problems between contractors with other contractors

External risks

- E1: Unexpected bad weather
- E2: Unforeseeable site condition

	Problems in project	FIDIC contract	CGC
Risk			
I1	a. Late payment causes contractor financial problems	• Clause 15.2: contract termination due to contractors' bankruptcy.	• Clause 45.2: Cost compensation due to late payment
	b. Poor contractors' finance at the beginning of project		• Clause 43: Retention 10% of payment shall be deduce for each payment until work is finished.

		<ul style="list-style-type: none"> • Clause 48.1.b: Contract termination due to contractors' bankruptcy.
12	<p>a. Contractors use other people property without permission</p> <p>b. Effects to heritage area</p>	<ul style="list-style-type: none"> • Clause 1.13: contractors' obligation to comply with all applicable Laws of the country. • Clause 17.5: intellectual and industrial property rights • Clause 38: Obligation of contractor to pay taxes
13	<p>a. Traffic jam and traffic accidents, air and noise pollution</p>	<ul style="list-style-type: none"> • Clauses 4.1, 4.8, 4.18: contractors' obligation to take responsible in health and safety effects in and around sites. • Clauses 6, 7, 13, 14, 16.2, and 17: contractors' obligation to take responsible in health and safety effects in and around sites. • Clause 24.1.a: effects to surrounding environment due to unavoidable work progress
14	<p>a. Poor contractor work quality caused by subcontractor</p> <p>b. Lack of competitive procurement in selecting good contractors</p> <p>c. Short duration of work completion due to political effect</p> <p>d. Unqualified staffs and labors</p>	<ul style="list-style-type: none"> • Clauses 4.4, 5.1 and 5.3: subcontractors work responsibility • Clauses 4.7, 4.9, 7.1, 8.1, 8.2, and 9.1: contractors obligation in finishing projects on time with the good quality of work and cost saving • Clauses 6.8 and 6.9: employers' right in requesting for contractors' staff changing by including the reasons which can lead to these requests. • Clauses 4, 5, 15, 23, 27, 31, 32, 34, 35 and 45.2: contractors obligation in finishing projects on time with the good quality of work and cost saving • Clause 10: contractors shall have enough qualified staff with good experience. Staffs of contractor can be changed due to employers' requests, but no clear reasons of these requests are not mentioned.

15	<p>a. Contractors are late in submitting claim documents</p> <p>b. Long process in approving payment</p> <p>c. Lack of cooperation between contracts and employers in payment process</p> <p>d. Annual limited budget for government projects</p>	<ul style="list-style-type: none"> • Clause 14.7: process of payment • Clause 14.8: punishment due to delay payment issue • Clause 16.2 (c): contractors termination of contract due to delay interim payment within 42 days after the expiry of the time stated in sub-clause 14.7 	<ul style="list-style-type: none"> • Clause 45.2: Punishment due to delay payment
16	<p>a. Long process in approving documents both approving change and payment in public work procurement.</p> <p>b. All approving document must be in hard copies which take time for processing.</p>	<ul style="list-style-type: none"> • Clause 13.3: approving of change process • Clauses 14.6 and 14.13: process in issuing and approving interim and final payment 	<ul style="list-style-type: none"> • Clause 42.1(j): Compensation to contractors in the case of late in approving payment claim by employers • Clause 44: process of approving final payment
17	<p>a. Avoid the problems and accelerate the processes of work</p> <p>b. Unsatisfied method statements</p> <p>c. Lack of detail project studies causes wrong in designs and BOQs</p>	<ul style="list-style-type: none"> • Clause 12.4: omission of work from variation • Clause 8.4 (a): extension of time for completion due to variation • Clause 13.3: variation process 	<ul style="list-style-type: none"> • Clause 26: employers can request employers to finish work before time specified in contracts
18	<p>a. Late in approving by local authorities</p> <p>b. Late in the processes of solving problems</p>	<ul style="list-style-type: none"> • Clause 2.2: employers shall give contractor assistance in getting 	<ul style="list-style-type: none"> • Clause 22: obligation of employer to help contractors in getting

	between local authorities with local people living along road construction projects	approval from relevant authority.	approval from relevant authority.
I9	<p>a. corruption in projects for getting quick approval, and have good cooperation with engineers during work execution</p> <p>b. Influences of family or internal relationship in contractors' companies</p>	<p>Clause 15.2: contract might be terminated by employers if corruption made by contractors is found. Clear definitions of corruption in project are included.</p>	<p>Clause 48.1.d: termination of contracts if employers find out corruption made by contractors</p>
I10	Problems caused by a contractor can obstruct work of neighbor contractors	<ul style="list-style-type: none"> • Clause 4.6: contractors shall have good cooperation with other contractors in the same projects. 	<ul style="list-style-type: none"> • Clause 12: Obligation of contractor to cooperate with other contractors, to support material, equipment and other services as mention in the schedule of work in particular condition. • Clause 42.1(b): Compensation to contractor if other contractors' work affect contractors' work
E1	Heavy rain, storms and flood	<ul style="list-style-type: none"> • Clause 17.3(h): allocation of risk of unforeseeable forces of nature to employers. • Clause 17.4: compensation to contractors for employers' risk in clause 17.3(h) 	<ul style="list-style-type: none"> • Clause 14.1: contractors' guarantee to all contractors' work equipment, tool which are damaged by force majeure • Clause 36.2: Employers' responsibility for payment on fixing any defects caused by force majeure

	<ul style="list-style-type: none"> • Clause 19.1(v): definition of force majeure which includes bad weather condition • Clause 19.4: compensation due to negative impact of force majeure. 	<ul style="list-style-type: none"> • Clause 46: project termination after 84 days of serious effects from force majeure. In this case, contractors shall be possible to get payment of completed work, but are responsible for taking care construction site and terminate projects.
E2	<p>a. Changes of soil condition, especially, unexpected changes of soil layers.</p>	<ul style="list-style-type: none"> • Clause 4.12: definition of unforeseeable physical conditions. Process and compensation for this risk are also included. • Clause 42.1(e): Cost compensation for any unexpected changes of soil layer. However, other section of clause 42 provides right on making decision on this compensation to employers.

APPENDIX B

RELATED CAMBODIAN LAWS AND REGULATIONS FOR PROPOSED RISK

CLAUSE IMPROVEMENT

Table B.1: Related Cambodian laws and regulations for proposed risk clause improvement

Internal Risks	Cambodian Laws and Regulations
Improper work suspension	Not Found
Contractors financial problems	<ul style="list-style-type: none"> • The IRRGPP 3.15.2.2 is mentioned about contract termination in the case that contractors' bankruptcy. It is also specified contractors to keep all equipment before leaving sites. • In addition, the IRRGPP 3.15.2.5 gives additional descriptions about cost compensation. • The IRRGPP Appendix 3D-Part 1-5.3.c is specified that contractors are required to have enough financial supports for themselves for the first 3 months of project implementation.
Electrical, water, and other facility supplies for projects	Not Found
Poor quality and incompetence of contractor	<ul style="list-style-type: none"> • The clause 658 of the Civil Code is written about reduction of contract cost if contractors cannot complete projects on time specified in contracts. However, this issue is specified clearly about the rate of cost reduction in the CGC which is prioritized in effecting project. • The IRRGPP 3.14.10 is specified the cases that contractors or suppliers are late in finishing work or supplying materials. This clause requires them to give notices to employers if they are late in work completion. Then employers shall make decision on compensation. Any delays caused by contractors or suppliers are under their responsibilities. Is short, this clause provides a procedure to deal with delay in completing work or late in material supplying. • The IRRGPP 3.15.2 is specified clearly the right of employer to terminate contracts in the cases that contractors deny or cannot complete work correctly according to contract late in completing work. This clause is also mentioned clearly about duration that employers shall inform contractors, duration that

	<p>contractors shall have to fix problems, and duration employers shall send contractors second notices before terminating contracts. In addition, the IRRGPP 3.15.2.5 gives additional descriptions about cost compensation.</p> <ul style="list-style-type: none"> • The IRRGPP 3.16.2.2 and 3.16.2.3 are mentioned about tests on checking any defects to projects. In addition, the clause 3.16.2.7 (3) of IRRGPP is written about compensation that contractors can get from employers if employers require contractors to conduct tests for checking defects which are not specified in contracts. • The IRRGPP Appendix 3D-Part 1-5.3.d is required contractors to show evidence in bidding documents about the availability of contractor to supply enough equipment and tools (both contractors owns or rent) to implement in projects.
Contractors failures in examining sites and their surrounding	<ul style="list-style-type: none"> • The IRRGPP Appendix 3D-Part 1-6 is mentioned that all contractors involving in bidding shall be responsible for their own in visiting construction sites and find out any related information for preparing designs and bidding documents.
Delayed payments to contractors	<ul style="list-style-type: none"> • The IRRGPP 3.15.2.3 is mentioned about contract termination by contractors if employers do not pay contractors in according to contracts. This clause is also mentioned about procedures to do before terminating contracts. Moreover, it is also mentioned about work that contractors shall do after contracts are terminated. • In addition, the IRRGPP 3.15.2.5 gives additional description about cost compensation.
Improper work suspension	Not found
Changes in work	The IRRGPP 3.16.2 describes briefly about procedures, condition and compensation due to changes of work in projects.
Lack of project information	Not Found
Defective designs	Not Found
Poor performance of subcontractors	Not Found
Obtaining approval or consent from relevant authorities	The IRRGPP 3.16.2.7 (7) is written about compensation for contractors if relevant authorities are late in approving documents specified in contracts on time.

Corruption in projects	<ul style="list-style-type: none"> • Related to corruption during project bidding, the IRRGPP 1.5.6.7 is written for avoiding corruption in approving the winner of bidding due to relative relationship. • The IRRGPP 9.1 presents corruption activities that occur during bidding stage. This part provides clearly about definition and punishment of any actions of corruption in order to get bidding to both public officers and private contractors.
External Risks	Cambodian Laws and Regulations
Unexpected bad weather	Not Found
Unforeseeable site condition	The IRRGPP 3.16.2.7 (5) is written about compensation that contractors can get in the cases of unforeseeable soil condition which is difficult studies and can cause wrong in calculation.
Munitions of war and explosive materials	Not Found
Inflation or currency fluctuation	Not Found
Shortages in materials, manpower or equipment	Not Found

VITA

Buntha Say was born on September 8th, 1990 in Battambang province, Cambodia. He is the first child in a family with a younger sister and a younger brother. He spent his childhood and study life from elementary school to High school in his hometown. He continued his undergraduate degree, majoring in Architectural Engineering, Department of Civil Engineering, Institute of Technology of Cambodia, Phnom Penh, Cambodia from 2003 to 2008. In July 2008, he successfully graduated his bachelor's degree in engineering. Then, He got a scholarship from AUN/Seed-Net/JICA and leave Cambodia to continue higher education in Master's degree of Construction Engineering and Management, Department of Civil Engineering, Chulalongkorn University, Bangkok, Thailand.

