

**INVESTIGATION OF RISKS IN UNSOLICITED
ROAD PROJECTS IN SRI LANKA**

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ABSTRACT

Investigation of Risks in Unsolicited Road Projects in Sri Lanka

Risk management is an important factor in project success. It is the process of identifying, classifying, analysing and assessing of inherent risks in a different stage of the project. Due to the nature of the construction projects which specify in road development works consists of many related operations, may risk sources and events will contribute in project duration.

The aim of this research is to consider the very useful matter, which is the risk of the current construction industry with special reference to unsolicited road project in Sri Lanka. The risk management plan, at first step is to identify and classify with the key risk sources which effects on project objectives in stages of construction project. Where the problems are determined and considered reasonable solution due to various manners of risk handling in the road construction industry. Therefore the concept of unsolicited proposal is applied to new era of the procurement method in construction industry in Sri Lanka.

The involvement of the project risk management in unsolicited road projects are considered the cases of four road projects in the National road list of Road Development Authority and allocation and handling of project risks are categorized with the sixteen risk events are described with objectives namely, identify the key stages in the management process for the unsolicited road projects in Sri Lanka, identify the risk events associated with the pre contract stage of unsolicited road projects in Sri Lanka, investigate the risks allocation and responses of contractual parties in unsolicited road projects.

The sample of the present research was consisted with sixteen participants and selected through the officers in unsolicited road projects with the category of Client and Contractor and data of respondents were collected with documents and semi structured interviews with the response rate task more than 75% by the researcher.

Referring the findings of case studies, the most significant risk events are identified to the process of current unsolicited road project in Sri Lanka namely possession of site, Dealing with utility agencies and Improper Estimates. The conclusion and recommendations of this research stated that the influence of finding of the risk handling work of the unsolicited road projects to forecast the different field of construction industry.

Keywords: *Risk Sources, Risk Allocation, Risk Handling, Construction of unsolicited road projects*

DEDICATION

To my family members

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List of Abbreviations

BII	–	Bureau of Infrastructure Investment
BOI	–	Board of Investment
BOO	–	Build Own and Operate
BOQ	–	Bill of Quantities
BOT	–	Build – Operate and Transfer
BOT	–	Build Operate and Transfer
CANC	–	Cabinet Appointed Negotiating Committee
CCEM	–	Cabinet Committee on Economic Management
GOSL	–	Government of Sri Lanka
IA	–	Implementation Agreement
ICE	–	Institution of Civil Engineers
ICTAD	–	Institute of Construction, Training and Development
PC	–	Project Committee
PET	–	Percent Expected Time – overrun
PFI	–	Private – Finance Initiative
PMBOK	–	Project Management Body of Knowledge
PMI	–	Project Management Institute
PPC	–	Percent Plan Completed
PPI	–	Private Participation in Infrastructure
PPP	–	Public – Private Partnership
RDA	–	Road Development Authority
RFP	–	Request for Proposal
RFQ	–	Request for Qualification
RMPs	–	RISK Management Processes
SBD	–	Standard Bidding Document
SCAPC	–	Standard Cabinet Approval Procurement Committee
SWOT	–	Strength, Weak, Opportunity and Threat
TOR of PC	–	Terms Of Reference of Project Committee
USP	–	Unsolicited Proposal

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CHAPTER – 1

INTRODUCTION

1.1 Background of the Research

The construction projects are always unique and risks can arise from a number of the different sources. It is apparent that risk and uncertainty are inherent in all construction activities (Oyegoke, 2006 & Pheng & Chuan, 2006). Therefore, nowadays, risk analysis and management continue to be a major feature of the project management of construction projects in an attempt to deal effectively with uncertainty and unexpected events and to achieve project success (Banaitiene & Banaitis, 2012).

Chris & Stephen (2003) described the key motives for formal risk management process (RMPs) in construction projects. These include the benefits of documentation, the value of quantitative analysis that facilitates distinguishing between targets, expectations, and commitments, the pursuit of risk efficient ways of carrying out a project, and related culture changes.

Project Management Institute (2008) and The Institution of Civil Engineers (2005) described the nine knowledge areas of management namely integration, scope, time, cost, quality, human resource, communication, risk and procurement in projects. Among the nine knowledge areas, risk management is a comprehensive and systematic way of identifying, analysing and responding to risks achieving the project objectives in Project stages and project life cycle (PMBOK Guide, 2008). Project Management Institute (2008) and Institution of Civil Engineers (2005) further explained the steps of the risk management process in projects including planning, identification, qualitative risk analysis, quantitative risk analysis response planning, monitoring and control and improvements of construction project management processes and effective use of resources.

Lenzi (2012) stated that budgeting and project management are based on several key functions to manage projects effectively and efficiently. The risk of the project is one of the key factor and need to be able to recognize and manage to use of risk based project estimates in specified period. Lenzi (2012) further explained that risk is the possibility that it may not achieve product, project estimate, schedule or resource targets because something unexpected occurs or something planned does not occur. Therefore, all projects and estimates have some degree of risk because predicting the future with certainty in impossible activities to achieve the final task due to various reasons.

The project is implemented to carry out the several activities of project estimate in particular schedule of work and time (Dresp, 2012). Managing risk is a most effective and essential factors for construction industry as well as the manufacturing industry in the modern world (Kendrick, 2003).

In times of increased competition and globalization the construction industry, project success becomes even more critical to business performance, and yet many projects still suffer delays, overruns, and even failure. The risk management tools and techniques, which have been developed to improve project success in modern construction industry and usage of some risk management practices, such as risk identification, probabilistic risk analysis, planning for uncertainty and trade-off analysis, the difference in application across different types of projects, and their impact on various project success dimensions(Dvir, Shenhar & Raz,2002)

According to Stephen & Chapman (2003),managers risk in project, behave the different stages of risk factors have to determine, evaluate and manage that may affect to the project completion in schedule of work on time. Therefore the recognize project risk factors, the project risk assessment is to identify the specific risks that may result from each of the risk factors.

Buertey, Emmanuel & Kumi (2012) have described the impact of risk factors affecting project that essential literature of the understanding and managing risk

factors have to consider the success of project. Most reliable and effective details regarding to determine changes of the project plan or environment and consider the assesses the potential effects of those risks on the project.

The develop plans for mitigating the effects of the risks, monitor the status of the project risks throughout performance of the managers are discussed and summarized using a systematic risk methodology by the researcher.

The task facing project managers in highway construction industries is how to determine the large scale of risks and uncertainties present in unsolicited projects and assess their impact on project outcomes.

Governments worldwide have been increasingly looking to the private sector to fill the growing gap between the demand and supply of infrastructure services (John & Georgina, 2007). As a result, private participation in infrastructure (PPI) in developing countries increased dramatically in the past fifteen years and they recognized the important mechanism for bringing technical and managerial expertise to the construction, operation, maintenance and financing of infrastructure projects (John & Georgina, 2007). This research looks at specific type of private participation in infrastructure (PPI) projects called “unsolicited proposal.” Unsolicited proposals usually originate within the private sector such as developers, suppliers and financiers that spend their own money to develop basic project specifications, then directly approach government to get the required official approval (John & Georgina, 2007).

According to the guidelines (Department of Finance- Sri Lanka, 2011) issued to use the unsolicited development proposals to implement the urgent infrastructure development namely road projects in Sri Lanka.

John & Georgina (2007) further described the three major systems of unsolicited projects in infrastructure projects such as Bonus system, Swiss Challenge system and Best and Final offer system.

The National Procurement Agency of Sri Lanka provides the general framework for handling unsolicited proposals (Procurement Manual, 2006). As per the Guidelines, line agencies and Ministries receiving unsolicited proposals process them according to the procedures applicable to solicited proposals. Unsolicited proposals contain all basic information to ascertain the economic and financial viability of the project.

Once the need is determined, the relevant line Ministry calls for proposals or advertise for particular project. The party that made the original offer should be given a chance to improve it in the invitation for bids and offers if the proposal has been significantly changed to suit the needs and objectives of the agency involved. No decision should be made solely on the basis of unsolicited offers without inviting proposals and bids through public advertisement (John & Georgina, 2007)

Avoiding the time extension in road construction project, the local funding agencies are contributed on the basis of predetermined date of completion of project work (Government Procurement Guide lines, 2006). Then the project managers' role is very higher standard of understanding and managing risk in project. Then the risk management literature provides a wide range of risk management techniques, tool and systems to understand and manage the risk in project work.

One of the leading public sector highway construction authorities is Road Development Authority in Sri Lanka. Road Development Authority (RDA) plays as a major client for the major construction projects and contributes to assistance to several projects as well as upgrades the road under local authorities (Annual report-RDA, 2012). However the rapid infrastructure development work programme, the unsolicited proposal are introduced in road projects and implemented in throughout the country (Department of Public Finance-Sri Lanka, 2010).

Understanding and managing the issues regarding the risk management of unsolicited road construction industry is very important and as essential sector for the current situation of the country and discussed with risk management process, techniques, and analysis with associating the stages of unsolicited road project.

1.2 Problem Statement

The rapid infrastructure development work of the country, has resulted in increased attention been given to PPI projects. Unsolicited proposals, which are a specific type of PPIs, has been particularly encouraged as a means of realising projects in shorter time frames compared to traditional procurement work.

However, due to the specific nature of these proposals as well as shortcomings of the evaluation and review stages, unsolicited projects may have specific risks associated to the managerial role of employer and contractor. Nowadays, in the Sri Lankan context, as the Government is encouraging the use of unsolicited proposals more and more, there is a need to investigate these risks in the application of unsolicited project proposals. However, so far little attention has been given towards investigating risks associated with unsolicited proposals particularly in the Sri Lankan context.

The discussion of risks and their handling in the application of unsolicited projects is essential for infrastructure development project works of the country. Therefore, this research investigates risk sources and the handling of risks in unsolicited road projects in Sri Lanka.

1.3 Research Aim

The aim of this research is to investigate risks and their handling in unsolicited road projects in Sri Lanka.

1.4 Research Objectives

The above aim is achieved through the following objectives.

1. To identify the key stages in the management process for the unsolicited road projects in Sri Lanka
2. To identify the risk sources associated with the pre contract stages of unsolicited road projects in Sri Lanka

3. To investigate the risks allocation and responses of contractual parties in unsolicited road projects.

1.5 Research Methodology

The literature review was carried out to find the theoretical factors to achieve the research objectives with basic and sub titles of risk management with special reference to project risk by associating books, journals, web sites and bulletins.

Four case studies were conducted in selected unsolicited road projects to identify the risk sources and their handling methods in the Sri Lankan context. Semi-structured interviews and document reviews were used as the main data collection techniques and the collected textual data was analysed using content analysis.

1.6 Scope Limitations

The research was limited to identify the risk sources and investigate risk allocation in pre contract stage of ongoing and recently completed unsolicited local banks funded projects on Class A and B roads of national road network in Sri Lanka.

1.7 The Dissertation Outline

The report consists of five chapters. Outline of the study report and details of each chapter are summarized as follows.

Chapter 1 - Introduction

Chapter 1 gives an overview of the dissertation, beginning from the background of the research, and proceeds to the aim, objectives, methodology, and scope of study and dissertation outlines.

Chapter 2 – Literature Review

This chapter mainly discusses on the concept of risk, risk in highway construction projects, and risk allocation and handling in unsolicited project proposals. The chapter includes the theories and previous studies and empirical findings.

Chapter 3 – Research Methodology

Chapter 3 describes the expansion of the research and consists of the method of research with basic approaches to fulfil the objectives of research design. The research design, which consists of the research philosophy, research approaches and research techniques, is explained in details.

Chapter 4 – Data Collection and Analysis

This chapter presents the data case study analysis and presents findings in relation to the management process of unsolicited road projects in Sri Lanka, their risk sources and handling.

Chapter 5 – Conclusions and Recommendations

This chapter describes the conclusion of the case study research followed by recommendation with regard to the risk identification, risk allocation with project estimates and risk handling techniques of unsolicited project towards the further research issues in the area of this research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The construction industry is subjected to more risks than other industries. In construction projects, risks and uncertainties are of several types. Many of these uncertainties will involve a possible range of financial outcomes that could be better or worse than predicted (Flanagan & Norman, 1993).

This chapter first discusses the concepts of risk and risk management. It then goes on to identify the risk sources in construction projects in general. The chapter also provides an overview of unsolicited proposals and presents the stages of unsolicited project development as available in literature.

2.2 Risks in Construction Projects

2.2.1 Risk definition

Generally, the word risk can be directly linked to danger or harm that should be avoided. However, in the world of project management, risk has two sides; danger (negative event) and opportunity (positive event). This is reflected in the objective of risk management as to increase the probability and impact of positive events and decrease the probability and impact of negative events in a project (PMI, 2008). This idea of looking at risk is at the core of the private sector's thinking of risk bearing involved in delivering infrastructures. The link between risk and uncertainty is evident in various definitions of risk by various authors who see risk as derived from uncertainty or as a result of lack of certainty (Hillson, 2002; PMI, 2008).

The British Standard on Project Management (EN BS 6079-3:2000) defines risk as: an uncertainty inherent in plans and the possibility of something happening (i.e. a contingency) that can affect the prospect of achieving business or project goals. In

literature, the word “risk” is used in different meanings with different words such as hazard or uncertainty (Al-Bahar & Crandall, 1990).

Jannadi & Almishari (2003) defined risk as a combination of the probability, the severity, and the exposure of all hazards of an activity. Chapman (2001) accepted risk as the “likelihood of occurrence and the degree of impact of a negative event adversely affecting an activity”. Barber (2005) defined risk as “a threat to project success, where the final impact upon project success is not certain”.

Kartam & Kartam (2001) have argued that all the risks should rightfully reside with the owner and transfer to another party should entail fair compensation.

Risk can generally recognized among those within the construction industry as the phenomenon of continually facing a variety of situations. Mainly the situation can identified involving many unknown, unexpected, frequently undesirable and often unpredictable factors.

Compared with many other industries, the construction industry is subjected to more risks due to the unique features of construction activities, such as long period, complicated processes, abominable environment, financial intensity and dynamic organization structures (Flanagan & Norman, 1993; Akintoye & MacLeod, 1997; Smith, 2003).

Having an understanding on the meaning of risk, it is important to examine risks in project and management systems which is affected by different risks as it had been discussed earlier and is also related to the intention of this study.

This research aims at identifying the top major risks regardless of their nature of impact, whether positive or negative, through considering the probability of their occurrence and their impact or magnitude of consequence (Laila & Mohamed., 2013).

2.2.2 Risk management

The construction industry is heterogeneous and enormously complex. There are several major classifications of construction that differ markedly from one another: housing, non-residential building, heavy, highway, utility, and industrial (Sears et al., 2008). Construction projects include new construction, renovation, and demolition for both residential and non-residential projects, as well as public works projects, such as streets, roads, highways, utility plants, bridges, tunnels, and overpasses.

Risk management may be described as “a systematic way of looking at areas of risk and consciously determining how each should be treated. It is a management tool that aims at identifying sources of risk and uncertainty, determining their impact, and developing appropriate management responses” (Uher, 2003).

Risk management is probably the most difficult aspect of project management. A project manager must be able to recognize and identify the root causes of risks and to trace these causes through the project to their consequences.

Furthermore, risk management in the construction project management context is a comprehensive and systematic way of identifying, analyzing and responding to risks to achieve the project objectives (ICE 2005, PMI 2007).

Michael (2010) stated that the risk management concept is a process of identifying, analysing and responding to risk factors throughout the life of a project in order to provide a rational basis for decision making in regards to all risks and implies to control the possible future events.

Jack & Smuel (2012) have described that risk management is the process of identifying possible risk evaluating the potential consequences and then developing and implementing plans for minimizing any negative effects.

The use of risk management from the early stages of a project, where major decisions such as choice of alignment and selection of construction methods can be influenced, is essential. The benefits of the risk management process include identifying and analysing risks, and improvement of construction project management processes and effective use of resources. The success parameters for any project are in time completion, within specific budget and requisite performance (technical requirement). The main barriers for their achievement are the change in the project environment. The problem multiplies with the size of the project as uncertainties in project outcome increase with size (Dey, 2011).

Large construction projects are exposed to uncertain environment because of such factors as planning, design and construction complexity, presence of various interest groups (owner, consultants, contractors, suppliers, etc.), resources (manpower, materials, equipment, and funds) availability, environmental factors, the economic and political environment and statutory regulations. Managing risks in construction projects has been recognized as a very important process in order to achieve project objectives in terms of time, cost, quality, safety and environmental sustainability (Zou, 2007).

2.3 Project Risk Management

Project risk management provides an analytical framework to deal with project complexities. The Project complexities consist in terms of involvement of various stakeholders, high dependence on socio-economic and environmental factors, financial constraints, and non-transparent regulatory and legal frameworks by explaining Bhattacharyya & Dey (2007). Risk management has been considered in many studies of Build-Operate-Transfer projects by Dey & Ogunlana (2004) and product innovation by Halman & Keizer (1998), to the best of our knowledge.

Risk management is defined as the process of identifying and assessing risk, and to apply methods to reduce it to an acceptable extent (Tohidi, 2011). Then, the main

purpose of project's risk management is to identify, evaluate, and control the risk for project success (Lee et al., 2009).

Project risk management is carried out in collaboration with other project elements namely, scope, scheduling, quality, cost, procurement, and information and integrated with risk event and conditions of each project elements (Pejman, 2012).

2.3.1 Project risk management process

According to Risk management Dictionary (2010), a risk management process is one that systematically applies management policies, procedures and practices to a set of activities intended to establish the context, communicate and consult with stakeholders and identify, analyse, evaluate, treat, monitor and review risk.

Michael (2010) explained that the project risk management process is a quality problem - solving process with associating quality and assessment tools to determine and prioritize risks for assessment.

According to the risk in project, the rules for managing project risk are explained by Michael (2010) such as, identify the risks early on in project, and communicate about risks, consider opportunities and threats, prioritize the risks, assess the risks, develop responses to the risks, develop the preventative measure tasks for each risk, develop the contingency plan for each risk, register project risks and tracking tasks and associated risks.

Overall, risk management process includes the following main steps:

(1) Risk planning; (2) Risk identification; (3) Risk assessment (qualitative and quantitative) (4) Risk analysis; (5) Risk response; (6) Risk monitoring, and (7) Recording the risk management process (Baloi & Price, 2003).

Risk has become so important within commerce that it is now a separate field of study. Employees qualified in risk management are highly paid and in demand. Risk

management is essential for most industries and the specific risk management approach can often be determined by each industry, but there are a number of basic approaches and tools in risk management that apply in any industry. The basic approaches that apply to all industries are Risk Identification, Risk Analysis and Assessment, Risk Control and Monitoring Risks (Brigitta, 2014).

Project risk management is an integral part of the process which aims to identifying the potential risks associated with a project and responding to those risks. Construction risks are related to technical, management, logistical or socio-political aspects and natural disasters. In the domain of project management, some of the critical effects of risks are failure to achieve operational requirements and the required quality, non-completion of the project within stipulated time and estimated cost (Ehsan, Mirza, Alam, & Ishaque, 2010).

Several types of Public - Private Partnership (PPP) structures have been introduced worldwide and they differentiate upon the responsibilities and risk allocation between the public and the private sector (Diego et al., 2005).

2.3.2 Risk Identification and classification

According to the approach of Brigitta (2014), there are a number of common tools and techniques that are used by risk managers to help them identify possible risks to the organization or product. These tools and techniques are often used in combination to ensure that all potential risks are identified within the organization. Risk managers also try to ensure an environment where employees feel open about discussing potential risks without reprisal or consequences.

Brigitta (2014) further explained that risks identified by a risk manager generally fall into four categories namely financial risks, strategic risks, operational risks and hazard risks. The risks are classified by identifying the consequence, type and impact of risk. Wiguna & Scott (2006) have derived a risk hierarchy under four risk

categories: external and site condition risks, economic and financial risks, technical and contractual risks, and managerial risks.

For the purpose of risk analysis, researchers have developed various risk categorization framework. Zhi (1995) classified construction risks into four levels: Nation/region; construction industry, company and project levels.

Under these four levels, a subdivision is made, such as political, economic, market, physical risks, etc. Edwards & Bowen (1998) identified risk first into two basic categories: Natural and Human.

The natural risk is subdivided into weather and geological risks; the human risk is subdivided into nine types, such as social, political, economic, legal, cultural, etc. Han & Diekmann (2001) list five categories of risk: political, economic, cultural legal, technical/construction and other risks, which are further subdivided.

2.3.3 Risk Analysis and assessment

Risk analysis and assessment involves evaluating the various identified risks or risk events, to determine the levels of risk posed by that particular identified component or event, and to quantify the risk in order to assess the level of prevention or control that is required by that risk (Brigitta, 2014).

According to the approaches of Brigitta (2014), it is also important to consider the implications of control within the risk assessment process. The ease with which the risk can be avoided, the costs involved in risk avoidance and the costs associated with risk events, need to be considered and balanced to ensure the best possible profile for each type of risk is developed. Once the identification and assessment processes are complete, it is time to create the structures and processes to control or avoid risk.

The analysis includes who might be harmed and how that may occur. Groups of people are generally identified when dealing with who might be harmed, rather than listing people by name. Groups commonly include customers, employees or the general public. It is important to identify how they may be harmed to assess the potential consequences of each identified risk event. The type of harm can contribute to the level of management and control required by that particular risk event.

According to Bunni (1997), when a risk has been identified, assessed and analysed, it has to be allocated to various parties in order to keep them under control, prevent the occurrence of harmful consequences. Therefore, it is required to study the allocation of those risks in this research.

2.3.4 Risk Control and Handling

Risk handling by lessening their impact is a critical component of risk management. Managers need to realize the contents and effects of all alternatives before making decisions about an appropriate strategy for risk handling (Wang & Chou, 2003). Risk handling is the choice of a proper strategy to reduce the negative impact of the risk (Miller & Lessard, 2001). It is defined as the first step in risk control by Baker et al. (1999a). But Kim & Bajaj (2000) define risk handling/response as the way risk issues are dealt with. According to Flanagan & Norman (1993), risk response refers to how the risk should be managed either by transferring it to another party or by retaining it.

Further, risk handling principles are classified mainly into four categories, i.e. risk retention, risk reduction, risk transfer and risk avoidance (Carter & Doherty, 1974; Flanagan & Norman, 1993; Raftery, 1994; Baker et al., 1999b; Dey, 2001; Wang & Chou, 2003).

Wang & Chou (2003) see risk handling strategies as consisting of one, or a combination, of the above methods. Studies have proved the validity of various strategies chosen on the basis of individual projects.

However, the study by Fan et al. (2008) has established that the risk-handling decisions of a project are determined by project characteristics (e.g. project size, slack, unit prevention cost, risk situation, etc.).

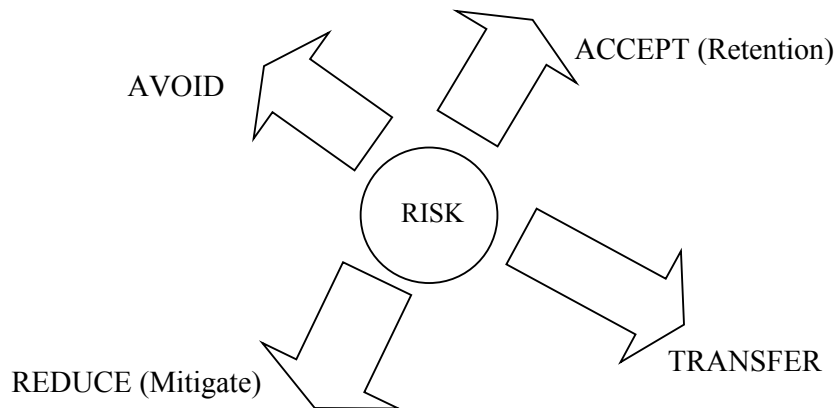


Figure 2.1: An overview of Structure for risk control

Source: Brigitta, 2014

The processes and structures are help to determine by the type of risk identified and the type of analysis associated with the risk. Risk control includes identifying procedures for risk avoidance, loss control, risk transfer strategies and potential risk retention.

Risk avoidance will include setting up procedures and controls that allow the organization to avoid the risk completely (Brigitta, 2014).

Avoidance strategies include dropping hazardous products or removing potentially hazardous situations from the organization completely. Risk avoidance can be one of the most successful strategies for risk management but not all organization risks can be avoided. For ones that cannot be avoided, the risk manager needs to identify loss control measures and risk transfer strategies. A good risk manager should also

consider the risk retention and the consequences of risk retention as well (Brigitta, 2014).

According to the PMBOK (2000), Risk control may involve choosing alternative strategies, implementing a contingency plan, taking corrective action, or replanning the project.

The risk response owner should report periodically to the project manager and the risk team leader on the effectiveness of the plan, any unanticipated effects, and any mid-course correction needed to mitigate the risk.

The risk control techniques namely, risk avoidance, loss prevention, loss reduction, separation, duplication and diversification are described the different researches of institutions as tabulated in Table 2.1.

Table 2.1: Risk Control Techniques

Type of Techniques	Poms & Associates (2014)	Chapter 5; Risk Controls – The State office of Risk Management (2005)-Austin	Clear Path Employer Services (2016)
Avoidance	Avoidance is the best means of loss control. This is because, as the name implies, it is avoiding the risk completely	Avoidance simply means to not undertake an activity, action or program that would produce an undesirable loss exposure	Decision not to create a particular loss exposure or eliminate completely any existing exposure. This is the most extreme technique. Remember, avoidance may cause new loss.
Loss Prevention	Loss prevention is a technique that limits, rather than eliminates, loss. Instead of avoiding a risk completely, this technique accepts a risk but attempts to minimize the loss as a result of it	Prevention measures concentrate on reducing the frequency of losses. If any activity or program must be undertaken	Reduces the probability or frequency of a particular loss, but does not completely eliminate the possibility of a loss.
Loss Reduction	Loss prevention is a technique that limits, rather than eliminates, loss. Instead of avoiding a risk completely, this technique accepts a risk but attempts to minimize the loss as a result of it.	Risk reduction techniques are therefore utilized to reduce the effects of perils. Risk reduction is associated with reducing the severity of a loss when it occurs.	Reduces the severity of losses that do occur.

Type of Techniques	Poms & Associates (2014)	Chapter 5; Risk Controls – The State office of Risk Management (2005)-Austin	Clear Path Employer Services (2016)
Separation	Separation is a risk control technique that involves dispersing key assets. This ensures that if something catastrophic occurs at one location, the impact to the business is limited to the assets only at that location.	Exposure segregation is a specialized form of both risk prevention and risk reduction. An organization’s activities and programs may be either separated, diversified, or duplicated	Division of a single asset into two or more assets.
Duplication	Duplication is a risk control technique that essentially involves the creation of a backup plan. This is often necessary with technology.	Duplication of exposures relies on the concept that a backup of the resource or activity will be available	complete reproduction of a standby asset as reserve
Diversification	Diversification is a risk control technique that allocates business resources to create multiple lines of business that offer a variety of products and/or services in different industries	Diversification of exposures involves the placement of assets into different asset management programs.	spreading risk across numerous areas or individuals

2.3.5 Risk monitoring

The Project Management Body of Knowledge (PMBOK - 2004) stated that risk monitoring control is the process of keeping track of the identified risk, monitoring residual risks and identifying new risk, ensuring the execution of risk plans, and evaluating their effectiveness in reducing risk.

Risk monitoring and control records risk metrics that are associated with implementing contingency plans. Risk monitoring and control is an ongoing process for the life of the project.

The risks change as the project matures, new risks develop, or anticipated risks disappear.

Good risk monitoring and control processes provide information that assists with making effective decisions in advance of the risk's occurring. Communication to all project stakeholders is needed to assess periodically the acceptability of the level of risk on the project.

According to the PMBOK (2000), the purpose of risk monitoring is to determine if the risk responses have been implemented as planned, actions are as effective as expected, or if new responses should be developed, project assumptions are still valid, risk exposure has changed from its prior state, with analysis of trends, risk trigger has occurred, proper policies and procedures are followed and risks have occurred or arisen that were not previously identified.

2.4 Unsolicited Projects in Construction Industry

According to John & Georgina (2007), unsolicited proposals are a specific type of Public Private Partnership (PPP) projects in the world. Unsolicited proposals are not requested by a government and usually originate within the private sector. These proposals typically come from construction companies with ties to a particular

Industry such as developers, suppliers, and financiers that spend their own money to develop basic project specifications, then directly approach governments to get the required official approvals.

John & Georgina (2007) further explained the Public-Private Partnership projects in deregulated, competitive markets generally do not require as much public sector support or oversight, and client have the option to turn to alternatives if a service is overpriced or quality is not satisfactory.

The different systems that governments in the world use to manage unsolicited proposals are commonly referred to as the “Bonus System,” the “Swiss Challenge System” and the “Best and Final Offer System.” Using a Bonus System, the governments of Chile and Korea grant an advantage to the original project proponent in the form of a premium used in the bidding procedure. The “Bonus,” usually between 5 percent and 10 percent, is credited to the original proponent’s bid in the open tender (John & Georgina, 2007).

The Swiss Challenge System is used in the Indian States of Andhra Pradesh and Gujarat, Italy, the Philippines and Taiwan. However, the original proponent is granted the right to counter-match the best offer and secure the contract (John & Georgina (2007).

The Best and Final Offer System is used in Argentina and South Africa is similar to the Swiss challenge in approach, but only grants the original proponent the advantage of automatically competing in the final tendering round. In practice, all the main systems have demonstrated to be effective in providing more transparency and competition to private infrastructure projects, and are much better than having no policy at all.

However, they are only as successful as the overall Public - Private Partnership systems and institutions of the country where they operate (John & Georgina, 2007).

2.4.1 An Overview of Public – Private Partnership infrastructure project and unsolicited proposal

Issa et al. (2012) stated that the pressure on governments to absorb the growth of cities and provide advanced services through building mega infrastructure projects contributed to the movement towards using private capital in the provision of public services. This approach, named Private Finance Initiative (PFI), officially started in the 1990s in the United Kingdom. The Private Finance Initiative approach is argued that infrastructure projects are the only projects open to PFI arrangements (Mountain, 1998 & Bing et al., 2005). It is further concerned with risk allocation in PFI infrastructure project which involves financing projects from private money. The PFI approach has come with many promised benefits of fast delivery, advanced technology, innovative designs and high quality.

Li & Ren (2009) seek the optimal allocation of risks between the public, client and the private company.

It is claimed that it can deliver value for money through proper risk allocation (Akintoye 1998; Treasury 1997). In this research, is aimed to investigate the issue of risk allocation in PFI infrastructure through an extensive literature review on the theory and practice of the subject.

2.4.2 Sri Lankan experience in Public - Private Partnership Projects

As stated in the Medium-Term Development Policy Framework (2011-2016) of the Government based propaganda, the privatization of state owned business is not considered as a sole strategy of economic reform.

In uplifting the management and the workmanship of the government owned business ventures, the government is paying attention to apply alternative strategies to get private sector involved. In this situation, the government is paying its attention to the fact that the private sector has a social responsibility in addition to earning profits and as such, the private sector needs to be involved in implementation of

government ventures and projects (Annual Report -Financial Commission of Sri Lanka, 2015).

As further described in the above Policy Framework, depending on Treasury funding for the government ventures should be under a minimum level and their capital base should be strengthened through different investment methods. The policy framework emphasizes Public-Private Partnership (PPP) as a successful alternative funding method. At national level, strategic plan adopted for uplifting of infrastructure has gained considerable progress in PPP approach (Annual Report - Financial Commission of Sri Lanka, 2015).

2.4.3 Risk allocation of Public – Private Partnership project

The Public - Private Partnership contracts core aspect is to transfer risk from the public to the private sector (Bing et al., 2005), although it is argued that risk transfer has arrived only as a ‘fortunate’ by product (Froud, 2003). Thus, theoretically, the majority of risks should be transferred to the private sector which is responsible for the financing, designing, construction and operation of the infrastructure project.

The advantage of risk transfer in a Public – Private Partnership contracts comes mainly from a strategy in dealing with risks; called risk spreading. It involves the ability to spread risk to a relatively high number of bearers, thus, theoretically eliminating it. Chechenia & Gifford (2007) believe that Public-Private contract deals provide the required environment for risk spreading and diversification to multiple parties. Furthermore, some public risks involved in environmental-related goods, cannot easily quantify and consequently cannot be widely spread (Spackman, 2002).

Andi (2006) has argued that "construction risks can hardly ever be eliminated. They can merely be transferred or shared from one party to another through contract clauses". This is supported by Mak & Picken (2000) who emphasize the fact that contractors have ready to accept a certain level of risk due to unforeseen costs they incur during construction and that risk is also an issue for clients.

Such allocation of risk becomes part of the risk management process. Thompson & Perry (1992) suggest that a carefully drawn up contract will ensure the right allocation of responsibilities in the same way as the procedure which determines the type of contract and the tendering procedure for a project. It will define the role of each constituent in the contract, such as the contract agreement, conditions of contract, specifications, preamble notes, bills of quantities and drawings, etc., which determine the allocation of risks. Although risks can be transferred beyond the limits of contract clauses that can only be with the concurrence of both parties as seen in the study by Wang & Chou (2003).

A party to whom a risk is allocated is considered to have the "ownership of risk," which according to Uff (1995) and Godfrey (1996) has several meanings; a) having a stake in the benefit or harm that may arise from the activity that leads to the risk; b) responsibility for the risk; c) accountability for the control of risk; and d) financial responsibility for the whole or part of the harm arising from the risk should it materialize.

However, the common understanding on risk allocation has it that the receiving party has both the competence and expertise to fairly assess the risk and to control or minimize it (Hartman, 1996 & Hayes, 1985).

This is apparent in a concession-based Public-Private Contract where the government has the overall control over demand levels of a road, but at the same time the private company has the capacity (resources) required to manage this risk. Secondly, these principles imply subjective judgment and are not easily reflected in a decision support model or in a real contract (Lam et al., 2007).

Jin (2011) proposed a theoretical framework for risk allocation that interprets the risk allocation decision making in terms of theories behind these two principles. He looked at the transaction cost economics and the resource-based view of organization's capacity

2.4.3.1 Risk allocation to unsolicited road proposals in Sri Lanka

Sri Lankan Standard Contract, the preparation of contract document is consisted with contract data to guide the ICTAD publication namely, Standard Bidding Document, Procurement of works, Major Contracts, ICTAD publication No: ICTAD/SBD/02/2007) to identify the risk allocation with contractual parties and it is applied to the unsolicited road project proposal as well.. This characteristic is also reflected in its risk allocation clauses. Some risks deals with in the SBD -02 clauses are not described and add or omit the text in contract data of contract document in unsolicited road project for further classifications.

2.4.4 Developing and managing unsolicited projects

Most Unsolicited Proposal frameworks define a step-by-step procedure for managing unsolicited proposals. Often public officials welcome an objective Unsolicited Proposal (USP) framework that allows them to deal with USPs within a pre-determined process and without having to make exceptions. Such an objective and binding framework acts as a check against abusive as well as politically motivated proposals, and empowers officials to reject such proposals on the basis of a technocratic and rule-based process.

John & Georgina (2007) explained that the steps that are typically followed in the management and submission of a USP.

- The authority evaluates the proposal.
- If the authority decides to reject the USP, returns to the proponent all documents received in the USP.
- If the authority decides to consider the USP, it confirms such a decision with the proponent in writing.
- The authority conducts a comprehensive evaluation of the USP, in line with the requirements for the assessment of PPPs or non-PPPs in the appropriate regulations, including an independent feasibility study.
- If the authority decides to proceed with the USP, it must negotiate a USP agreement with the proponent to guide the process.

- If the USP agreement is closed, then the authority must prepare and issue bid documents.
- The authority issues a Request For Qualification (RFQ) to test the market for the existence of other private entities capable of providing the product or service.
- If there is no adequate response to the RFQ, the authority prepares a draft contract for the provision of the product or service.
- If there are one or more adequate responses to the RFQ, the authority prepares a request for proposals (RFP), with a draft contract.
- The authority conducts a competitive bidding process.
- The authority reimburses the proponent should the proponent not be awarded the contract for the provision of the product or service at the conclusion of the competitive bidding process.

John & Georgina, (2007) further explained that there is no international standard for managing unsolicited PPP proposals. Some countries have found it easiest to not allow them at all. Most countries allow unsolicited proposals, but do not have special processes for managing them and directly negotiate the terms of the project through informal procedures that involves several agencies or Ministries. The best approach is allowed for governments to have clearly explained reasons for unsolicited proposals and for corresponding publicly available procedures for their management. The management process for unsolicited proposals in countries that have a formal system in place can be divided in two major stages.

1. The first stage is similar in most cases and takes place from the time the proponent presents the project to the government until all internal assessments and approvals are finished and the project is ready to be publicly tendered.
2. The second stage involves a competitive tender process; approaches tend to differ in incentives or benefits to the original proponent of the project (John & Georgina, 2007).

2.4.4.1 Stage 1: Approving Unsolicited Proposals

According to John & Georgina (2007) it is explained that the stages are applied in different countries with advanced systems for managing unsolicited proposals, follow specific procedures during the first stage as explain in section 2.4.4 (see figure 2.2).

Step 1: The private proponent first submits a preliminary description of the project to the appropriate agency or Ministry with general concepts or detailed information (John & Georgina, 2007).

Step 2: After a stipulated review period, the agency or Ministry gives a preliminary response, usually assessing whether the project serves a “public interest” or first within the strategic infrastructure plan of the government. During this review period, the agency or Ministry may also request additional legal, financial, and environmental studies that the proponent will be required to conduct at its own cost (John & Georgina, 2007).

Step 3: If the preliminary project description is accepted, then the proponent usually receives formal recognition for the project concept and finalizes the preliminary proposal. At this situation the designated agency or Ministry should have information on the applicant’s role in the concessionaire company and its ability to construct and/or operate the project, a technical feasibility study, an estimated total project cost and financing plan, an income and expenditure plan for operation such as user fee revenue, the justification of project need, and environmental or other social impact studies (John & Georgina, 2007).

A bid bond in order to guarantee the seriousness of the proposal is also required at this time for future reimbursement of proposal development cost.

Step 4: The detailed proposal is then reviewed, often through modified negotiations between the proponent and the appropriate agency or Ministry to solidify project characteristics. At the end of the submission period, the project may be approved for

a competitive process or rejected. If the project is rejected, then the project proponent may resubmit a modified version in some countries or the government may use the concept in a public bid after a stipulated period (John & Georgina (2007)).

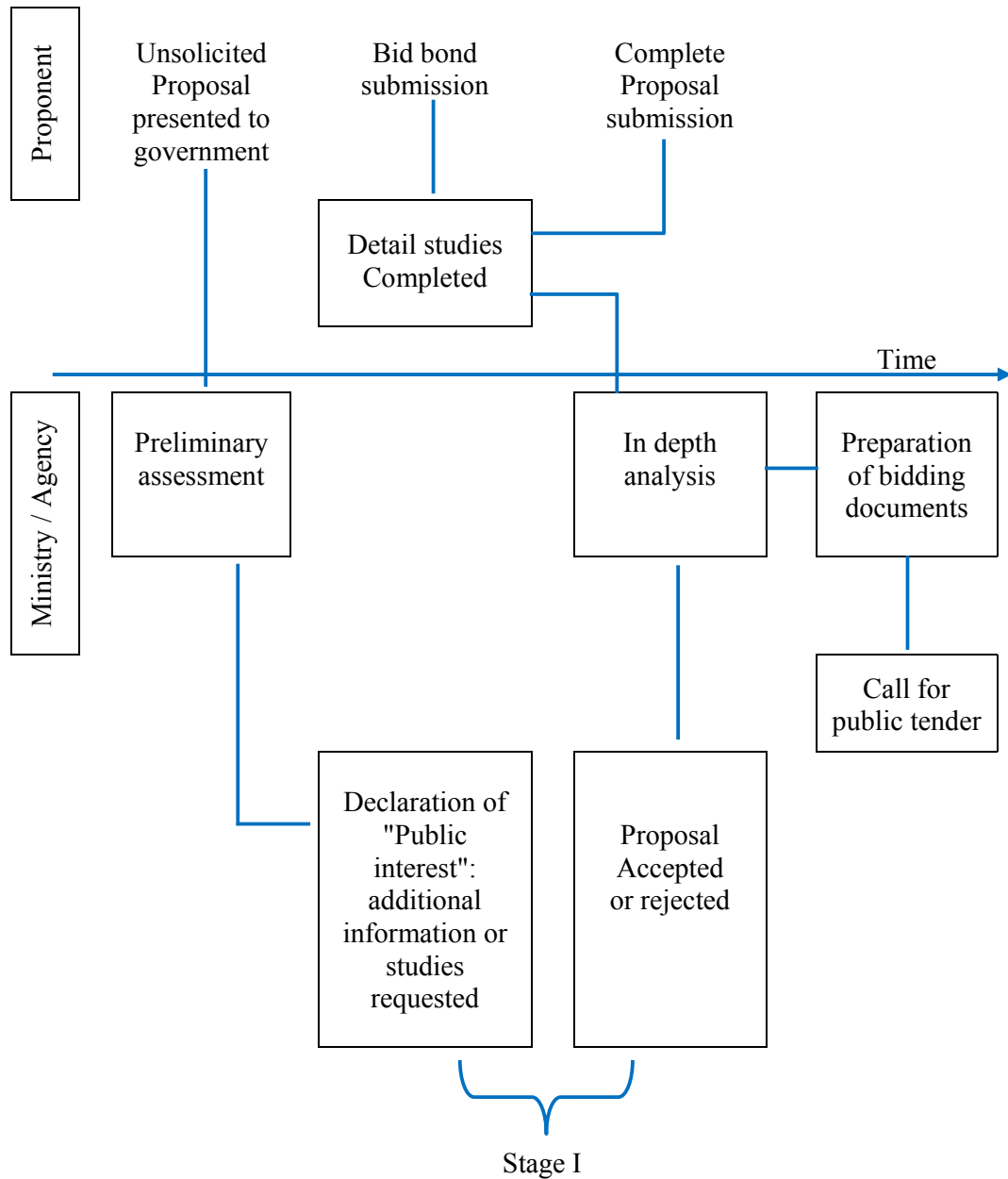


Figure 2.2: Approval steps for Unsolicited Proposals (Stage – 1)

Source: John & Georgina (2007)

2.4.4.2 Stage 2: Tendering unsolicited proposals in different stages

If accepted, the project moves on to Stage 2 where a competitive process will be carried out, typically one of three systems: Bonus, Swiss Challenge, or a Best and Final offer system.

Bonus System

John & Georgina (2007) explained that in this system an unsolicited proposal awards a bonus in the formalized bidding procedure to the original project proponent.

This bonus can take many forms, but most commonly it is an additional theoretical value applied to the original proponent's technical or financial offer for bidding purposes only.

In these cases, the original proponent's offer is selected if it is within a stipulated percentage of the best offer in the competitive process. In other cases, the bonus translates into additional points in the total score when evaluating the proposal.

After the review process of Stage 1 is completed, the following procedure takes place under a bonus system:

Step 5: Once the project is formally approved, the original project proponent is officially awarded the bonus. The value of the bonus is determined by the agency or Ministry within a maximum (10 percent in Chile and Korea) (John & Georgina, 2007).

Step 6: The project is announced in an official register or gazette and opened to public bid under the normal tendering processes outlined in the tender documents, as well as in general framework laws (for example, PPI laws, build-operate-and-transfer (BOT) laws, concessions laws, and so on) (John & Georgina, 2007).

The announcement must include the value of the bonus awarded to the original proponent and the estimated reimbursable costs for proposal development.

Competitors are allowed to submit competing bids for a designated time.

Step 7: During the public bidding phase, the project proponent may bid on the project or concession using the bonus or choose not to bid (John & Georgina, 2007).

Swiss Challenge System

A common system for introducing unsolicited PPI proposals into a competitive process is the Swiss challenge. This procedure is most well known in the Philippines, and also used in India (the states of Andhra Pradesh and Gujarat), Italy, Taiwan and the U.S territory of Guam. The system is similar to the bonus system in that it allows a third party to bid on the project during a designated time. Instead of providing a pre-determined advantage, however, the original proponent has the right to counter-match any superior offers (John & Georgina, 2007).

After the first stage of the process is completed (That is Stage 1: Approving Unsolicited Proposals, steps 1– 4, described in section 2), the following procedure takes place:

Step 5: The project is announced in an official register or gazette and opened to public bid under the normal tendering processes, which are outlined in the tender documents.

Step 6: In the Philippines, the original project proponent is also submit a bid bond during this period equivalent to that required in the tender documents for a potential challenger. This bid bond is intended to verify that the original proponent has means to fulfil the project. The agency or Ministry involved has the discretion to publish information regarding the original proposal (such as original project pricing and specifications) or to conduct a blind challenge.

Step 7: In the Philippines and Guam, when a lower price proposal is submitted and approved, the original project proponent will have 30 working days to match the

price. The Enabling Act in Andhra Pradesh does not specify a timeframe for the proponent to match the best bid.

Step 8: If the original project proponent does not match the price, then the project is awarded to the lower price project proponent of the Swiss Challenge.

Best and Final Offer System

Recently, variations of the Bonus and Swiss Challenge Systems have been developed in several countries. The key element of many of these is multiple rounds of tendering, in which the original proponent is given the advantage of automatically participating in the final round (John & Georgina, 2007).

In general, some of these newer hybrid models follow a similar approach that allows for a best and final offer. Once the project proposal completes the initial assessment (That is Stage 1: Approving Unsolicited Proposals, Steps 1– 4 described in section 2) and the tender documents are ready, the government will invite competing proposals from other developers. The procedure continues as follows:

Step 5: The project is publicized in the official register or gazette inviting proposals from third parties. Information about the bid price is not disclosed to the other bidders and the proponent has to resubmit a formal bid (John & Georgina, 2007).

Step 6: Bids are received, evaluated, and ranked. In South Africa, the two most advantageous bids are selected in the first round, from which a final round of bidding will take place. If the original proponent is not one of these two selected, it will then automatically be allowed to compete in the final round as well (John & Georgina, 2007).

Step 7: The second round takes place where best and final offers are requested only from those selected in the first round. Information about bid prices is not disclosed. The preferred bid will only be selected in the second and final round (John & Georgina, 2007).

2.4.5 Unsolicited Project Proposal in Sri Lanka

The RDA is the principal highway authority has a responsibility to provide a road network to achieve the social benefits of the people in terms of mobility and safety. Since the rehabilitation and development of the road network is undertaken with public funds at a very high cost.

It becomes the most essential responsibility of the RDA to ensure that the adequate economic returns are achieved from the investments made on highway improvements. This is achieved by carrying out feasibility studies before major projects are under taken and followed by post evaluation of these projects after completion (Annual report - RDA 2014).

Swiss Challenge System

Since available funding from the Consolidated Fund and the capacity in the public sector to implement increasing number of infrastructure projects is limited, Government seeks alternative sources of funding while ensuring efficient infrastructure service delivery and maximizing value for money. The Cabinet Committee on Economic Management (CCEM) is decided to introduce “Swiss Challenge Procedure” to be followed by the Ministries, Departments and other government organizations when dealing with unsolicited proposals (Waidyaratne, 2016).

2.4.5.1 Formal Approval for the Project

Priority projects considered by the Government of Sri Lanka (GOSL) for development through the private sector, once identified and screened by the relevant line Ministry with the assistance of the Board of Investment in Sri Lanka (BOI)/Bureau of Infrastructure Investment (BII) (in regard to the economic and financial viability of the project), is submitted to the Ministry of Finance and Planning for preliminary clearance. On the determination of the Ministry of Finance and Planning that the project should be proceeded with, the relevant line Ministry should submit a Cabinet Memorandum including the outline of the project proposal seeking:

- (a) The formal approval for the project in principle.
- (b) The appointment of a Negotiating Committee by the Cabinet with authority to develop the proposal.

The relevant line Ministry should thereafter, request the Ministry of Finance and Planning to appoint a Project Committee (Ministry of Finance- Sri Lanka, 1998).

2.4.5.2. Cabinet Appointed Negotiating Committee (CANC)

The Cabinet will appoint a Negotiating Committee to handle all matters pertaining to Build Own and Operate (BOO)/Build Operate and Transfer (BOT) projects and make recommendations on the selection of a proponent. The composition of CANC shall be determined by the Cabinet. Generally the Chairman of CANC may be Secretary to the Treasury or Deputy Secretary to the Treasury. The Secretary of the relevant line Ministry/Ministries and Chairman/BOI may be the other members. (Ministry of Finance- Sri Lanka, 1998).

2.4.5.3. Project Committee (PC)

The Project Committee will be constituted once the Cabinet in principle approves the project. The Project Committee will be appointed by the Secretary to the Treasury at the request of the Secretary of the line Ministry in liaison with BII. Its membership will include representatives of the following Ministries/Departments (Ministry of Finance- Sri Lanka, 1998).

- I. Line Ministry
- II. Ministry of Finance & Planning
- III. Board of Investment in Sri Lanka (BOI)/ Bureau of Infrastructure Investment (BII)
- IV. Relevant State Agency/is
- V. Attorney-General's Department
- VI. Any other Ministry/Department/Agency as appropriate:
- VII. Central Environmental Authority

The PC may co-opt consultants/experts from time to time to obtain expert advice. A representative of BII will function as the Secretary/Convener to the Project Committee. The Committee will service project development and will also be responsible for guiding the project through its various stages of implementation (Ministry of Finance - Sri Lanka, 1998).

2.4.5.4. Terms of Reference of Project Committee (TOR of PC)

The Project Committee will be mainly responsible for steering the preparation of the Request for Proposal (RFP) documents and submit them for the approval of the CANC. The RFP would include the following:

- (i) Criteria of assessment of technical and financial viability of the project.
- (ii) Details of specifications
- (iii) Models of relevant Agreements as decided on a case by case basis.
- (iv) Environmental data and information.
- (v) Any other relevant information.

The other responsibilities of the PC are as follows:

- (i) Schedule bids and evaluate same for consideration of the CANC.
- (ii) Monitor the progress during project development phase and report to CANC periodically.
- (iii) Co-ordinate all activities including scheduling meetings, correspondence, etc., relating to the project (Ministry of Finance - Sri Lanka, 1998).

2.4.5.5. Legal Obligations

Since negotiations on project proposals may result in legal obligations on the part of the Government, recommendation for any contractual commitments and Government guarantees, if any should be made by the relevant line Ministry/ BII in consultation with the Treasury and Attorney-General and be approved by the Cabinet prior to entering into any formal contractual commitment ((Ministry of Finance – Sri Lanka, 1998).

2.4.5.6. Time Frame:

The period of time is decided according to the process from invitation to conclusion. The issue of a Request for Proposals (RFP) to signing of an Implementation Agreement (IA) should be limited to one year (12 months). However, the time frame may be extended with Cabinet approval depending on the complexities of the project proposal on a case by case basis (Ministry of Finance- Sri Lanka, 1998).

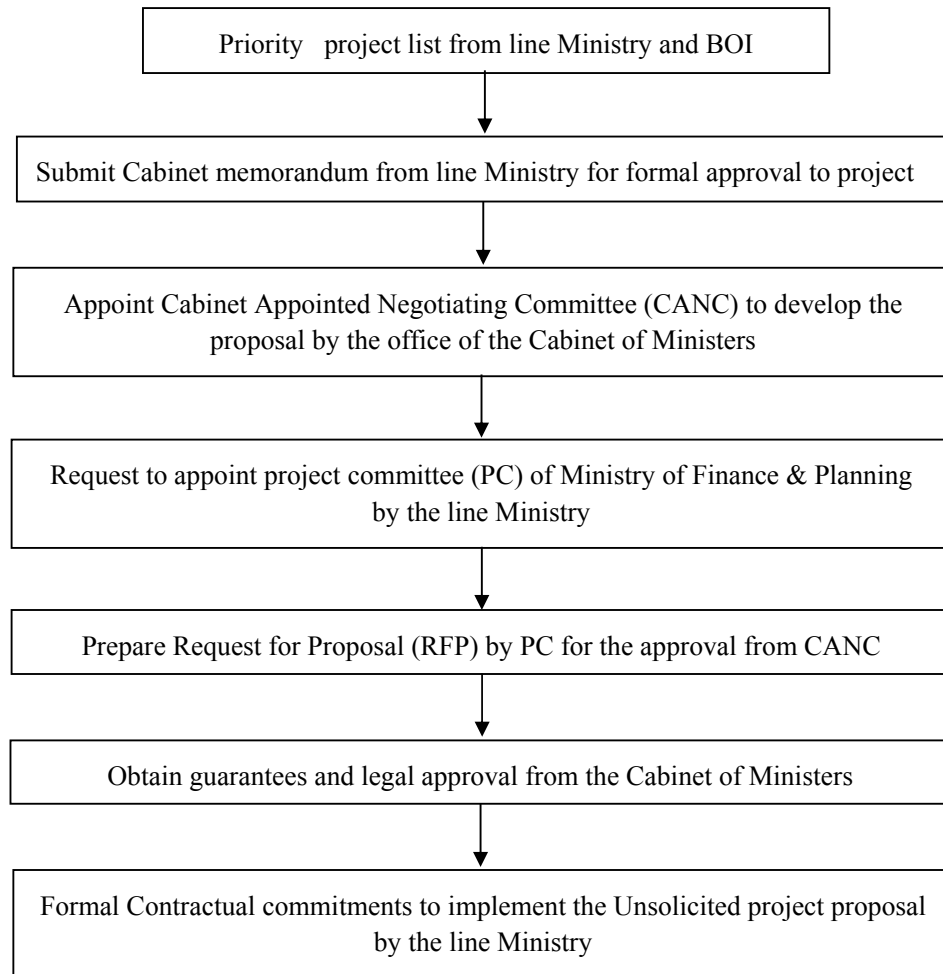


Figure 2.3: Stages of the management process of unsolicited project in Sri Lanka

Source: Construction Division, RDA (2011)

2.5 Project Risk and Sources

Different type of risk factors are categorized in the places of applicable and the research is achieved through the following factors.

Risk Sources: Risk source is defined as any factor that has a potential to cause harm to a project either owing to an adverse change from initial project conditions or an unexpected situation (Fidan et al., 2011).

Risk Event: A risk event is the occurrence of a negative happening (Standards Australia, 2004). Risk factors lead to risk consequences through the occurrence of risk events. Risk events can be described as variations (increases or decreases) in quality and quantity work, productivity, performance, and schedule such as delays, interruptions or progress payments.

The four type of risk sources are Technical and Contractual risks, Economic, Financial and Political risks, Managerial Risks and External and Site Condition risks (Wiguna & Scott, 2006).

The identification of project level risks, according to their potential effect on construction project objectives considered to important categories of internal and external risks in project with summarized as follows (Nerija & Audris, 2012).

Table 2.2: Project level Risk categories

Internal Risk sources	External Risk Sources
Design risks	Natural risks
Right of way risks	Inflation and interest rate risks
Environmental risks	Fiscal policy risks
Organizational risks	Political risks
Project management risks	Globalisation
Construction risks	Exchange Fluctuations

Source: Nerija & Audris (2012)

Laila & Mohamed (2014) further stated that sources of risk influence projects' performance in terms of time, cost and quality in negative or positive ways. These sources are classified according to their nature into physical, environmental, design, logistics, and financial, legal, political, construction and operation risks.

They are also classified into internal and external risks. Internal risks include financial, design, contractual, construction, personal and operational risks, whereas external risks include economic, social, political, legal, public, logistical and environmental risks.

2.5.1 Risk Sources Associated with Construction Project

Construction project is also supposed to identify different unpredictable factors so that the whole project activities are implemented with risks which may be controllable or uncontrollable in specified time frame. The project managers do effective planning for the risk associated with the project. But, before doing this, as a project manager must know the assessment of the project risk and what are the sources of the project risk without knowing the same, project manager cannot really plan the risk management (Predip, 2012).

The sources of risks in project are specific because of the infrastructure development nature and geography of the country. In this situation, there are evidences that the employer and contractor do not consider the attention to those risks, thereby causing delay of schedules, cost overrun and insufficient workmanship. The risk events of the construction project were identified such as schedule, scope, resources, quality, cost, Material and equipment (Predip, 2012).

On the basis of studies on different types of projects like residential, industrial, and commercial and infrastructure development in various foreign countries, twelve critical risk sources identified to construction project in pre contract stage are shown in Table-2.3.

Table 2.3: Risk Sources in Construction Project with Researchers

Risk source	Chris (2000)	Dey (2002)	Ghosh et al.(2004)	Hans W. A. et al (2009)	Wong et al.(2010)	Memon et al. (2011)	Rezakhani (2012)	Issa (2013)	Aziz (2013)	Goh et al.(2013)	Abd El-Karim et al. (2015)	Jayasudha & Vidiyelli (2016)	Perera et al.(2011)	Abeyratne & Jayasena (2013)	Rashed et.al (2012)
1.Schedule of work										x	x				
2.Procurement of Resource							x					x	x	x	
3.Dealing with utility agencies									x				x		
4.Tentative drawings	x												x		
5.Designs changes		x	x		x					x				x	
6.Dependence on local funds			x							x				x	x
7.Project Period											x				
8.Possession of site				x									x		
9.Delay caused by authorities				x											
10.Scope Changes					x		x						x		
11.Improper BOQ						x								x	
12.Quality measures work								x							

Risk sources given in Table 2.3 are explained in details below.

1. Schedule of Work

Goh et al.(2013) stated that the manage time risk, referring to risks of tight scheduling, inappropriate time allocation and short bidding time, is frequently triggered by other risk factors such as weather risk, technical risk and design risk. The schedule of work programme is essential in initial stage of the construction work it has to be planned on time with applicable to the hardware or software.

Abd El-Karim et al. (2015) explained that the uncertainty in construction project cost and scheduling, which in turn, impact the assessment of cost and schedule overruns.

2. Procurement of Resource

The ability to overcome the risks associated with the procurement of, or contracting for, the execution and operation of the project. This risk factor involves issues or concerns associated with the contractual and procurement approaches, systems and processes used for both project execution and operation (Jayasudha and Vidivelli, 2016).

Jayasudha & Vidivelli, (2016) further explained that unpredictable really and requirement of construction stages cannot expect availability of the resources as planned. That is the procurement of resources are risk in such stages and resources can be used from some other projects as well, in that case managers need to get someone new and it can create a problem in schedule and cost both. Sometimes the quality is also in case of inexperience because the deliverable can be of poor quality due to some other imposed factors that is a huge risk and contractors are responsible for this aspect.

3. Dealing with Utility Agencies

There are many parties involved to communication and coordination with other parties is a very crucial factor to achieve the time in a project. Effective communication can alleviate most of delay factors. Proper communication and coordination channels between various parties should be established during each phase of construction.

Any problem with communication may result in severe misunderstanding and therefore delays in execution of the project (Aziz, 2013). Road construction is the major part of an integrated to the infrastructure development work in such area, so that the influence of various utility agencies are significantly impact to shifting of utilities, demolishing and dismantling work or salvage wholly or in part of all existing structures. The failures to achieve those works completed properly are a major risk to complete the project in schedule date of completion.

4. Tentative Drawings

Shop drawings represent the assembly details for erecting a structure which should reflect the intent and rationale of the original structural design. They are prepared by the construction contractor and reviewed by the design professional. However, since the responsibility for preparing shop drawings was traditionally assigned to construction contractors, design professionals took the view that the review process was advisory and assumed no responsibility for their accuracy (Chris, 2000). In pre contract phase, the contractor has been submitted the proposal with typical drawings and tentative drawings are used to commence the works as scheduled, the changes will occurred due to site conditions. The cost and time incurred to changes of drawings is carried out the risks for the contractor.

5. Designs Changes

The success parameters for any project are in time completion, within a specific budget and with requisite performance (technical requirement). The main barriers in achieving these are changes that occur in the project environment. The problem multiplies with the size of the project as uncertainties in project outcome increases with size. Large-scale construction projects are exposed to uncertain environments because of the factors of climactic environment, planning and design complexity (Dey, 2002).

The contractor is submitted the proposal with specified geometric and pavement designs. However the designs have been reviewed by the Engineer and given the authority to make changes from section to section of entire road lengths or structures.

If there are any changes from the initial geometric and pavement designs, the entire work programme, Bill of Quantities and resources are changed and influenced to duration of project period and estimated cost, so that it becomes a risk of the unsolicited project.

6. Dependence on Local Funds

Time risk can be reduced in its likelihood of occurrence and the severity of impact through the manipulation of other resources. For example, additional resources, including human resources, equipment and money, can be allocated to reduce the delay in a project. A compromise may be required to balance the time risk and the financial risk to achieve the best situation for the project. (Goh et al., 2013). Financial and economic risk is composed of: (i) unavailability of funds; (ii) financial failure of contractor; (iii) economic disaster, (iv) tenderers price (v) exchange-rate fluctuation; and (vi) inflation (Ghosh, 2004).

The unsolicited projects are locally funded projects for which the funding sources are private and state owned banks. The funding agencies are already selected by the contractor and agreement signed with employer (RDA) and funding agency to resettle the loan in grace period with interest. Therefore the risks involved with the dependence on these funds are utilized to other projects which were funded by another funding source to overcome delay of payments by the employer. If the employer is not resettling the funds use for other projects, the funding agency is limited to issue the funds until settlement the withdrawing funds from the unsolicited project.

7. Project Period

Several imperative factors that affect cost and time contingency are identified and studied for affecting cost overrun and schedule overrun. They are divided into four major criteria: (a) Site Conditions, (b) Resources, (c) Project Parties, and (d) Project features related factors. Site conditions include environmental, Sub-surface and Site location. Resources include Labour, Equipment and Material. On the other hand, project parties cover Owner, Engineering & Design, Contractor and Project

management. In addition, Project features cover Financial, Political and schedule sub-criterion (Abd El-Karim et al., 2015).

The contractor has been agreed to complete the project work in specified project period and confirmed the letter of acceptance within 14 days of date of receiving in post contract phase. However the geometric and pavement design changes, scope changes due to site condition and new works, the project period may be extended and the contractor has incurred to extension of time period and additional cost of preliminary items and maintenance, it will affect the contractor and employer risk.

8. Possession of Site

Sarwono (2014) explained that land acquisition risk has always been considered as one of the risk that could have a significant impact on the overall success of an infrastructure project. On-time land acquisition is very important since a slight delay in the acquisition of only a small area of the land that is a section of a project could affect the entire schedule and viability of the project. In order to minimize this risk, the Sri Lankan government has improved the existing land law so that it will enable the government to immediately acquire the required land for highway development. Depending on the size of the project and the amount of political support given by the government towards the project, the land acquisition process normally will take one to three years.

The contractor has been mobilized the construction work after handing over the road and work commenced without issues of land acquisition work and shifting of utility services. If there is any delay of possession of site, the contractor could not maintain the schedule of work and the employer has a risk to complete the work as specified project period.

9. Delay Caused by Authorities

For most of the time, the government does not grant an approval on project-related issues on-time and sometimes they even cancel those that had been approved previously. Such condition makes the approval process a very time-consuming

practice and could result in a delay on the overall project development process. Moreover, the lengthy approval process is mostly due to several causes such as the unprofessional and incompetence of the government officials, poor implementation of the law and regulations by the government, complex and bureaucratic approval procedures, and decentralization with unclear responsibility provision which creates unnecessary requirements from many divisions and levels for just one simple problem in a project (Sarwono, 2014).

Immediately after the contract is awarded, the construction phase begins. In cases where detailed drawings and technical specification were available as a part of the tender document, the contractor proceeds with the construction. During the construction it may occur in practice that some requirements resulting from the drawings and technical specifications are divergent, in some cases the site conditions might differ from those taken into consideration in the design, or other circumstances influencing the assumption of the project have been met. The Contractor has submitted the necessary request to proper approval for construction activities from the relevant authorities through the Employer to avoid any risk of delay work.

10. Scope Changes

Project risk management is in collaboration with other project elements and an efficient risk management plan considerably increases the chance of gaining project scope and the effect of other project elements with project risk management is integrated with through ten risk event such as Management Integration, Information Management, Human Resources, Procurement Management, Cost Management, Conditions of Scheduling, Quality Management and Conditions of Scope (Rezakhani, 2012).

The analysis has produced important findings concerning the reasons highway projects have overrun and provided evidence of the most important risks on which highway agencies need to focus their efforts. Of particular concern are changes in project designs and scope changes during project development. (Wong et al., 2010).

Scope should be clearly defined as part of the Project Definition. Much of the work at that time is directed at agreeing the optimum definition of the project to operate in construction activities with the coordination of both parties. Any changes of the project scope, the risk occurred in both parties to fulfil the project work as the schedule of work without change the project cost in unsolicited projects.

11. Improper BOQ

Cost is the fundamental component for any construction project. However, cost overrun is observed as one of the most frequently occurring issues in construction projects worldwide and need to be studied more to alleviate this issue in the future. This leads to serious need of addressing the critical issue of construction cost overrun. To avoid construction cost overrun, very first and most important step is to identify and understand the causes and factors responsible for that. (Memon et al., 2011)

The proposal has been submitted by the contractor with relevant drawings and the final Bill of Quantities (BOQ) is carried out with respect to original BOQ of the proposal. The Pre contract stage, the employer signed the agreement with contractor with negotiated or discounted BOQ without changing the quantities or items of original BOQ.

Therefore the exceeding BOQ quantities and additional work is the major risk to complete the work within project estimate by the contractor.

12. Quality Measures Work

Lean construction is a new philosophy oriented toward construction production administration. It sets productive flows in motion in order to develop quality control systems with the aim of reducing losses throughout the process. Evaluating the effect of using the new tool is described in terms of two measurements: Percent Expected Time-overrun (PET) and Percent Plan Completed (PPC). The most important risk factors are identified and assessed, while PET is quantified at the project start and during the project execution using a model for time-overrun quantification. The

results showed that the relationship in total project time is reduced due to decreasing PET values, while PPC values improved to quality measures work of the project (Issa, 2013).

The contractor has implemented the work in proper supervision staff and coordinating the Engineer representative of the employer with relevant drawings, specifications and testings. The contractor shall execute and complete the works and remedy any defects in the satisfaction of the Engineer.

Therefore the contractor has to implement the quality measures work to complete in specified period without defects otherwise the contractor has a risk to complete the work within defect notification period.

2.6 Summary

Risk management refers to the practices and procedures that an organization uses to manage the risks it faces. Risk refers to the uncertainty that surrounds future events and outcomes. It is the expression of the likelihood and impact of a future event with the potential to influence the achievement of the organization's objectives.

Integrated risk management in road construction projects extends risk management practices throughout the organization's structures, processes, and culture. It incorporates and aligns risk management in road construction projects with business planning, the setting of objectives, decision making, and other management activities of the organization. It considers environmental, strategic, operational, and financial risks across the organization. Therefore, road construction projects are social capital projects which are operated in an environment affected with risks.

The ability to manage risk factors is one attribute of an effective public service. That is the managing risk; important risks are to be identified first and can increase the certainty that its programs and activities will meet their objectives. To the extent that integrated risk management contributes to better management and delivery of

programs and better value for money, it clearly has a role in making the public service more effective and properly allocated to the contractual parties so that they can be analysed and an appropriate response can be determined. The employer or the contractor, who is allocated the risk that occur with risk sources and response which will be required to accept the consequence of risk allocations.

Prior recognition of risk Allocation in risk management can help projects make more informed decisions in managing the environmental, strategic, operational, political, and financial risks that are within their control and can position them to better respond to risks that are beyond their control. Therefore the risk handling decisions can contribute the risk management in road construction projects which help managing risk and control activities across an organization; the two are inextricably linked more accurately. Control includes management actions to manage and/or mitigate risk to an acceptable level while supporting the organization's objectives.

The researcher looks financial risk management at specific type of PPI projects called “unsolicited proposals.” Unsolicited proposals are not requested by a government and usually originate within the private sector. These proposals typically come from companies with ties to a particular industry such as developers, suppliers, and financiers. Basically the institutions spend their own money to develop basic project specifications, then directly approach governments to get the required official approvals.

Altogether twelve risk sources were identified from the literature as applicable to construction projects in general. Moreover, the management and development process of unsolicited proposals were identified under section 2.4.4, stages as Approving Unsolicited Proposals and Tendering Unsolicited Proposals. The remaining sections of this research investigate the applicability of these identified risk sources and the unsolicited project process to the unsolicited road projects in Sri Lanka.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Literature synthesis concluded the approach and identification of research questions considered in the previous chapter and the aim of this chapter is to formulate the methodological and systematic frame work in order to accomplish the pre-determined research objectives. Hence, this chapter explains the research design, approach, strategy and techniques in terms of data collection and analysis that will be undertaken in the study.

3.2 Research Design

According to Trochim (2006), research design is the structure that links all the elements in the research. The research designs refer to the overall strategy and choose to integrate the different components of the study in a coherent and logical way which provides details on the methods undertaken in data collection, measurement and analysis of data to effectively address the research problem (De Vaus, 2001).

3.3 Research Process

Research process consists of series of actions or steps necessary to effectively carry out research and the desired sequencing of these steps (Kothari, 2004).

(Blankenship, 2010) has explained that scientific research involves a systematic process that focuses on being objective and gathering a multitude of information for analysis so that the researcher can come to a conclusion.

According to the Blankenship (2010), the scientific research process is a multiple-step process where the steps are interlinked with the other steps in the process. If changes are made in one step of the process, the researcher must review all the other steps to ensure that the changes are reflected throughout the process.

Figure 3.1 illustrates the research process for the study.

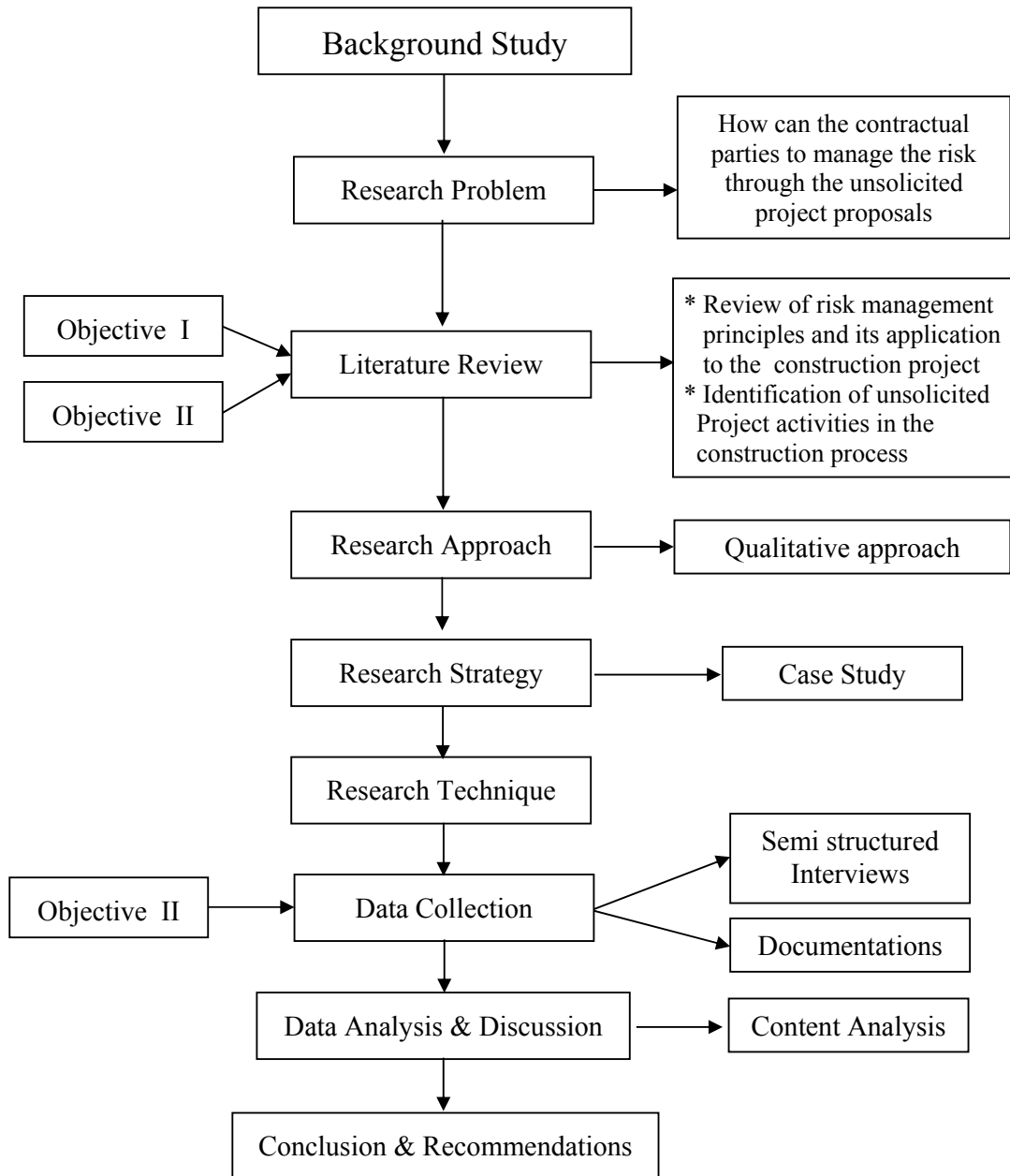


Figure 3.1: Research frame work

3.4 Research Approach

Identifying a solution of a research problem, the most suitable approach has to be selected which help to fulfil the research objectives by the researcher. Two types of research approaches are identified as Inductive and Deductive method. Most of the inductive approach, deals with the observations of data, interviews and questionnaires which are based to find out the solutions of research problem (Hasan Z. et al., 2016)

Hasan Z. et al. (2016) explained that the deductive approach, the theories are tested to build the hypothesis of research problems and most suitable and economical surveys are conducted to find the solution of research problem. Main distinction between inductive and deductive research approach relates to the existence and placement of hypotheses and theories. Specifically, if the researcher adopts a range of hypotheses the research is aimed to explore, then it will be deductive research. On the other hand, if hypotheses are absent at the start of the research then it will be the case of inductive research. The researcher has selected the inductive approach that was followed in this research is the case study research giving the emphasis on the research question in concern to find out the solution of research problem.

Susan (2011) explained that there are two types of Research Methodologies such as quantitative and qualitative research approaches.

The Qualitative Research involves describing in details specific situation using research tools like interviews, surveys, and observations which are used to gain an understanding of underlying reasons, opinions, and motivations. The sample size is typically small, and respondents are selected to fulfil a given quota.

The Quantitative Research requires quantifiable data involving numerical and statistical explanations. Quantitative Research is used to quantify the problem by way of generating numerical data or data that can be transformed into useable statistics.

In this research, the cases are determined and data generated to uncover trends in thought and opinions and deeply concern to solve the issues.

The data collection is done by using unstructured or semi structured techniques. To ensure the easy application and the accuracy of data collection in case studies, the qualitative research approach is selected and gathered data with individual interviews and observed the documents in focus groups of the project phases in unsolicited road project of Sri Lanka.

According to the explanation by John & Georgina (2007), the stages of the current unsolicited project proposal are identified and used to find the project risk using the following stages and the data collection is done to follow the interview guide line through the respondents of the current unsolicited projects as four cases.

Stage 1: Approving the Unsolicited Road Proposal

Stage II: Tendering the Unsolicited Road Proposal

3.5 Research Strategy

Research methodology in essence is focused around the problems to be investigated in a research study and therefore it varies according to the problems investigated. It is important in a study that there is consistency between research questions, methodological and theoretical approaches (Churchill & Sanders, 2007). Research strategy is one of the components of research methodology. Research strategy provides overall direction of the research including the process by which the research is conducted (Remenyi et al., 2003).

Research Strategy is a methodology that helps the researcher to investigate the research issues. According to Saunders (2003), research strategy is a general plan that helps researcher in answering the research question in systematic way.

The process of research strategy in deferent stages was introduced by Robert K.Yin in 1994. Each stage of the methodology consists of a discussion of procedures recommended in the literature, followed by a discussion of the application of those procedures in this research.

1. Design the case study protocol

The first stage in the case study methodology recommended by Yin (1994) is the development of the case study protocol. This stage is composed of two subheadings: Determine the Required Skills and Develop and Review the Protocol.

Yin (1994) suggested that the researcher must possess or acquire the following skills to determine the required skills such as the ability to ask good questions and to interpret the responses, be a good listener, be adaptive and flexible so as to react to various situations, have a firm grasp of issues being studied, and be unbiased by preconceived notions. The design and develop the protocol based on the design and develop the draft questions.

2. Conduct the case study

The second stage of the methodology recommended by Yin (1994) and which were used in the current study is the conduct of the case study. There are three tasks in this stage that must be carried out for a successful project: Preparation for Data Collection, Distribution of the Questionnaire, and Conducting Interviews. Yin (1994) suggested three principles of data collection for case studies:

1. Use multiple sources of data
2. Create a case study database
3. Maintain a chain of evidence
4. Analyse case study evidence

"Data analysis consists of examining, categorizing, tabulating, or otherwise recombining the evidence to address the initial propositions of a study" (Yin, 1994). The analysis of case study is one of the least developed aspects of the case study methodology.

Yin (1994) suggested that every investigation should have a general analytic strategy, so as to guide the decision regarding what will be analysed and for what reason. He presented some possible analytic techniques: pattern-matching, explanation-building, and time-series analysis.

In general, the analysis can expect on the theoretical propositions that led to the case study. If theoretical propositions are not present, then the researcher could consider developing a descriptive framework around which the case study is organized.

3. Develop conclusions, recommendations, and implications based on the evidence

The reporting aspect of a case study is perhaps most important from the user perspective. The results of this study can be presented in a future article in this publication, and can include a detailed description of procedures and the results derived from the statistical tests. These results are presented not exclusively as statistical results, but with accompanying explanations of the meaning of those test results. In that way both the technical requirements and the informational needs are met.

As indicated by Yin (1994; 2003) the case study design represents the research plan that guides the process of data collection, analysis and interpretation. Four types of case study designs were proposed by Yin (2003): (a) single case (holistic), (b) single case (embedded), (c) multiple cases (holistic) and (d) multiple cases (embedded). Initially, the single case design implies the deployment of one case study and it is holistic when it involves simply one unit of analysis or the case itself whereas, it is embedded if it integrates more complex sub units of analysis (Yin, 2003).

The present researches used the qualitative research approach to analyses and understand the field and other data. A different approach was purposefully selected in order to effectively advance the understanding of project risk and the study focused heavily on qualitative data obtained from case studies. Case study is one of

such research strategies. Here, a study which sought to adopt case study as the preferred research strategy is discussed.

3.5.1 Research question

Rehabilitation and Improvements of roads is one of the major infrastructure development activities in the fundamental development activity in the country. The massive road development work is implemented throughout the country and risk of the construction activities in pre and post contract stages has to be handled effectively if there is a risk identified and mitigated with major parties together. In Sri Lankan construction industry, the road construction work is focused the major role of the development activates with collaboration the other industry and the behaviour of risk factors has to be researched on the following two questions, which can be the concern in this research pertaining to the unit of analysis.

Therefore, the two major questions are drawing to concern in case study.

1. What are the risk sources in unsolicited road projects in Sri Lanka?
2. How are the contractual parties allocate and handle the risks in unsolicited road projects in Sri Lanka?

3.5.2 Unit of analysis

The first step in deciding how can one analyse the data is to define a unit of analysis (Trochim, 2006).The definition of the unit of analysis in research design is focused in fundamental activity of the data collection from “how” or “what “questions (Yin 1994).

Through the case study of this research, the risk activities undertaken by the contractual parties in unsolicited road projects were analysed. Thus, the unit of analysis was the risk study in contractual parties in pre contract stage of unsolicited road projects in Sri Lanka as shown in the figure 3.2 below.

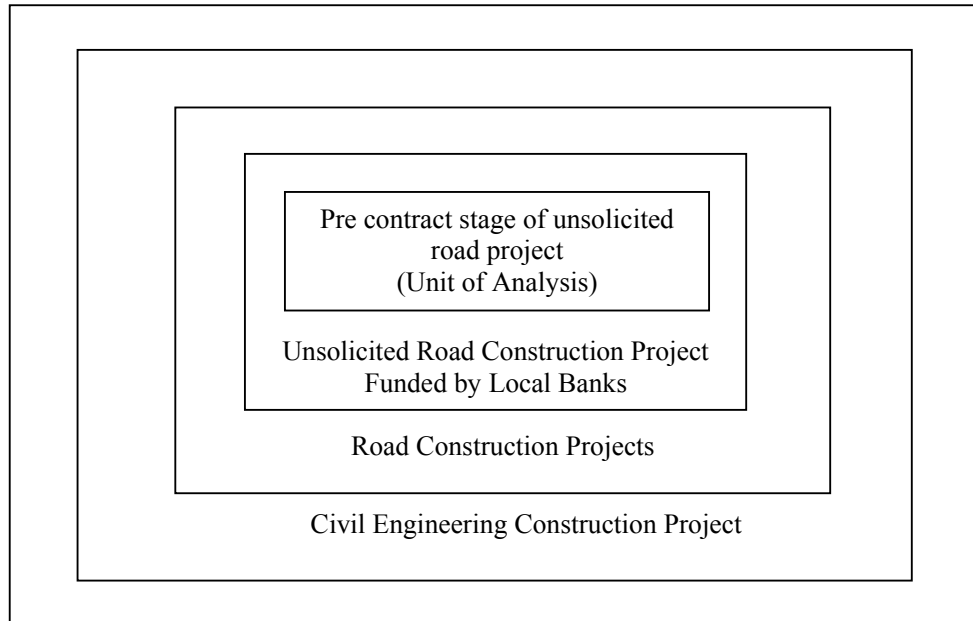


Figure 3.2: Unit of Analysis

3.5.3. Case selection

A case study should incorporate an element of protocol and strategies that contains more than the survey instruments; it should also contain procedures and general rules that should be followed in using the instrument. Yin (1994: 64) listed this necessary protocol to include:

- An Overview of the case study project (objectives, issues, topics being investigated)
- Field procedures (credentials and access to sites, sources of information)
- Case study questions (specific questions that the investigator must keep in mind during data collection)
- A guide for case study report (outline, format for the narrative)

To achieve deep understanding in case study research requires a multiple research methods across multiple time periods (i.e. triangulation).

According to Woodside (2010) triangulation includes (1) direct observation by the researcher within the environments of the case, (2) probing by asking case participants for explanations and interpretations of “operational data” (3) and analysis of written documents and natural sites occurring in case environment.

The use of mix or multiple methods in case study usually contributes to increasing accuracy and complexities/coverage in a study more than generality according to Woodside (2010).

The selection of case studies should be made based on “Purposive sampling” and not based on “random sampling” as is the case with survey research (Yin 2003). Yin (2003) argued strongly that multiple cases should be considered as multiple experiments and not multiple respondents in a survey and cases must be selected based on replication logic and not based on sampling logic. As a result, each case either predicts similar results (literal replication) or predicts opposite results for predictable reasons (theoretical replication).

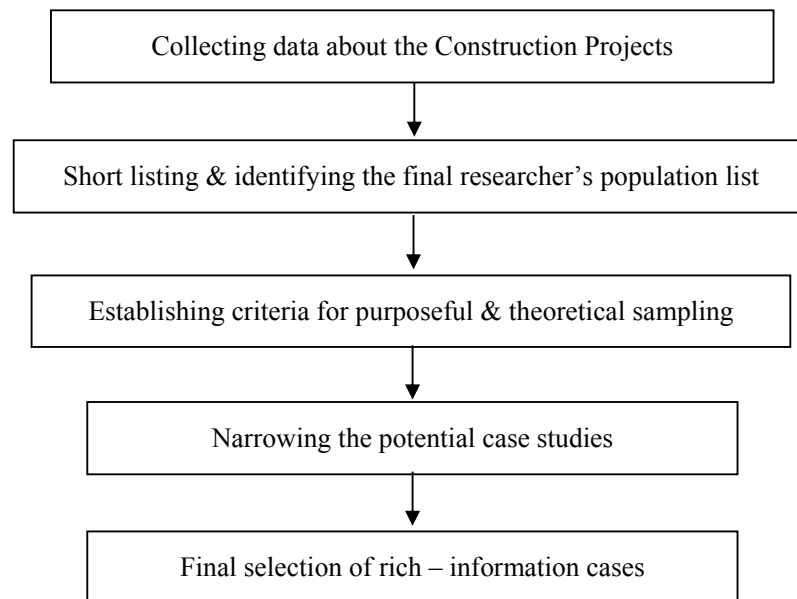


Figure 3.3: The Selection Process of case studies
Source: International Review of Business Research Papers
(Volume-6 Numbers 2 July 2010, Pp.109)

3.5.3.1 Selection of cases in road projects

In this research study, four unsolicited road projects were selected as Cases to evaluate the risk in different stages of unsolicited projects. Basically the Cases were included in to annual road rehabilitation work programme of National road list of Road Development Authority and identified as unsolicited road projects in each case which had been completed in recent past.

Class A&B road construction work is being carried out by assisting the Road Development Authority (RDA). RDA consists mainly of the maintenance and development of the roads & bridges in the national highway network in Sri Lanka (Road Master Plan-RDA, 2007:2017). According to the master plan, RDA has a responsibility for the development of the national road network to cater for the ongoing overall development programme of the country.

According to the annual rehabilitation road list of RDA, two nos. of Class A unsolicited road projects and two nos. of Class B unsolicited road projects were selected to evaluate risk sources and events because all roads were included in the national road list, considering easy access to data collection of the research, easy reference of contract documents and infrastructure developing areas including urban, sub urban and rural.

Selection of those four road projects are finalized by means of discussions made with contract administrators of Local Banks Funded Project division of Road Development Authority. The procurement guild line of projects was followed with Standard Bidding Document, Procurement of Works - Major Contracts of ICTAD publication No – ICTAD /SBD/02. The table 3.1 gives the details of the four cases.

Table 3.1: Details of Cases

Characteristic	Case A	Case B	Case C	Case D
Road Classification	Class A – Project 1	Class A – Project -2	Class B - Project -1	Class B- Project -2
Name of the Employer	RDA	RDA	RDA	RDA
Length of the Road	23.0 Km	97.1Km	33.0 Km	23.0 Km
Date of Commencement	07-09-2013	01-05-2012	11-03-2012	17-04-2012
Scheduled Date of Completion	07-03-2015	31-10-2014	20-09-2014	16-04-2014
Original Construction Period (Months)	18	30	30	24
The Original Contract Sum (Rs.Mn.)	6,956.05	7,995.00	2,750.00	2,328.36
Province	Western	North central/ Eastern	North central	Southern
Type of specification	Standard Bidding Document -02	Standard Bidding Document -02	Standard Bidding Document -02	Standard Bidding Document -02
Funding Agency	National Bank of Sri Lanka -1	National Bank of Sri Lanka -2	National Bank of Sri Lanka -3	National Bank of Sri Lanka -2

(Source: Progress Report, RDA – LBFP Division)

3.6 Research Techniques

A qualitative researcher is a person who employs qualitative research methods to complete research studies, conducts subjective research based on detailed observations of people in different settings using a variety of methods. The following two types of Research Techniques were attended to consider the qualitative research method.

3.6.1 Data collection techniques

According to the data collection as described by Robert K. Yin in 1994, three principles of data collection were adopted to obtain the maximum benefits that could be gained from the different sources of evidence.

Principle -1: Use Multiple Sources of Evidence

Robert K. Yin (1994) stated that an approach to the individual sources of evidence was not recommended to conduct case studies and gathered the more different sources of evidence effectively strengthened the case study. Yin (1994) identified six primary sources of evidence for case study research. The use of each of these might require different skills from the researcher. Not all sources are essential in every case study, but the importance of multiple sources of data to the reliability of the study is well established (Stake, 1995; Yin, 1995). The six sources identified by Yin (1994) are: Documentation, Archival Records, Interviews, Direct Observation, Participant Observation and Physical Artefacts. Therefore two sources of evidence were used for data collection in this case study research; they were documentation review and semi-structured interviews.

Semi - structured interviews

Robert K. Yin (1994) discussed that the interview is one of the most important sources of the case study. Semi-structured interviews were conducted to collect data by using interview guide line (Refer Appendix-A, the interview guide line of Employer and Contractor). The semi-structured interview is allowed the standard and open type questions.

3.6.1.1 Data collection of case study: document review

The document review was developed and based on the findings of the case studies in order to achieve the objective one of the study (Refer section 1.4). Documentations review work were done to collect the data for understanding the approach of develop and manage the unsolicited project in the literature review and the current approach of implement and complete the unsolicited road project in Sri Lanka. (Refer the section 2.4.5 & 4.2.1)

The list of documents are tabulated as table 3.2

Table 3.2: List of Documents in Unsolicited Projects

Section 2.4.5	Section 4.2.1
Board Paper for Request for Proposal	Approved list of National road of RDA
Cabinet Memorandum	Approved Technical proposal submitted by Contractors
Cabinet decision	Technical Evaluation Report
Views on Cabinet Paper – Central Bank of Sri Lanka	Contract Document
Priority list of National road of RDA	Contract agreement
Technical proposal submitted by Contractors	Discounted BOQ
Evaluation report by project committee	Typical drawings
Loan agreement	Funding facilities from the Bank
Engineer’s Estimate	
Treasury guarantee	

3.6.1.2 Data collection of case study: semi –structured interviews

The interview guide line was developed with the aim of identifying the risk sources and events in unsolicited road project in Sri Lanka. Semi structured interviews were undertaken and thus, open ended questions were included. The guide line was categorised into different functions which were based on the literature for convenience. The structure of the interview guideline is depicted in Table 3.3 below.

Table 3.3: The Structure of the Questions of Interview guidelines

Question No.	Objective - Employer	Question No.	Objective- Contractor
General Information		General Information	
1 - 4.1	Details of the respondents	2 - 4.1	Details of the respondents
5 - 6	Preparation of Request for Qualification	5 - 6	Preparation of Request for Qualification
7	Reasons for submitting unsolicited proposal	7	Reasons for submitting unsolicited proposal
8	Time frame for awarding contract		Time frame for awarding contract
Risk related Information		Risk related Information	
1 - 1.2	Risks in Project proposal	1	Factors to prepare unsolicited proposal
2 – 6.2	Risks in Project review work	2-3	Determine the scope of work
7 -7.2	Risks in Project funding work	4 - 4.2	Stages of project proposal up to award of contract
8-8.2	Risks in pre contract stage work	5- 5.2	Risks in Project proposal
9 -9.2	Risks in quality measures work	6 – 6.2	Risks in Project funding work
		7 -7.2	Risks in quality measures work

General Information on Respondents

The number of respondents is selected on the basis of the managerial level of employer as well as contractor to collect data by interview the semi structured interviews Then the minimum four members of different categories of the project staff is selected in each cases to collect data.

Table 3.4 provides the list of interviews comprising the Employer, Consultant and Contractor of the four cases, Case A, B, C and Case D.

Table 3.4: Details of interviewees of the Case Study

Interviewee		Designation	Experience - Project	Experience - unsolicited Project
Case - A				
Employer/ Consultant				
1	RE(E) -1	Resident Engineer	+ 12 years	+2 years
2	PE(E) -1	Project Engineer	+ 12 years	+2 years
Contractor				
3	PE(C) -1	Project Engineer	+ 12 years	+2 years
4	QS(C) - 1	Quantity Surveyor	+ 12 years	+2 years
5	QCM(C) - 1	Quality Control Manager	+ 15years	+4 years
Case - B				
Employer/ Consultant				
1	RE(E) -2	Resident Engineer	+ 12 years	+2 years
2	PE(E) -2	Project Engineer	+ 12 years	+2 years
3	QE(E) -2	Material/Quantity Engineer	+ 12 years	+2 years
Contractor				
4	PM(C) -2	Project Engineer	+ 12 years	+2 years
5	QS(C) - 2	Quantity Surveyor	+ 12 years	+5 years

Interviewee		Designation	Experience - Project	Experience - unsolicited Project
Case - C				
Employer/ Consultant				
1	RE(E) -3	Resident Engineer	+ 12 years	+2 years
2	PE(E) -3	Project Engineer	+ 12 years	+2 years
3	QCM(E) -3	Material/Quantity Engineer	+ 15 years	+5 years
Contractor				
4	QS(C) - 3	Quantity Surveyor	+ 12 years	+5 years
Case - D				
Employer/ Consultant				
1	RE(E) -4	Resident Engineer	+ 12 years	+2 years
2	PE(E) -4	Project Engineer	+ 12 years	+2 years
Contractor				
3	PE(C) -4	Project Engineer	+ 12 years	+2 years
4	PM(C) -4	Project Manager	+ 12 years	+2 years

Considering the case study -1 and 2, more interviewees were attended than other case studies because more project details were concerned with the project period, cost and road lengths. The total numbers of interviewees are eighteen and more than one method has been used in the data validation process because the same results are found through different methods; there is a high degree of confidence level in the results.

Principle – 2: Create a case study database

The way of organizing and documenting the data collection is considered to create a case study data base. Two collections had been discussed by Yin (1994) such as the data or evidence base or the report of the investigator, whether in article, report or book format with case study notes, documents, tabular materials and narratives of interviews.

Principle – 3: Maintain a chain of evidence

It was made an effort to maintain a chain of evidence to increase the reliability of the information in four case studies. This was done by making sufficient citations to relevant portions and ensuring that an external observer is able to trace the steps in either direction to understand the case study.

3.6.2 Data analysis techniques

The different techniques are used to analyse the qualitative data that collected for a research. Data analysis consists of examining, categorizing, tabulating or otherwise recombine the evidence to address the initial propositions of a study (Yin, 1994) the analysis of case study is one of the developed aspects of the case study methodology. The details need to fulfil the target on experience and the literature to present the evidence in various ways, using various interpretations. Yin (1994) suggested the following data analysis techniques.

- Pattern matching (to strengthen internal validity)

If the case study is an explanatory one, the patterns may be related to the dependent or the independent variables of the study (or both). If the case study is a descriptive one, pattern matching is still relevant, as long as the predicted patterns of specific variables is defined prior to the data collection. Trochim (1989) considered pattern – matching as one of the most desirable strategies for analysis. This technique compares an empirically based pattern with a predicted one. If the patterns match, the internal reliability of the study is enhanced.

- Explanation building

This is a special type of pattern matching, but the procedure is more difficult. The procedure is mainly relevant to explanatory case studies. A parallel procedure, for exploring case studies has been commonly cited as part of a hypothesis-generating process (Glaser & Strauss, 1967), but its goal is not to conclude a study but to develop ideas for further study.

Explanation-building is an iterative process that begins with a theoretical statement, refines it, revises the proposition, and repeating this process from the beginning.

- Time-series Analysis

A third analytical technique is to conduct a time-series analysis, directly analogous to the time-series analysis conducted in experiments and quasi experiments. It is possible that a single dependent or independent variable could make this simpler than pattern – making, but sometimes there are multiple changes in a variable, making starting and ending points un clear.

According to the principle of data collection techniques were described by Robert K. Yin (1994), the researcher is applied the first principle of data collection techniques to compare and match the pattern of each Cases.

3.6.3 Qualitative data analysis techniques

Content analysis is a qualitative data analysis technique which can be used to make replicable and valid inferences by interpreting and coding textual material involves specialized procedures (Krippendorff,1980).Such techniques are extremely useful in analysing different types of qualitative data from the answers of research questions.

This research adopts a qualitative approach to investigate the risk handling frame work in unsolicited road project in Sri Lanka.Qualitative data is collected from interviews and documents in unsolicited road projects.The use of content analysis in this research is due to its simplicity, in position of few constraints at data collection and analysis of selected road projects and provision of a systematic approach to introduce step- by- step model of summarising content analysis (Mayring,2000).

3.6.3.1 Data Analysis: An Overview of Content Analysis

Content analysis is a research method for making replicable and valid inferences from data to their context, with the purpose of providing knowledge, new insights, a representation of facts and a practical guide to action (Krippendorff, 2004).

He further described that the content that is analysed can be in any form to begin with, but is often converted into written words before it is analysed.

According to the description of Krippendorff (2004), the content analysis literature, six features of texts that are relevant to definition of content analysis are identified, namely texts have no objective and no objective independent qualities, texts do not have single meanings that could be found, described and identified for what they are, the meanings invoked by texts need not be sheared, meanings (contents) speak to something other than the given texts, even where convention suggests that message contains in them or texts have them, text have meanings relative particular contexts, discourse or purposes and the nature of text demands that content analysis draw specific inference from a body of texts to their chosen contexts.

For the study, content analysis was used to analyse data from the case study interviews. Under the case study, risk sources and events in unsolicited road projects in Sri Lanka were identified within case and cross case analysis. In order to elaborate the findings of the case study, the format illustrated in Figure 3.4 was adopted.

Risk source	Case -A	Case -B	Case -C	Case -D	Total No. of respondents
Tentative Drawings	4(5)	2(5)	2(4)	2(4)	10

Figure 3.4: Elaborated Presentation of Content Analysis

3.6.3.2 Content analysis research approaches

Three approaches to content analysis exist in the literature. They are conventional, directed and summative. All three approaches are used to interpret meaning from the content of text data. The major differences among the approaches are coding

schemes, origins of codes, and threats to trustworthiness. In conventional content analysis, coding categories are derived directly from the text data. With a directed approach, analysis starts with a theory or relevant research findings as guidance for initial codes. A summative content analysis involves counting and comparisons, usually of keywords or content, followed by the interpretation of the underlying context (Hsiu, 2005). The theory based approach is the most frequently used approach because it can lead the development of codes based theories familiar to researchers (Boyatzis, 1998). The major differences among three approaches in content analysis are summarized as follows.

Table 3.5: Major coding differences among three approaches to Content Analysis

Type of content analysis	Study starts with	Timing of defining codes or key words	Source of codes of key words
Conventional content analysis	Observation	Codes are defined during data analysis	Codes are derived from data
Directed content analysis	Theory	Codes are defined before and during data analysis	Codes are derived from theory or relevant research finding
Summative content analysis	Key words	Key words are identified before and during data analysis	Key words are derived from interest of researches or review of literature

Source: Hsieh & Shannon (2005)

This research adopts the Directed content analysis for analysing the interview data with the use of the theoretical concepts developed in chapter 3. The capacity of content analysis to consider type of key risk sources and large number of risk factors of data is an advantage of using it. Content Analysis is described as the scientific study of content of communication. It is the study of the content with reference to the meanings, contexts and intentions contained in messages (Prasad, 2011). Content analysis can provide social interpretations of qualitative data by generating

unanticipated insights and unforeseen similarities and differences in between data set in risk handling frame work in road project. The reason that content analysis is a relatively easy and quick method to analyse with a large and complex data.

The validity and reliability of the research findings are always useful to analyses with qualitative data in qualitative research (Yin, 1994). The type of validity is described in Table 3.4 and external validity refers to establish the domain to find the research study which can be generalized and tested against each and every interview transcript during the data analysis stage across multiple interview transcripts (Yin, 1994). To understanding the internal validity, pattern matching and explanation building are performed during the content analysis (Yin, 1994).

3.6.3.3 Research validation

The qualitative content analysis is used to interpret the advantage of the qualitative text interpretation with the four points namely, fitting the material into a model of communication, Rules of analysis, Categories in the centre of analysis and Criteria of reliability and validity (Mayring, 2000).

Yin (1994) had described the four tests for research validations, comprising the construct validity, internal validity, external validity and reliability used to establish the quality of this case study since a case study takes the form of an empirical social research. The establishment of validation in each test are as follows.

Construct validity: establishing correct operational measures for the concepts being studied.

Internal validity (for explanatory or causal studies only and not for descriptive. or exploratory studies): establishing a causal relationship, whereby certain conditions are shown to lead to other conditions as distinguished from plausible relationships.

External validity: establishing the domain to which a study's findings can be generalized

Reliability: demonstrating that the operations of a study-such as the data collection procedures can be repeated, with the same results.

Table 3.6: Case study tactics for four design tests

Tests	Case Study tactic	Phase of research in which tactic occurs
Construct Validity	Use multiple sources of evidence	Data Collection
	Establish chain of evidence	Data Collection
Internal Validity	Do patterns matching	Data Collection
External Validity	Use replication – logic in multiple case studies	Research Design
Reliability	Develop case study data base	Data Collection

Source: Yin, (1994)

In this research, the validity which is one of the most important matter of the Case study is concerned with application of the Case study tactic namely construct and internal validity with application of multiple sources of evidence, establish chain of evidence and pattern matching from the data collection in qualitative data approach to evaluate the most important risk sources and events in unsolicited road project in Sri Lanka.

3.7 Summary

Chapter three of the study, research methodology briefly discusses with the research design, approach, strategy and techniques in terms of data collection and analysis. At the beginning of the study, a literature review was conducted as the base of the study in this chapter. The research process is detailed from the data collection to the report preparation. Therefore the expansion of the research is taken a systematic approach namely, qualitative approach which was the best approach for this research, strategies were analysed which is suited with the research approach. Semi- structured interviews and documents reviews were selected as the data collection techniques for

the case study strategy which were identified as most appropriate strategies. It has been understood to keep the records and data and the essential facts to formulate the research and analysis using the unsolicited road project in Sri Lanka.

CHAPTER 04

RESEARCH FINDINGS

4.1 Introduction

According to the Chapter 3, four different road projects handled by four major contractors were selected for in- depth study. According to the section 3.5.3.1 of Chapter 3, the cases are named as Case A, B, C and Case D. All four selected cases were National roads of Class A and Class B rehabilitated under the local banks funded unsolicited road projects.

Semi-structured interviews and documents reviews were used as the data collection tool and recordings transcribed to analyse by process of transforming verbal data into the written text for further analysis (Braun & Clarke, 2006). The research analysis attempts to identify the key stages of the management process of unsolicited road projects in Sri Lanka, the various risks associated with the project and how those risks had been allocated among the parties to the contract. It also identified the risk handling work in local banks funded project adopted by the party for whom a risk is allocated to the project work.

4.2 Key Stages of the Management Process of Unsolicited Road Projects

4.2.1 Introduction

Unsolicited road project proposals are mainly focused to infrastructure development of the country by considering the National Development Plan of the Ministry of Highways. Initially the proposals are based on the priority list of the National road network of the Road Development Authority of Sri Lanka.

The implementation of unsolicited project proposal is initiated through stages of section 2.4.4 in Chapter 2. The first stage of the managing unsolicited proposal, namely, approving unsolicited proposal was directly referred with the documents and second stage that is tendering unsolicited proposal was refereed through the semi-

structured interview with contractual parties in four cases of unsolicited road projects in Sri Lanka.

4.2.2 Stages of the management process of unsolicited projects: Document reviews

The proposals of National Road list are accepted to fulfil the basic requirement of nominated contractors with the funding agreement in between Employer and funding agencies and the steps of current contractual procedure of unsolicited projects are as follows and the list of documents are mentioned in section 3.6.1.1 of Chapter 3.

Step -1 Priority list of roads has been prepared by the planning division of Road Development Authority.

Step -2 Coordinating meeting was held to select the project proposals from eligible contractors and the secretary of Finance & Planning, Treasury & Highways and officers of treasury & RDA.

Step -3 The Cabinet of Ministers has granted approval for the priority list of National Highways to be rehabilitated under Step -1 of the “Rehabilitation of National Highways through Domestic Contractors.”

Step - 4 Chairman-RDA requests for the submission of technical proposals from eligible contractors with funding facility of local banks.

Step -5 Contractors has submitted a proposal for the Rehabilitation of the roads according to their capabilities and financial facilities offered from local banks to the secretary, Ministry of Highways.

Step – 6 Subsequently the Director General, Department of Public Finance has appointed a project committee to evaluate the proposal.

Step -7 Each project committee has proposed the Engineer's estimate based on the given quantities of project proposal and evaluated and given their recommendations to Standard Cabinet Appointed Procurement Committee (SCAPC).

Step -8 Cabinet approvals is requested by the line Ministry (Ministry of Highways) to proceed the Contractor's proposal according to the SCAPC recommendations.

Step -9 with the completion of Step – 8 External Resources Department of the Ministry of Finance & Planning has negotiated the terms and conditions of the loan with relevant banks. Cabinet approval requested by the Ministry of Finance to precede the loan with the relevant bank.

Step – 10 Loan agreements has been prepared and sent to the Department of Attorney General to get their approval.

Step – 11 RDA signed the loan agreement with the bank after obtaining the approval from the Attorney General and Board of Directors of RDA.

Step – 12 The RDA requests Treasury guarantee from Treasury Operation Department to proceed the project.

Step – 13 Contract is awarded to proposer.

Step – 14 Contract agreements signed in between RDA & the proposer.

(Source: Construction Division, RDA, 2011)

4.2.2.1 Case study findings: Document Reviews

According to the stages of the management process of unsolicited project explained in section 2.4.5 of the literature review in Chapter 2 and, the management stages of unsolicited project are described in section 4.2. are almost similar to implement the current unsolicited road project in Sri Lanka. The similarity of the management

process of the first stage namely approving unsolicited project proposal in section 2.4.4.1 of Chapter 2 is almost same as the current management process of the unsolicited road project proposal in Sri Lanka.

According to the document review, Sri Lankan approach to developing and managing the unsolicited project proposal, the second stage namely, tendering unsolicited proposal in different stages were not entailed to implement the project, because the contract awarded to the proponent for the particular unsolicited road project proposal due to urgent requirement of the infrastructure developing programme of the country.

The developing and managing the unsolicited project in Sri Lanka, the guidelines on Government Tender Procedure-Part II (for private sector Infrastructure Projects) of the Department of Public Finance of Treasury, Sri Lanka is published and described the guide line to be used by the line Ministries or Government Agencies when dealing with unsolicited development proposals in future work.

4.3 RISK Sources in Unsolicited Road Projects in Sri Lanka

4.3.1 Introduction

This section aims to analyse the qualitative data for risk handling in unsolicited road project of Sri Lanka. The qualitative data is systematically analysed in this chapter by performing theory base content analysis. The chapter will discuss the content analysis findings in relations to three main dimensions, namely, risk handling, response and allocation in unsolicited road projects.

4.3.2 Analysis within the Case and Cross case analysis

Analysis within the Case

The major sources of collecting case study information were made with the semi structured interviews. The recorded interviews were transcribed to text to further analyse the facts gathered. The analyses of Case A, B, C and Case D have been

carried separately, in an orderly manner to analyses of list of risk sources and events associated to the risk handling and allocation work with those particular projects. Similarly, the identification of each risk has been allocated and how to the risk handling methods adopted by the responsible party to cooperate with those risks.

Cross Case Analysis

Considering all the facts was carried out the within case analysis is considered and allowed the patterns to be matched in the Cross-Case Analysis.

4.3.3 Case study findings: Semi – Structures interviews

The research adopts the directed content analysis for risk handling in unsolicited road project in Sri Lanka. The main purpose of the content analysis in this research is to investigate the risk control in specialized the unsolicited road project in Sri Lanka.

The research findings of such a content analysis help to better understand how to improve the risk handling and implementing unsolicited road projects in infrastructure development work of Sri Lanka.

This research consisted of 18 participants for interview from the qualitative sample to receive the members of the project team with a response rate of 88% as shown in Table 4.1 of the unsolicited road projects in Sri Lanka. These participants have diverted their experience characteristics in unsolicited road projects.

Table 4.1: Respondents of Case Study

Category	No. of Participants	No. of Respondents
Resident Engineer	04	04
Project Engineer	06	06
Quantity/ Quality Engineer	01	01
Project Manager	02	02
Quality Control Manager	02	02
Quantity Surveyor	03	03
Total	18	18

Table 4.2 shows the research findings organized around risk sources in unsolicited road project in Sri Lanka. Each risk source consists of the critical risk events for evaluating risk handling work in unsolicited road project in Sri Lanka.

The analysis was started with identification risk sources associated with the four cases, Case A, B, C and Case D. The identification the following issues in different stages of risks is essential in properly allocating them to the responsible parties in project.

The interviews are based on the objectives of this research paper and answers of each respondents are tabulated to identify the area of risk associate in four cases of unsolicited road project in Sri Lanka (Refer Appendix- 1 & 2).The details of risk sources associated in each cases are tabulated in Table 4.2 and compared the identification of the risk sources of researchers in Table 2.3 in literature review chapter 2. Therefore specific risk sources are identified in unsolicited road projects namely, Legislative Changes, Contractor Competence, Public issues and Adverse weather condition.

Table 4.2: The risk sources under pre contract stage:
Approving the unsolicited road projects

	Risk sources in projects	Case -A	Case -B	Case -C	Case -D	Total
1	Tentative Drawings	3(5)	1(5)	0(4)	2(4)	6
2	Schedule of work	2(5)	1(5)	1(4)	3(4)	7
3	Possession of site	5(5)	4(5)	3(4)	4(4)	16
4	Design Changes	2(5)	2(5)	2(4)	2(4)	8
5	Scope Changes	4(5)	2(5)	3(4)	1(4)	10
6	Quality measures	0(5)	0(5)	0 (4)	0(4)	0
7	Dependence on local funds	0(5)	3(4)	3(4)	0(4)	6
8	Legislative Changes	0(5)	0(5)	0(4)	0(4)	0
9	Procurement of Resources	0(5)	0(5)	2(4)	3(4)	5

	Risk sources in projects	Case -A	Case -B	Case -C	Case -D	Total
10	Contractor Competence	0(5)	0(5)	0(4)	2(4)	2
11	Delay caused by authorities	4(5)	3(5)	2(4)	4(4)	13
12	Dealing with utility agencies	2(5)	2(5)	1(4)	1(4)	6
13	Public issues	3(5)	1(5)	0(4)	0(4)	4
14	Improper Estimate	5(5)	4(5)	3(4)	4(4)	16
15	Project period	5(5)	0(5)	1(4)	3(4)	9
16	Adverse weather condition	1(5)	0(5)	3(4)	1(4)	4

New Risk sources -

The details of respondents are summarized in all four cases of unsolicited road project in Sri Lanka.

1. Schedule of work

The respondents related to the Contractor in all four Cases mentioned that the Contractor was followed within the schedule of work and was ahead with the original programme of work in Class B road than Class A roads. Therefore the risk was involved to Case A and Case D, the Contractor requested the additional days beyond the original date of completion as schedule of work. Three major parameters such as Pavement Design, Traffic class and Volume were considered to preparation of schedule of work with respect to Project proposal in both Cases by the Contractor than the Employer.

2. Possession of site

The handover of the site in Case A to the Contractor has been delayed due to issues of land acquisition process of the Employer. The majority of the respondents said that the problem was made that the process of land acquisition work handled with several authorities which authorities were taken more time than the schedule time frame of the project. In addition to that the Case B, C and D, some land owners had refused to receive the compensation and demanded the value of their lands and

rebuilding of properties which affected the process of Possession of site as scheduled.

3. Designs changes

An interviewees stated that no proper designs to consider the remedial measures had been given for land slide areas in Case D, the design cut slope was changed to maintain the minimize slope to prevent the land slides. According to the answers of the respondents the main reason to change the design was based due to proposed design was based on the details of existing structures, but most of the structures were very weak. Therefore the new construction work has been implemented instead of widening of existing structures with proper design and investigations at site in Case A, B, and D.

Similarly some respondents stated that the widening of structures was designed on the design details of existing structures in Case A, B and D. The design details of widening sections were completely changed due to site conditions and redesign work had to be done with cost effectively. The risk of the design changes was made by the contractor because the contractor was submitted the all design details with tentative drawings at the beginning of the site under their preliminary investigations of structural works.

4. Scope Change

Majority of the respondents of Case A and C accepted that there were scope changes due to site condition. The major changes were made in Case A; it had been affected to increase the thickness of Asphalt layer and quantity of BOQ. In Case C, the area of concrete surfacing area was increased instead of Asphalt surfacing area. Both cases the majority of respondents stated that the scope changes affected a price escalation. The study noted that the details from respondents, the original contract sum of Case C was changed and requested the variation to receive Cabinet approval through the Ministry for varied amount of original Contract Sum.

5. Tentative drawings

Majority of the respondents in Case B and C accepted that use of tentative drawings was applicable in any road project similar to the project of Case B & C and not a risk to them. Therefore detail drawings were not much issued in these projects of Case B and C since it makes the quick process and a cost savings as well. In Case A and D, It has been caused many difficulties to process of work due to lack of details. In some Bridge construction works, the level of bedrocks given in drawings was deceptive, because it was much deeper than as it was shown in drawings. Then the dimensions were also changed once excavations were over and the additional excavation had been done by the Contractor to adequate the correct standard of the detail drawings.

6. Quality measures

No quality measures risk was identified because quality measures are one of the most important works to maintain the standard of the construction activities in all respondents of four cases. The applications of quality control techniques are pre-determined with the construction programme by the Contractor and monitoring & inspection work are handled by the guidance of Employer. The standard of quality work is measured and evaluated through the specifications, Quality manual and maintained the records frequently in all cases.

7. Dependence on local funds

All respondents noted that available funds of the all Cases were fixed and project able to proceed with its original scope of work but the additional amount was incurred in Case B and C due to additional construction work of structures and scope changes. According to the concept of unsolicited project, the Standard Cabinet Appointed Procurement Committee (SCAPC) was decided the original contract sum with funding facilitate from Local Banks. The process of this project, the responds noted that the additional amount of work was decided and approved by the Employer and submitted to SCAPC for the approval with funding agency and the Contractor was had to face made the risk until the payment for the additional amount of work

which was done beyond the scope of work of original work programme, but with the guidance of the Employer.

8. Legislative Changes

All cases of unsolicited road projects were entitled to exempt the Value Added Tax (VAT) which was imposed by the decision of Government for unsolicited project. The contractors were entitled to Suspended Value Added Tax for any purchasing and supplying activities. Hence the legislative changes are not a risk source to any cases of this study which is identified a specific risk source of unsolicited road project of Sri Lanka.

9. Procurement of Resource

It is abstracted the answers of interviewees, that there had been no major issues with regard to procurement of resources in the case A and B, but the rules & regulations of Government restricted to supply of gravel was directly affected the sub grade & shoulder construction work and the emergency work of Kottawa – Matara Expressway Project had an impact on the labour shortage of Case D.. There were some problems of resources to continue the construction activities to maintain the resources management plan due to scarcity of resources in the Case C.

10. Delays caused by the Authorities

According to the summary of the respondents that the public complain to restatement work and the factories, the utility shifting authorities had restricted the frequent interruption especially for the shifting of high tension electricity line and major water supply line in Case A that caused delays to the project.

The respondents noted that submission of estimate of utility agency were delayed which effected to complete the task of the project programme in Case B, C and D.

11. Coordinating the public issues

The respondents of the study noted that most of the township development works and highly residential areas were covered in projects of the Case A & B than Case B & C

and adopted that the inconvenience of the public was minimized to introduce the meetings and communicate the work areas in advance to public but the risk was made to contractor due to unsatisfactory site management work implemented during the construction work and the risk source is identified a specific risk source in unsolicited road project of Sri Lanka.

12. Dealing with utility agencies

Most of the respondents of the study identified that the main utility agencies were Sri Lanka Telecom, National Water Supply & Drainage Board and Ceylon Electricity Board and all agencies were quite difficult was regard to shifting of services in all Cases and the fact that those institutions were operated their schedules. Further details from the respondents in Case A & B, the RDA had acquired the land then those agencies implement their services, however there is a significant gap between the land acquisition work and the execution of works. Apart from that, underground water lines were caused the water bursts and making damages to finish road section and affected due to improper preliminary investigation of the Employer & Contractor which caused the risk in both parties to the time frame of the project duration.

The respondents of the Case C and D noted that uncleared obstructions had been a major cause for a delay in the total project and the contractor was happened to skip some locations due to this delay in shifting of services. It is noted that some locations, overhanging electricity lines and underground water lines were also damaged by the default of operators and caused the risk of Contractor to restatement with additional cost and time of the project duration.

13. Improper Estimate

Most of the respondents noted that Contractor admitted that the quantities and items of Bill of Quantities were much accurate, but some respondents revealed that the quantities had increased and exceeded the BOQ quantity which was affected to change of rate in details of Contract data and the additional works were affected to the original quantities of BOQ which extra amount were calculated through the BOQ

rates in Case A, B, C and D. According to the site conditions, the respondents identified that new items has to be completed within the scope of work and amount of new items were calculated with BOQ rates or without BOQ rates.

14. Project Period

According to the answers of the respondents, that the Standard Cabinet Appointed Procurement Committee (SCAPC) was decided and informed to make an agreement in between Contractor and Employer for completion of project period in specified period in all Cases. The additional work of the project and scope changes of the projects were affected to change the period of work in Case C. Similarly the delay of the procession of site have been affected to change the project period in Case A. and scope changes of project of Case D.

15. Contractor Competence

Most of the respondents noted that the capability of work planning, organization and implementation were well organized to maintain their reputation in Case A & B than Case C & D. In pre contract stage, the capabilities of work performance in previous project work of the Contractors were evaluated through the procurement committee of line Ministry. The capacity building of the entire projects and management is very useful manner to project completion work of all Cases. The risk was much identified only Case D in some stages of work due to capabilities of the Contractor to maintain the project work as scheduled and the risk source is identified a specific risk source in unsolicited road project of Sri Lanka.

16. Adverse weather condition

Majority of the respondents described and identified the external and site condition risks are not much critical risk sources among the risk events namely, (a) acts of god, (b) adverse weather condition and (c) unforeseen site and ground condition in any stage of unsolicited road project in Sri Lanka except Case C and D. Because the high flood situation was effected to the schedule of work and project period during the construction works in Case C and D. Therefore the risk source is identified a specific risk source in unsolicited road project of Sri Lanka.

According to the data analysis of this study, sixteen risk sources were identified as critical risk in project by the researchers with comparing the twelve risk sources in section 2.3.2.1 in Chapter 2. Among the risk sources of earlier identified risk sources of construction project, the respondents stated the few risk events namely Legislative Changes, Contractor Competence, Public issues and Adverse weather condition were affected in some stages of the unsolicited project work as well. Hence three risk sources are directly identified the most significant risk sources of the unsolicited road project as similar to construction projects by the majority of the respondents in this case study namely, Possession of site, dealing with utility agencies and improper BOQ.

4.4 Risk Allocation and Handling

4.4.1 Risk allocation and handling: Case study findings

The allocation of risk in contractual parties are considered and identified the issues of each risk sources to handle and control the most effective and efficient decision in unsolicited project with the view of respondents to associate the Case A,B,C and Case D in each construction stages.

Table 4.3: Risk allocation and Handling in Cases

	Risk Sources	Case A	Case B	Case C	Case D
1	Tentative Drawings	Employer	Contractor	Contractor	Contractor
2	Schedule of work	Employer	Contractor	Contractor	Employer & Contractor
3	Possession of site	Employer	Employer	Contractor	Employer
4	Design Changes	Employer & Engineer	Contractor	Contractor	Employer & Engineer
5	Scope Changes	Contractor	Contractor	Contractor	Contractor
6	Quality measures	Employer	Employer	Employer	Employer
7	Dependence on local funds	Employer	Employer	Employer	Employer

	Risk Sources	Case A	Case B	Case C	Case D
8	Legislative Changes	Employer	Employer	Employer	Employer
9	Procurement of Resources	Employer & Contractor	Contractor	Contractor	Employer & Contractor
10	Dealing with utility Agencies	Employer	Employer	Employer	Employer
11	Delay caused by the Authorities	Employer	Employer	Employer	Employer
12	Project Period	Employer & Contractor	Employer & Contractor	Employer & Contractor	Employer & Contractor
13	Contractor Competence	Contractor	Contractor	Contractor	Contractor
14	Improper Estimates	Employer & Contractor	Employer & Contractor	Employer & Contractor	Employer/ & Contractor
15	Public issues	Contractor	Contractor	Contractor	Contractor
16	Adverse weather condition	Employer & Contractor	Contractor	Employer & Contractor	Contractor

In the view of risk allocation and handling of the risk source, the way of managing project risk in each risk source are summarized with the opinion of project team in Case A,B,C and D project.

1. Schedule of work

The Contractor was submitted the schedule of work with their project proposal in initial stage of the work. The period of the project was highlighted in the project Bill of Quantities. The schedule of work was based on the completion of specified period of construction activities in BOQ. In Case A, B and C, the period of construction activities was higher than the Case D and Contractor of Case A was submitted their schedule of work in sectional wise as per the availability of resources and possession of site. The possession of site was the major risk which was retained to the Employer in Case A than Case B, C and D. The Employer had to mitigate the impact of risk

due to schedule of work by coordinating relevant authorities in advance and the process of possession of site expedite to complete the work as schedule of entire road by section to section.

The schedule of resources planning was the major task of the Contractor and submitted to the Employer. The risk was retained to the Contractor due to any delay of schedule of work and transferred to the Employer where the delay caused by them. The Contractor submitted the Extension of Time request to avoid the unnecessary delay caused by the Employer as their original schedule of work in Case A.

In Case B and C, the schedule of work was changed and reschedule of work due to earth slips & flood and impassable vehicles to transport materials. The risk was allocated to the Contractor to complete the project as scheduled and transferred to the Employer to mitigate the risk by allocating the Extension of Time without exceeding the Contract Sum.

In Case D, the capability of the Contractor to handle the construction activities in some stages was completely delayed in schedule of work and both Employer and Contractor were engaged to mitigate the risk to implement the extension of time in reasonable period of work.

2. Possession of site

The Possession of site was based on the process of the land acquisition work in all Cases. The major issue of the land acquisition work was done with the collaboration of other institutions. The process of land acquisition of the Case A was most critical than the Case B, C and D. because the road of Case A was situated in the commercial and residential areas. The risk of the Possession of site was transferred to the Employer by the Contractor to complete the project work in specified project period. In Case B&D. the land owners rejected to receive the compensation and appealed for legal actions and the Employer was reduced the risk to allow the Extension of Time and variation for the provision of rebuild the property in Bill of Quantities to manage the problems of compensation of legal issues without exceeding the Contract Sum.

3. Tentative drawings

In unsolicited road projects, the tentative drawings were prepared and submitted to the Engineer by the Contractor. The necessary amendment was done by the Engineer and submitted to the Contractor to continue the work without delay in Case A. The risk was allocated to the Contractor due to corrections of tentative drawings and allocated the time for redesign the structural works in failure of original design data. The Employer was reduced the risk for any redesign work to allocate the variation work without exceeding the Contract sum in specified project period.

4. Designs changes

The pavement design and geometric design was done and considered to prepare the Bill of Quantities of Project proposal by the Contractor in Case A, B, C and D. In all Cases, the existing structures and site records were considered to design of structures to suit the current carriageway width. According to the site condition and traffic data, the preliminary design was changed and redesign was done by the Contractor to review the designs by the Engineer in the Case A.

The risk was retained to the Contractor to complete the work as schedule without exceeding the Contract Sum due to any changes of quantity variation sum.

In Case A, the some structural and geometric designs were done by the Employer and review works were also done by the Engineer. The risk was retained to the Employer and the Engineer had to be prepared and reviewed the designs as schedule to submit to the Contractor without delay.

The role of the Employer and Consultant were done in one party in all Cases and the design review and defects were identified and evaluated by the Engineer to mitigate the risk due to design changes by the Employer.

5. Scope Changes

The original scope of work was changed due to failures of preliminary site investigation report prepared by the Contractor. The minor changes was submitted to

the Engineer and reviewed to suit the current situation of the site condition since the risk retained to the Contractor until complete the work within Contract Sum in all Cases. The Contractor was submitted the variation work to reduce the risk due to scope changes of the project and the Employer was mitigated the risk to provide the revised Bill of Quantities under evaluation of Engineer's Technical Evaluation Committee within the original Contract Sum.

6. Quality measures

The quality control technique is applied to the unsolicited project proposal instead of quality assurance by the Employer. The Employer managed the all quality measures with quality manual with adequate qualified staff in all Cases to mitigate the risk.

7. Dependence on local funds

The Contract sum of the unsolicited project had been negotiated and finalized with the Contractor at the Cabinet Appointed Procurement Committee meeting in all Cases.

Considering the funding agency contributed the funds selection of the Contractor's Capacity and the signed agreement in between the Employer and the funding agency. The funds were allocated and issued to the Contractor on the basis of the approval of monthly interim payment certificate from the Employer without exceeding the Contract Sum. In Case B and C, the Contract Sum had been exceeded due to unavoidable site conditions; the risk was retained to the Employer to facilitate the additional amount with the approval from the Cabinet Appointed Procurement Committee and the funding agency.

8. Legislative Changes

The Legislative Changes did not affect to the unsolicited road project because all the decisions were made by the Cabinets in early stages of the project and any changes of legal issues were retained by the Employer in all Cases.

9. Procurement of Resource

The major task of the Procurement of Resource was arranged to suit the schedule of work by the Contractor and submitted for prior approval from the Engineer. Any delay of Procurement of Resources, the risk was allocated to the Contractor and rescheduled the resource plan to complete work with original schedule of work in Case A, B and C. In Case D, the labour supply was the major risk due to major work of Southern Transport Development Project to the Contractor. The Contractor expedited the work and avoided the risk to allocate the Sub- Contractors through the approval of the Engineer. Any delay of the permit to supply the resources according to the original resources plan, the risk was transferred from the Contractor to the Employer. The Employer mitigated the risk to discuss the relevant authorities in advance and arranged the resources without delay in the Contractor's schedule of resource management plan.

10. Dealing with Utility Agencies

The estimate of the utility shifting was prepared by the utility agencies and submitted to the Engineer to pay through the Contractor. The risk was retained to the Employer since the shifting and relocation of services was delayed due to land acquisition and restriction of interruption in the existing services in residential and commercial areas in Case A and B.

The existing main water lines had been laid under the carriageway and the additional cost was estimated to shift the service into shoulder area by the utility agency. The additional Cost and the time for shifting work had been affected the Schedule of work and the Employer reduced the risk to shift the service line near the structures only. The other areas the existing service lines were allowed to the existing positions and in case of damage to asphalt surface, the rectification cost was claimed from the relevant utility agency. The several meetings and site inspection work were carried out to clarify the estimate of utility shifting work with relevant authority to transfer the risk by the Employer in Case A. Any delay of the shifting of services and the payment of the estimate, the entire work programme of the Contractor was changed and the risk was retained to the Contractor to complete the project as scheduled.

11. Delays caused by the Authorities

The preparation of estimates of utility shifting work and the compensation for land acquisition work were done by relevant authorities and submitted to the Engineer for arranging the payments through the Contractor. The Contractor was made the payment on time but the shifting works were arranged by the schedules of respective authority. Similarly, the land acquisition work was arranged with the collaboration of several authorities. Any delay of the shifting work and the land acquisition work, the risk was retained to the Contractor and the Employer reduced the risk by coordinating the relevant authorities in advance and allocates the extension of time with considering the critical path analysis.

12. Project Period

The procession of site, adverse weather conditions and scope changes affected the changes in project period and in the original schedule of work in both Cases. The Employer and the Contractor retained the risk to complete the project as scheduled and time extension requested by the Contractor for any delay of work or variation in work, since the Employer mentioned to reduce the risk and to allow the extension of time without cost in Cases A, C and D.

13. Contractor Competence

The maintenance and management of construction activities are based on the contractors' capacity and on the deployment of the resources in scheduled work programme in all Cases. The achievement of work are directly identified the roll of the contractor in period of work which are assigned time to time in project works. The risks are directly engaged to the contractors to their performance in project work and to the mitigation to fulfil the target as scheduled. Similarly the Employer is also retained the risk by the selection of the Contractor in early stage of the unsolicited project proposal with referring to the Request for Qualifications.

14. Improper Estimations

The accuracy and provisions of construction items are very important factors in unsolicited project proposal because the proposal BOQ is the key factor for the

particular project proposal in the stage of selection criteria. The estimation of Cases A, B and D is more accurate than Case C because the changes of design or scope directly affected the quantity variation and the period of project works. Therefore the risk retained first to Contractor because the project proposal submitted by him and later the Employer who mitigated the risk by providing variation and extension of time with or without changing the original Contract Sum of the project.

15. Public Issues

The developments in suburban areas mostly affected the public due to environmental and social issues to maintain their normal life and the risk retained to the Contractor until completion of the construction activities and also mitigated the risk to communicate with relevant authorities in advance by the Employer in all Cases.

16. Adverse Weather Conditions

The Adverse weather conditions directly affected the project period and resources supply work due to flood and earth slips in Case B and D. The risk was retained to the contractor and the Employer to complete the work as scheduled. The risk caused by the adverse weather conditions transferred to the Employer by the Contractor by requesting extension of time period to complete the work.

4.4.2 Risk allocation and handling: document review

4.4.2.1 Introduction

According to the findings the identification of risk sources in different construction stages, the risk allocation, controlling and handling work could be developed to minimize the risk issues in construction work. In developing this risk allocation and handling work, first the risk sources were categorized into four types of risk allocation could be considered which were adopted through the literature review (Wiguna and Scott, 2006).

Having considered the allocation of risks between contracting parties all actual handling of those risks, a risk handling work was developed. Semi-structured

interviews with documentary evidence and respondents, opinions were used for this task.

4.4.2.2 Risk allocation and handling: Sri Lankan standard of contract

Compared with the FIDIC Form, Sri Lankan Standard of Contract (Standard Bidding Document, Procurement of works, Major Contracts, ICTAD publication No: ICTAD/ SBD/02/2007) is rather short and concise.

This characteristic is also reflected in its risk allocation clauses. Some risks deal with in the FIDIC Form is even left unmentioned. The following is a brief summary of risk allocations in Sri Lankan Standard Contract.

External / Natural Risks

Climatic risk events are not dealt explicitly in Sri Lankan Standard Contract; however under Sub - Clause 8.4.c and Clause 20 Force Majeure, the Contractor shall be granted on EOT if some natural damages, such as earth quake or typhoon occur that impact the project progress. Force Majeure events may also include war, terrorism and civil war if agreed by both parties in the Particular Conditions of Contract under some circumstances, which is expressly stated under Sub-clause 20.1 that offers the definition of Force Majeure for construction contracts under the Sri Lankan legal system.

Political and Social Risks

These risks are very much less dealt with directly. In case of occurrence, several clauses can be applied: Clause 20.1 Definition of Force Majeure and Clause 8.0 Delays Caused by Authorities in which case the Contractor shall be allowed an appropriate EOT and share the relevant costs with the Employer.

Social risk events are covered under Clause 4.22, which requires the Contractor to be responsible for site security by providing authorized personnel at site to prevent possible thefts and vandalism.

Economical and Legal Risks

Sub – Clause 13.6 specifically deals with these risks It is provided that the contract price can be adjusted taking into account any increase or decrease in Cost resulting from Change in Law in Sri Lanka. Basically it is impacted by the following circumstances.

- Changes in law
- Changes in government regulations
- Changes in government policies
- Changes in the price indices as published by the construction cost authorities (ICTAD)

It can be seen from such provisions that the Employer can, in general bear the risk of price fluctuation.

Behavioural / Managerial Risks

The behavioural risks of the parties are listed as follows:

a. Employer's Behavioural Risks (including Engineer's)

- Late or incorrect instructions from Engineer on behalf of Employer (Cl.3.3,3.5)
- Late Payment (Cl.14.7)
- Late or failure to provide drawings or meet commencement requirements as agreed (Cl.1.9,8.1)
- Failure to provide instruction or approval (Cl.2.2 ,.3.3)
- Disturbance of Contractor's normal working on site (Cl.4.15)
- Interference with inspection for acceptance or taking over (Cl.10.1,10.2 &10.3)

b. Contractor's Behavioural Risks

- Contractor caused accidents and casualties (Cl.4.8,6.6)
- Improper interference of the public (Cl.4.19)
- Acts or defaults by subcontractors (Cl.5.1,5.2)

- Environmental protection (Cl.4.13)
- Quality defects (Cl.4.17)
- c. Risks Caused by Third Parties Behaviour**
 - Suspension of delivery of water, electric power and telecommunication by utilities Authorities (Cl .8.4,8.5)

Risk allocation in construction contracts has come to assume prominence because risk identification and risk allocation have a clear bearing on risk handling decisions. The proper management of risks requires that they be identified and allocated in a well-defined manner. This can only be achieved if contracting parties comprehend their risk responsibilities, risk event conditions, and risk handling capabilities.

4.4.2.3 Risk allocation and handlings: Case study findings with Sri Lankan Standard of Contract

Respondents were allowed to disclose the current handling methods and also propose their own views regarding possible handling of these risks. These results are summarized in Table 4.3. In developing risk allocation and handling, the risk sources were categorized into four types initially. The actual allocation of risks, which was identified using the case study approach, is shown against each risk source along with the risk response that could be used in dealing with it.

The last column provides the risk handling actions that could be adopted for the relevant risk response in Table 4.4.

Table 4.4: Risk allocation and handling: Case study findings and Sri Lankan Standard of Contract

Risk Source	Risk Allocation through the SBD -02	Actual Risk Allocation from Case Study	Risk handling strategies in unsolicited project
Quality measures	Contractor	Employer	Providing adequate provision in BOQ of project proposal and follow quality manual & standard specifications and identify the accuracy in proposal review stage.
Tentative Drawings	Contractor	Contractor& Employer	Providing the variation order for redesign works.
		Engineer	Review all design drawings and comment the construction drawings to resubmit for approval without delay the work programme.
Design Changes	Employer &	Employer	Conducting the design details with site inspection and providing necessary instructions in advance
	Contractor	Contractor	Submitting the design details with calculation to the Engineer in advance
		Engineer	Checking and reviewing the design changes with site inspection & calculations to consider the limitations of project cost.
Scope Changes	Employer	Employer	Allocating additional funds from line Ministry
		Contractor	Requesting Variations and Extension of Time for any changes from the original scope

Risk Source	Risk Allocation through the SBD -02	Actual Risk Allocation from Case Study	Risk handling strategies in unsolicited project
Schedule of Work	Employer	Employer	Before commencing of construction activities, coordinating relevant authorities in advance to receive prior approvals and arrange the possession of site without objection to site work
		Contractor	Considering all preliminary site investigation reports to prepare the Bill Of Quantities of the unsolicited project proposal
Possession of Site	Employer	Employer	Collaborating to obtain the prior approval of relevant authorities and arrange to commence the construction work as scheduled.
		Contractor	Requesting variations and Extension of Time
Dependence on Funds	Employer	Employer	Providing interim payments of bills, variations and extra work without exceeding the Contract Sum
			Requesting additional funds to allocate exceeding amount of the Contract Sum from the line Ministry in advance
			Limiting the scope of work to allocate within the Contract Sum
Legislative Changes	Employer	Employer	Providing variations for additional cost
Contractor Competence	Employer & Contractor	Contractor	Maintain the standard and quality of work

Risk Source	Risk Allocation through the SBD -02	Actual Risk Allocation from Case Study	Risk handling strategies in unsolicited project
Dealing with Utility Agencies	Employer & Contractor	Employer	Informing and coordinating relevant utility authorities in advance
		Contractor	Identifying the areas of utility shifting to prepare the Bill of Quantities and allocate adequate provision for BOQ
Public issues	Contractor	Contractor	Providing effective and efficient communication link with Employer, Contractor, Engineer and other parties before commencing the construction works.
Improper Estimate	Contractor	Contractor	Providing adequate quantities in proposal BOQ and request to revised the BOQ
Procurement of Resources	Contractor	Employer	Submitting the prior approval to allocate permit of resources in advance
		Contractor	Coordinating and Obtaining the approval to allocate the resources with relevant authorities
Delay caused by authorities	Employer	Employer	Paying interest to delayed payments or holding the deducting the liquidated damages
Project Period	Contractor	Employer	Minimizing uncompleted activities within the project period
			Providing Extension of Time without cost

Risk Source	Risk Allocation through the SBD -02	Actual Risk Allocation from Case Study	Risk handling strategies in unsolicited project
		Contractor	Completing the exceeding quantities of project scope without change the original Contract sum
Adverse weather condition	Employer & Contractor	Employer	Allowing an Extension of Time to the Contractor
			Compensation to affected parties with provision of BOQ
		Contractor	Loss of resources due to flood and claimed from the provision of BOQ
			Providing variations for excess amount of quantities to rectify the damage road

4.5 Summary

Chapter four of the study was implied to present the findings of the Case Study research through the cross Case analysis and discussion based upon the findings. Data required to achieve the aim of the study was gathered through the case study strategy and document reviews. Under the case study strategy semi- structured interview were accompanied to data collection. The analysis was initiated with the risk identification of the four cases in major construction stages of unsolicited road projects and project risk sources related to project risk sources identify in Chapter Two. The identified risks are analyzed with the actual risk sources in construction stages and followed the risk allocation in Contract Clauses among the contractual parties. The risk controlling and handling are identified with the risk sources in each stage and followed to reconsideration to avoid, retain, accept or mitigate the risk sources in each stage to fulfill the third objective.

Based upon the research findings, the chapter five of this study designed to provide conclusions and recommendations.

CHAPTER – 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter focuses on results of findings which derived from the previous chapters pertaining to the analysis of the captured data. The conclusion summaries the fulfilments of each objective along with the findings under each objective. In addition to and it, the recommendations were made on the basis of research findings for the risk in unsolicited road projects in Sri Lanka through the contract documents among the contractual parties.

5.2 Conclusions

Governments worldwide have been increasingly looking to the private sector to fill the growing gap between the demand and supply of infrastructure services in different construction projects. As a result, private participation in infrastructure (PPI) in developing countries increased dramatically in the past twenty five years, contributing the funding locally or internationally. Many governments have recognized that the private sector can be an important mechanism for involving technical and managerial expertise to the construction, operation, maintenance and financing of infrastructure projects. The involvement of unsolicited proposal to infrastructure development work is the new era of construction industry in our country. Hence the concept of unsolicited proposals is initiated in road construction works by the Ministry of Ports and Highways that enables an organization to implement the construction activities in terms of efficiency and effectiveness. With the application of unsolicited project proposals, the risk related issues were encountered and discussed to mitigate among the contractual parties with available risk allocation and handling techniques in construction industry.

Construction project risks are analysed by the actual observation or calculation of their occurrence. There are often insufficient historical data to enable their objective

analysis. So the researcher has considered sixteen risk sources to consider the risk handling, response and allocation in unsolicited road project in Sri Lanka.

The researcher started with identification of twelve risk events associated with the four cases taken to analysis and found the most relevant risks among the sixteen events in unsolicited road project in Sri Lanka. The studies of the four cases were realized through the literature review and the observance of real situation was revealed on the nature of the existing project activities. They were operated, being exposed to risk sources throughout their entire construction process of unsolicited projects.

Objective – 1: To identify the key stages in the management process for the unsolicited road projects in Sri Lanka

The first objective of the study was achieved through the literature review. Literature provides the relevant facts of key stages of unsolicited project proposals and it is clearly adopted to apply in relevant stages to current unsolicited road projects of Sri Lanka. The first stage of management process for the unsolicited road project proposal is done in step by step to fulfil the requirement of approving unsolicited proposal from the proponents in specified road projects. However the second stage of the management process namely, tendering unsolicited proposal was not involved where the competitive process was not implemented to the unsolicited road projects. The typical systems: Bonus, Swiss challenge or Best and Final offer system were not clearly introduce the procurement guide line of department of public Finance of Sri Lanka.(Supplement 23 dated 12.05.2011).To overcome the issues and request of public to involve the current concept of unsolicited project proposal, the Government of Sri Lanka is considering obtaining of funds from alternative sources while efficient infrastructure service, the public sector involvement is considered to implement the number of infrastructure projects. Hence the procurement guideline of department of Public Finance of Sri Lanka is issued to implement the second stage of management process of literature namely, tendering unsolicited proposal through Swiss Challenge system.(Supplement 30 dated 26.12.2016)

Objective – 2 To identify the risk sources associated with the pre contract stages of unsolicited road projects in Sri Lanka

With the assistance of literature review and case study interviews the second objective of the research was attained. Twelve risk sources were identified in the literature review (refer Table 2.3) which were refined and then the risk sources relevant in the unsolicited road project were extracted (refer Table 4.2). The risk sources were directly related to different stages of construction projects. The study concentrated to identify the risk sources in stages of construction projects namely, pre - tendering stage and tendering stage. The risk sources were considered in all cases that the risk sources were specific to the geographical location of the construction project, because the Contractor had been submitted their project proposal with respect to the site conditions and the Employer reviewed it with referring necessary documents. The implementation of Possession of site and improper estimate were the most important risk source in first stage in construction projects as well as the unsolicited road projects. The extension of time for project period was allowed to mitigate the risk source of possession of site by the Employer and variations were requested to transfer risk by the Contractor to risk handling process of the most effective risk source in the entire project work. Similarly the risk source of improper estimates was identified the most influenced risk source of unsolicited road project in Sri Lanka due to lack of detail investigations to prepare the proposal BOQ and accepted the risk by the contractor in pre- contract stage. The revised the BOQ of contract document within the contract sum was adapted to risk mitigation due to improper estimate by the Employer in risk allocation and handling process (refer Table 4.4).

The balance risk sources were identified in construction projects as well as unsolicited road projects except quality measures and legislative changes.

The quality control techniques were applied to measure the quality issues by the Employer in unsolicited road project to substitute the sub clause 4.17 in section 3 of condition of contract of SBD - 2 by adding identifying defects, tests, correction

defects and uncorrected defects by the Employer to avoid the risk due to quality measures.

The legislative changes was not affected to unsolicited road projects because the Ministry of Finance & Planning approved to grant exemption on payment of taxes, then any changes of Government policies for taxes were not affected to the unsolicited road project.

Objective – 3 To investigate the risks allocation and responses of contractual parties in unsolicited road projects

The accomplishment of the third objective of the study was done through interviews and document reviews. The contract documents of unsolicited road project, the risk allocation was clearly included with referring the SBD - 2 and the risk allocation of each risk sources were identified (refer Table 4.3) and the risk control was done in section 2.3.4 of Chapter 2 by the contractual parties (refer Table 4.4). The risk sources due to any changes of designs were influenced the construction work because the typical drawings were submitted in first stage namely approving the unsolicited project proposal by the Contractor. When design changes were identified in Construction stage, the risk was allowed to the Employer because the improper design review were done by the Employer in first stage of the management process of unsolicited project proposal in Sri Lanka (refer Table 4.4). The project period was decided at the first stage of the management process of unsolicited road project through the contractor's project proposal. The extension of time or limiting the project activities related to variations were implemented to mitigate the risk within the contract sum by the Employer in unsolicited road project (refer Table 4.4). The risk allocation in SBD - 2, the Clauses are explained the risk involvement in contractual parties in construction industry. However the design changes and period of work were already decided in first stage of the management process of unsolicited project by the contractor and any changes of design and completion of project, the risk was transferred to Employer and risks were mitigated by providing variations, extension of time without cost within contract sum by the Employer.

The risk mitigation is very effectively applied to risk allocation in each stage of construction activities to complete the project work with coordinating both parties in all cases.

The risk transfer is also much important to manage the project risk because it could affect as a barrier for certain losses and also to achieve the objectives of each party. The risk avoidance is considered as the most effective risk handling method and the approach is clearly identified in early stage of the construction activities in both parties with keeping better communications and records. It could be realized and coordinated with both parties; otherwise the effects of risks are retained by a particular party and handled the risk sources to minor effect to construction activities by implementing other risk handling methods.

The risk identification and effective risk handling is very essential factor in construction activities of unsolicited road project by adopting previous experience to achieve the better decisions. It has been noted that, there is no one best way of dealing with a risk and apply different handling methods to solve the specific risk events in each stage of construction work.

The Employer was allocated some part of the construction risks through the contract clauses of the Standing Bidding Document in Major Contract(SBD - 2) before the contract was awarded and this influences the Contractor to understand and allocate the risks with the project proposal. All sixteen risk sources are entitled to the clauses of SBD - 2 of ICTAD publications. The absence and unclear clauses are occurred the disagreement and unfair of risk allocation. In such situations, the risks had been specifically allocated to a party through the references of contract clauses and share the risk in both parties.

The application of reconsideration risk handing work is very useful to relevant parties to identify the risk in construction stages and the type of risk allocation in advance since it has been derived through the current cases in unsolicited road project in Sri Lanka.

Governments could use several approaches to handle unsolicited proposals. One option is simply to adopt a law prohibiting unsolicited projects, identified as bonus system. A second option is for governments to purchase the project concept and then award the project through a competitive bidding process in which no bidder has a predefined advantage, identified as Swiss Challenge system. A third option is to offer the original proponent a predefined advantage in a competitive bidding process, identified as Best and Final offer system. Under this third option two main approaches have developed: the bonus system and the Swiss Challenge system. Considering the above three approaches in unsolicited project proposal, the Government of Sri Lanka implemented the own system with the model of Swiss Challenge system and further modified to suit the best model of the Government of Sri Lanka.

5.3 Recommendations

The identification of risks in a systematic way in construction stages is more effective and important factor to manage and complete the project within the specified contract period by the contractual parties.

Based on the findings of the research following recommendation can be made:

- The Employer should identify any issues regarding to possession of site with comparing the scope of work before commencing the project.
- Consultants should review and improve design documents, shop drawings and the payments schedule of Contractor to avoid any delay or cost overruns at the project.
- The Employer are recommended to revise the bid documents such as technical specifications, drawings, Bill of Quantities and the design of the project in a good way at the initial stage of the unsolicited project. This is to avoid disputes and payment delay and time over run may occur.

- The Employer should coordinate the relevant authorities of utility shifting work in advance to manage the risk control techniques and avoid the unnecessary delay.
- The Employer or Funding agency should work within stipulated budget putting in bank account before starting the project execution to avoid unnecessary delay for supply and maintain the resources for particular project.
- CIDA registration should be minimum of 05 years in particular project category and Contractor's Grade should be C2 and above for unsolicited project proposals.
- Similar construction experience of Contractors should be consider minimum of one Contract being completed to the value of 70% of the Contract Sum within last 05 years
- Average Annual Turnover of the Contractor should be consider at least for last 05 years

5.4 Further Recommended Studies

1. Its suggested that the boundaries of the study widened to understand the risk allocation, handling and project finance of unsolicited projects in building, water supply, bridge and other infrastructure construction projects.
2. Studies for legal issues and risk allocation associated with recovery of payment in construction industry through arbitration and adjudication are suggested to implement in unsolicited project as other procurement systems.
3. It is recommended to increase the sample size and use real case studies to build up a new model to analyse the unsolicited projects.
4. Develop a risk handling frame work to identify the issues of unsolicited road projects.

Reference List

- Akintoye, A.S., MacLeod, M.J. (1997). The Construction research studies. Retrieved from: www.processprotocol.com/extranet/.../pdf/.../construction%20studies.pdf
- Abd El – Karim, M.S.B.A, El Nawawy, O.A.M., Abdel – Alim, A.M. (2015). Identification and assessment of risk factors affecting construction projects. Journal .Housing and Building National Research Canter. Retrieved from <http://www.sciencedirect.com/science/article/pii/S168740481500036X>
- Al- Bahar, J.F., Crandall, K.C. (1990). Systematic risk management approach for Construction Design Management, International Journal of Project Management. 19(3): 147 -160
- Annual Report, Road Development Authority (2012). Retrieved from <https://www.parliament.lk/uploads/.../annual-report-road-development-authority-2012.p>
- Andi. (2006). The Importance and Allocation of Risks in Indonesian Construction Projects. Construction Management and Economics, Vol.24, pp.69-80.
- Aziz, R.F. (2013). Ranking of delay factors in Construction projects after Egyptian revolution. Alexandria Engineering Journal. (2013) 52.387 - 406. Retrieved from www.sciencedirect.com/science/article/pii/S1110016813000318
- Baker, S., Ponniah, D., Smith, S. (1999). Risk Response Techniques Employed Currently for Major Projects. Construction Management and Economics. Vol.17, pp. 205 -213.
- Buertey, J.I.T., Emmanuel, A., Kumi, T.A. (2012). Estimating cost contingency for construction projects: the challenge of systemic and project specific risk. Journal of Construction Project Management and Innovation. Volume 2, issue 1: 166 - 189, 2012.

Retrieved from http://journals.co.za/docserver/fulltext/jcpmi/2/1/jcpmi_v2_n1_a1.pdf?expires=1497766044&id=id&acname=guest&checksum=ABC1ECE0183A58A8106AEC05794646D6

Bing, L., Akintoye, A., Edwards, P.J., Hardcastle, C. (2004). The allocation of risk in PPP/PFI construction projects in the UK. Retrieved from [www. down.cenet.org.cn/upfile/47/2005518123113112.pdf](http://www.down.cenet.org.cn/upfile/47/2005518123113112.pdf)

Banaitiene, N., Banaitis, A. (2012).Risk Management in Construction Project. Retrieved from <http://w.w.w.intechopen.com/download/pdf/38973>

Bhattacharyya, S.C., Dey, P.K. (2007). Managing risk in a large rural electrification programme in India, *Impact Assessment and Project Appraisal*, 25(1), March 2007, pages 15–26 Retrieved from www.tandfonline.com/page/terms-and-conditions

Baloi, D., Prince, A.D.F.(2003).Modelling global risk factors affecting construction cost performance. *International Journal of Project Management*, 21(4):261 - 269.

Brigitta, S. (2014). Risk Management Techniques and Strategies for Risk Managers. Retrieved from http://www.udemy.com/pmi_risk_management_professional_pmi_rmp

Bunni, N.G. (2003).Risk and Insurance in Construction. (2ndEd.).London: span press
Clear Path Employer Services, (2016). Risk Control Techniques. Retrieved from www.clearpathemployer.com/risk-control-techniques.html

Churchill, H. & Sanders, T. (2007). Getting your PhD: a practical insider's guide. London, Sage Publications.

Chapter 5: Risk Controls- The state Office of Risk Management. (2005).P.O. Box 13777 Austin, TX 78711-3777 512/475-1440.Retrieved from <https://www.sorm.state.tx.us/rmtsa-guidelines-2/rmtsa.../rmtsa-volume.../rmtsa-vol-i-se..>

Democratic Socialist Republic of Sri Lanka.(2011,May).Procurement Guideline Part II Reference:237(Supplement-23). Department of Public Finance.

Democratic Socialist Republic of Sri Lanka.(2006,October).Procurement Manual (Supplement-07). National Procurement Agency.

Diego., Haruo., Marito.,Naohisa,. (2005).Private Finance for Road Projects in Developing Countries: Improving Transparency through value –for money (VFM) Risk Assessment: Journal of the Eastern Asia Society for Transportation Studies, Vol.6, and pp.3899 – 3914.

Dey, P.K. (2002).Project risk management: A combined analytic hierarchy process and decision tree approach. Cost Engineering Vol.44/No.3. March. Retrieved from https://www.researchgate.net/.../40499015_Project_risk_management_A_combined_a.

Dey, P.K. (2011).Issues and Challenges of managing projects in India: A Case study in: Budhwar P.S, Varna A, editors. Doing business in India: Building research – based practice. New York: Routledge; 2011.

Dey, P. K., & Ogunlana, S. O. (2004). Selection and Application of risk management tools and techniques for build-operate-transfer projects. *Industrial management and data systems*, Retrieved from <https://research.aston.ac.uk/.../selection-and-application-of-risk-management>

Dvir, D., Shenhar, A.J., Raz, T. (2002). Risk management, project success, and technological uncertainty. Retrieved from <http://www.praxiom.com/iso-31000-terms.htm>

Edwards, P.P., Bowen,P.A.(1998).Risk and Risk Management in Construction, a review and future directions for research, Engineering Construction and Architectural Management. Vol.5, issue.4, pp. 339-349. Retrieved from <http://www.doi.org/10.1108/ebo21087>

- Ehan, N., Mirza, E., Alam, M., Ishaque, A. (2010). Risk Management in Construction Industry. Retrieved from www.meeting.edu.cn/meeting/UploadPapers/1282726331593.pdf
- Fan, C.K., Chen, T.C. (2012).The Risk Management Strategy of Applying Cloud Computing .International Journal of Advanced Computer Science and Applications, Vol. 3, No. 9, Retrieved from <http://www.chinacloud.cn/upload/2012-10/12100614526693.pdf>
- Fidan, G., Dickmen, I., Tanyer, A.M. (2011).Ontology for relating risk and Vulnerability to Cost Overrun in International Projects. Retrieved from [http://ascelibrary.org/doi/abs/10.1061/\(ASCE\)CP.1943-5487.0000090#sthash.jjrhdFfp.dpuf](http://ascelibrary.org/doi/abs/10.1061/(ASCE)CP.1943-5487.0000090#sthash.jjrhdFfp.dpuf)
- Finance Commission of Sri Lanka. (2015).Public Private Partnership Approach: Theory and Practice. Retrieved from <http://fincom.gov.lk/public-private-partnership-approach-theory-and-practice>
- Flanagan, R., Norman, G. (1993). Risk Management and Construction. Retrieved from Retrieved from www.amazon.com/Risk-Management-Construction...Flanagan
- Flanagan, R., Norman, G., Chapman, R. (2006).Risk Management and Construction (2nd ed.) Oxford: Blackwell Publication.
- Ghosh, S., Jintanapakanont, J. (2004).Identifying and assessing the critical risk factors in an underground rail project in Thailand: a factor analysis approach. International Journal of Project Management 22 .633 – 643. Retrieved from https://www.academia.edu/8041766/Identifying_and_assessing_the_critical_risk_factors_in_an_underground_rail_project_in_Thailand_a_factor_analysis_approach?
- Goh, C.S., Abdul – Rahman, H.(2013).The Identification and Management of Major Risks in the Malaysian Construction Industry. Journal of Construction in Developing Countries.18 (1), 19 -32 Retrieved from web.usm.my/jcdc/vol18_1_2013/art2_jcdc18-1.pdf

- Han, S. H., and Diekmann, J. E. (2001). "Approaches for making risk-based go/no-go decision for international projects." *J. Constr. Eng. Manage.*, 127(4), 300–308.
- Helman, J.I.M., Keizer, J.A. (1998). *Risk Management in Product Innovation Project*. Retrieved from www.researchgate.net/profile/johanneshalman/publication/232274044_risks_in_major_innovation_projects
- Henning, D. (2012). *Project Cost Estimate and Contingency*. Retrieved from <http://w.w.w.wiki.iploca.com/appendix+3.4.5+project+cost+estimate>
- Hillson, D. (2002). Extending the risk process to manage opportunities. *International Journal of Project Management*. 20 (3):235 -240.
- Hsieh, H.F., Shannon, S.E. (2005). *Three Approaches to Qualitative Content Analysis*. Published by Sage <http://qhr.sagepub.com/content/15/9/1277>
- Institution of Civil Engineers and the Actuarial Profession (2005). *Risk analysis and management for Projects (RAMP) (2nd ed.)*, London: Thomas Telford Ltd.
- Issa, D., Emsley, M., Kirkham, R. (2012). *Reviewing Risk Allocation for infrastructure Private Finance Initiative (PFI): Between Theory and Practice*. Retrieved from www.arcom.ac.uk/-docs/proceedings/ar2012-1219-1231_Issa_Emsley_Kirkham.pdf
- Jayasundha, K., Vidivelli, B. (2016). *Analysis of Major Risks in Construction Projects*. *ARPN Journal of Engineering and Applied Sciences*. Retrieved from www.arpnjournals.org/jeas/research_papers/tp_2016/jeas_0616_4375.pdf
- Jock, R. M., Samuel, J. M. (2012). *Project Management: a Managerial approach*, (7th ed.) John Wiley & Sons. Inc .111River Street, Hoboken, NJ 07030 - 5774

- John, T.H. & Georgina, D. (2007). Unsolicited Infrastructure Proposals. Public-Private Infrastructure Advisory Facility(PPIAF) Publications/o the world Bank,1818 H street, Washington, DC 20433.
- Krippendorff, K. (2004). Content analysis. An Introduction to its Methodology. Sage Publication.2004.
- Kartam, N.A., Kartam, S.A. (2001). Risk and its management in the Kuwaiti construction industry: a contractors' perspective... International Journal of Project Management. Volume 19, Issue 6 August 2001, Pages 325-335
- Laila, M.K. & Mohamed, A.H. (2014). Identifying the latest risk probabilities affecting construction projects in Egypt according to political and economic variables. From January 2011 to January 2013 Retrieved from www.sciencedirect.com/science/article/pii/S1687404814000285
- Lam, P.T.I. (1999). A sectoral review of risks associated with major infrastructure projects. International Journal of Project Management, Vol.17, No.2, 77-87
- Lenzi, J.C. (2012).Use of Risk based project estimates for budgeting and project management. Retrieved from www.wsdot.wa.gov/publications/fulltext/projectmanagement/policy
- Li,B.,Ren,Z.(2009).Bayesian technique framework for allocating demand risk between the public and private sector in PPP projects.IEEE,837 -841.
- Martin, S. (2006).Risk Management in Construction Project Management. Journal of Business Economics and Management Volume 7, 2006 –issue2 Retrieved from www.trandfonline.com
- Mark, S., Pickmen, D. (2000). Using Risk Analysis to Determine Construction Project Contingencies. Journal of Construction Engineering and Management. Vol. 126, No.2. pp. 130 -136.

- Mayring, P. (2000). Qualitative Content Analysis. Forum Qualitative Social Research. Volume. 1, No.2. Retrieved from <http://www.qualitative-research.net/index.php/fqs/article/view/1089/2385>
- Mayring, P. (2014). Qualitative Content Analysis. Theoretical Foundation, Basic Procedures and Software Solution. Retrieved from http://www.ssoar.info/ssoar/bitstream/handle/document/39517/ssoar-2014-mayring-Qualitative_content_analysis_theoretical_foundation.pdf?sequence=1
- Memon,A.H., Rahman,I.A.,Azis,A.A.A. (2011). Preliminary study on Causative Factors Leading to Construction Cost Overrun. International Journal of Sustainable Construction Engineering & Technology. Volume 2, Issue1, June 2011.Retrieved from <https://core.ac.uk/download/pdf/12007158.pdf>
- Miller, R., Lessard, D. (2001). Understanding and managing risks in large engineering projects, Management. Volume, November 2001, Pages 437-443
- Michael, S. (2010).Risk Management. The what, why and how, global report. Retrieved from [www.bia.ca/articles/rm-risk management.htm](http://www.bia.ca/articles/rm-risk%20management.htm)
- Nick, G. (2015). Project Management for Dummies. Wiley Publication. Retrieved from <https://books.google.lk>
- Nerija, B. & Audrius, B. (2012).Risk Management in Construction Projects. Retrieved from <http://www.intechopen.com/download/pdf/38973>
- Perera, B.A.K.A, Dhanasinghe, I. (2011). Risk Allocation of Road Projects in Sri Lanka .Retrieved from <https://www.irbnet.de/daten/iconda/CIB11457.pdf>
- Perera, B.A.K.S., Dhanasinghe, I., Rameezdeen, R.(2009). Risk management in road construction: The case of Sri Lanka. Journal, 13, 2009. Retrieved from International Journal of Strategic Property Management Volume - Issue 2

- Pinto, J.K., Slevin, D.P. (2016). Critical Success Factors in R&D Projects. *Journal Research-Technology Management*. Volume 32, 1989 - Issue 1. Retrieved from <http://www.tandfonline.com/doi/pdf/10.1080/08956308.1989.11670572?needAccess=true>
- Lam, P.T.I. (1999). A Sectional review of risks associated with major infrastructure projects. *International Journal of Project Management*, Vol.17, No.2, 77- 87.
- Lee, E. (2009). Large engineering project risk management using a Bayesian belief network. Retrieved from www.isiarticles.com/bundles/Article/pre/pdf/722.pdf
- Oyegoke, Pheng & Chun, (2006). Risk management in Project: Peculiarities of Lithuanian Construction Companies. Retrieved from <http://www.thefreelibrary.com>
- Pejman, R. (2012). Classifying Key Risk Factors in Construction Projects. Retrieved from www.bipcons.ce.tuiasi.ro/Archive/292.pdf
- Project Management Institute. (2004). *A Guide to the Project Management Body of Knowledge (PMBOK^R Guide) (3th ed.)*, New Town Square, USA.
- Project Management Institute. (2008). *A Guide to the Project Management Body of Knowledge (PMBOK^R Guide) (5th ed.)*, New Town Square, PA19073-3299 USA.
- Rabechini, R., deCarralho, M.M. (2013). Understanding the impact of Project risk management on project performance: Empirical study, *Journal of Technology Management & Innovation*, volume 8, special issue ACTEC
- Raftery, J. (1994). *Risk Analysis in Project Management*. London: E & FN Spon. Poms & Associates. (2014). *Risk Management*. Retrieved from <http://www.pomsassoc.com/6-fundamental-techniques-risk-control>

- Rezakhani, P. (2012). Classifying Key Risk Factors in Construction Projects. Retrieved from https://www.researchgate.net/.../266460882_Classifying_key_risk_factors_in_construction.
- Remenyi, D., Williams, B., Money, A. & Swartz, E. (2003). Doing research in business and management: An introduction to process and method, London, SAGE Publications
- Risk Management Dictionary. (2010).ISO 31000 2009.Published by Praxion Research Group Limited.
- Saunders, M., Lewis, P., Thornhill, A. (2003).Research Methods for Business Students.3rd Edition, Dorling Kindersley (India) Pvt. Ltd. Licensee of Pearson Education Limited in south Asia. Retrieved from <https://books.google.lk/>
- Sarwono, H. (2014). Analysis on the Possession of Site as Physical Cause of Claim and the Related Clauses in the “FIDIC Conditions of Contract for Construction MDB Harmonised Edition” Journal of Basic and Applied Scientific Research. 4(12)109-121. Retrieved from [https://www.textroad.com/.../J.%20Basic.%20Appl.%20Sci.%20Res.,%204\(12\)109-12..](https://www.textroad.com/.../J.%20Basic.%20Appl.%20Sci.%20Res.,%204(12)109-12..)
- Smith, S.F. (2003). Is scheduling a solved problem? *Retrieved from www.cs.cmu.edu/afs/cs/user/sfs/www/mista03/sfs-mista-book.pdf*
- Stephen, W., Chapman, C. (2003).Project risks Management. John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex PO19 8SQ, England.
- Susan, E.W. (2011).What is the Difference between Qualitative Research and Quantitative Research? Retrieved from <https://www.snapsurveys.com>
- The Project Management Body of Knowledge (2000). Risk Monitoring and Control. Retrieved from www.cin.utpe.br/v2/wbs_11.6html

- Thompson, P.A., Perry, J.G.(1992).Engineering Construction risks,Thomas Telford Publishing London. T. Telford, 1992.
- Tohidi, H. (2011). The role of Risk management in IT systems of organizations. Retrieved from www.sciencedirect.com/science/article/pii/S1877050910005193
- Trochim, W., William, M. (2006). The Research Methods Knowledge Base, 2nd Edition. Retrieved from the Internet at <http://www.socialresearchmethods.net/kb>
- Tom, K. (2003).Identifying and Managing Project Risk, American Management Association, 1601, Broadway, New York, NY 10019.
- Treasury Sri Lanka. (1997). Private Sector Infrastructure Projects. Retrieved from <http://www.treasury.gov.lk>
- Uher, (2003), Managing Project. Retrieved from <https://books.google.lk/books?isbn=1259097277>
- Usama, H.I. (2013).Implementation of lean construction techniques for minimizing the risks effect on project construction time. Retrieved from <http://w.w.w.sciencedirect.com/science/article>
- Wang, M.T. Chou, H.Y. (2003).”Risk Allocation and Risk Handling of Highway Projects in Taiwan”, Journal of Management in Engineering, vol.19,no.2. pp 60-68. Retrieved from [https://doi.org/10.1061/\(ASCE\)0742-597X\(2003\)19:2\(60\)#sthash.Y34MFshD.dpuf](https://doi.org/10.1061/(ASCE)0742-597X(2003)19:2(60)#sthash.Y34MFshD.dpuf)
- Wong, K.W.J., Skitmore, M., Creedy, G.D. (2010).An Evaluation of the Risk Factors Leading to Cost Overrun in the Delivery of Highway Construction Projects. Journal of Construction Engineering and Management, 136(5), pp. 528-536 Retrieved from <https://www.scribd.com/document/89981626/Jurnal-Highway-Cost-Overrun>

- Woodside, A., Villiers, R., Marshall, R. (2010). *Incompetency and Competency Training*. Springer International Publishing, Switzerland. Retrieved from <https://books.google.lk>
- Wiguna, I.P.A., Scott, S. (2006). Relating risk to project performance in Indonesian Building Contracts. *Construction Management and Economics*, Vol.11, pp.1125- 1135
- Yin, R.K. (1994). *Case study research design and methods*. (2nded.). Sage Publication, Inc. London.
- Zhi, H. (1995). "Risk management for overseas construction projects." *International Journal Project Manager*, 13(4), 231–237.
- Zou, P.X.W., Zhang, G., Wang, J., and (2007) .Understanding the key risks in construction projects in China. *Int. Journal Project Manage*2007; 25(6):601-614.

APPENDIX – 1: Interview Guide Line – Employer

Date:

General Information

1. Name (Optional):
2. Organization (Optional):
3. Role in this Organization:
4. Experience in Road Projects:
 - 4.1. Experience in Unsolicited Projects:
5. How did you prepare the Request for Qualification (RFQ) in this project proposal?
6. If there were more adequate responses to the Request of Qualification (RFQ), how did you prepare the Request for Proposals (RFP)?
7. What were the key reasons for submitting an unsolicited proposal for this particular project?
8. How long did it take from the submission of project proposal to the awarding of contract?

Risk related Information

1. What were the main risks faced by you in developing the preliminary project proposal for this project?
 - 1.1. Who were responsible parties for handling the risk for preliminary project proposal of this project?
 - 1.2. What was the risk handling techniques used at this project?
2. How did you carry out the review of project proposal?
3. How were the factors you consider to accept or reject the project proposal in review stage?

4. Once the project was accepted, what was the time allocation for the review of project proposal?
5. How did you consider the collaboration of other institution to review of project proposal?
6. What were the main risks associated in the project review stage of this project?
 - 6.1 Who were the responsible parties for handling the risk for review work of this project proposal?
 - 6.2 What was the risk handling techniques used in this stage of the project?
7. What were the main risks associated with funding for this project?
 - 7.1 Who were the responsible parties for handling the risk for funding of this project?
 - 7.2 What was the risk handling techniques used at this stage of the project?
8. Were there any other risks related to the pre contract stage of this project?
 - 8.1. Who were the responsible parties for handling the risk for any other matters of this project?
 - 8.2. What were the risk handling techniques used in this project?
9. How did you identify the quality measures in stages of project proposal?
 - 9.1 Who were the responsible parties for handling the risk for quality measures work of this project?
 - 9.2 What were the risk handling techniques used in this project?

APPENDIX – 2: Interview Guide Line – Contractor

General Information

1. Name (Optional):
2. Organization (Optional):
3. Role in this Organization:
4. Experience in Road Projects:
 - 4.1 Experience in Unsolicited Projects:
5. How did you prepare the Request for Qualification (RFQ) in this project proposal?
6. If there were more adequate responses to the Request of Qualification (RFQ), how did you prepare the Request for Proposals (RFP)?
7. What were the key reasons for submitting an unsolicited proposal for this particular project?
8. How long did it take from the submission of project proposal to the awarding of contract?

Risk related Information

1. Once a project is selected what are the main factors you consider in preparing the preliminary unsolicited road project proposal?
2. What did you determine the scope of work for this particular project proposal?
3. Once a scope of work is determined, how did you consider the project period of unsolicited road project proposal?
4. Can you briefly explain the stages you went through from project inception to the awarding of contract?
 - 4.1. How did you develop the preliminary description of the project proposal for this particular project?
 - 4.2. What was the level of details provided in this preliminary project proposal?

5. Can you identify any key risks involved to prepare the project proposal in this project?
 - 5.1. Who were the responsible parties for handling the risk in that stage?
 - 5.2. What were the risk handling techniques used in this project?
6. What were the main risks associated with funding for this project?
 - 6.1 Who were the responsible parties for handling the risk for funding of this project?
 - 6.2 What were the risk handling techniques used at this stage of the project?
7. How did you identify the quality measures in stages of project proposal?
 - 7.1 Who were responsible parties for handling the risk for quality measures work of this project?
 - 7.2 What was the risk handling techniques used in this project?

APPENDIX -3: Interview Transcript Sample of Case Study – Employer

Date:

General Information

1. Name (Optional):
2. Organization (Optional): RDA
3. Role in this Organization: Deputy Director/Quality Control Manager
4. Experience in Road Projects: 25 Years

4.1. Experience in Unsolicited Projects: 05 years

5. How did you prepare the Request for Qualification (RFQ) in this project proposal?

Commonly attended to prepare RFQ in unsolicited road project. Considered the previous experience of the contractor, technical and financial capacity, Grade of ICTAD, funding facilities granted by the local bank.

6. If there were more adequate responses to the Request of Qualification (RFQ), how did you prepare the Request for Proposals (RFP)?

Not attended but the following facts were considered to prepare the RFP.*Submission of form of RFP,* Technical and Financial proposal,*Project Period,*Design proposals with relevant typical drawings,*Preliminary site inspection and investigation report,*feasibility study report,*Economical and physical advantages for the nation,*Public interest and Environmental impact due infrastructure development work,

7. What were the key reasons for submitting an unsolicited proposal for this particular project?

Upgrading the existing road to link the National road network, Facilitate the infrastructure development in rural area, Developing the tourism industry in this area, Developing the Agriculture and irrigation facilities

8. How long did it take from the submission of project proposal to the awarding of contract?

Approximately 03 months

Risk related Information

1. What were the main risks faced by you in developing the preliminary project proposal for this project?

Scope changes due to site conditions, Quantity variation due to scope changes, Insufficient BOQ items in Original BOQ, Schedule of work of Master Work programme, Delay caused by authorities, exceeding the original contract sum, dealing with utility agencies

- 1.1 Who were responsible parties for handling the risk for preliminary project proposal of this project?

Scope changes – Employer/ Contractor, Quantity variation – Contractor, Insufficient BOQ items in Original BOQ – Contractor, Schedule of Work – Contractor, Delay caused by authorities – Employer

Project Period – Employer/Contractor, Dealing with utility agencies – Employer/contractor

- 1.2 What were the risk handling techniques used at this project?

Scope changes- Allocating additional funds from the Line Ministry – Employer (Risk Retention), Limiting the scope of work to allocate within the Contract Sum – Employer (Risk Mitigation)

Quantity variation/ Insufficient BOQ items in Original BOQ - Requesting Variations – Contractor (Risk Transfer)

Schedule of Work- Coordinating relevant authority and apply prior approvals- Employer (Risk Mitigation), Preparing the required preliminary site investigation report – Contractor (Risk Mitigation)

Delay Caused by authorities- Requesting interest payments –Contractor (Risk Transfer), - Paying interest payments or deducting liquated damages – Employer (Risk Retention)

Project period – Minimizing uncomplete activities within project period – Employer (Risk Retention), - Requesting Extension of time – Contractor (Risk Transfer)

Dealing with utility agencies, Employer – Communicate the work programme in advance (Risk Transfer)

Contractor – Coordinating the prepare estimate and payments on time (Risk Mitigation)

2. How did you carry out the review of project proposal?

Not attended. PC of line Ministry had been done the review work. Geometric and pavement designs were arranged with respective divisions of RDA

3. How were the factors you consider to accept or reject the project proposal in review stage?

Not attended.

4. Once the project was accepted, what was the time allocation for the review of project proposal?

Approximately 02 months.

5. How did you consider the collaboration of other institution to review of project proposal?

According to the previous information of the line ministry, the various originations were participated to review work namely, Dept. of Irrigation Central Environmental Authority, Dept. Of Agriculture, National Water Supply & Drainage Board, Dept. Of wild life, Dept. of Forest etc.

6. What were the main risks associated in the project review stage of this project?

Referring the previous details available from the Line Ministry records, the main risks associated in the project review stages namely, Inadequate information of Project Proposal

Submission of unsatisfactory typical drawings and design details

Insufficient time frame to detail investigation and evaluate the reports with project proposal

- 6.1 Who were the responsible parties for handling the risk for review work of this project proposal?

Employer/ Contractor

- 6.2 What was the risk handling techniques used in this project?

Reconsider the information of project proposal- Employer (Risk Mitigation)

Compare the BOQ items of Engineer estimate and Contractor estimate – Employer (Risk Avoidance)

Submitting accurate details and Information –Contractor (Risk Mitigation)

7. What were the main risks associated with funding for this project?

Exceeding the Contract sum due to extra works due to under estimate of the BOQ of project Proposal

7.1 Who were the responsible parties for handling the risk for funding of this project?

Employer and Contractor

7.2 What were the risk handling techniques used at this stage of the project?

Contractor -Resubmit the revised BOQ and Variation to extra funds (Risk Transfer)

Employer -submit detail report with revisited BOQ to SCAPC through the PC of line Ministry for allocating additional funds (Risk Retention)

8. Were there any other risks related to the pre contract stage of this project?

Not known but PC had to determine the Project period with available resources in rural area of this project

- Who were the responsible parties for handling the risk for any other matters of this project?

Contractor: Consider sufficient preliminary site investigation to prepare the project proposal

Employer – Consider the proposal BOQ amount to adequate the completion of work within the period of Contract

- What were the risk handling techniques used in this project?

Contractor - Submit adequate details and data for redesign work (Risk Mitigation)

- Submit variations and request extension of time for any changes of original proposal(Risk Avoidance)

Employer – Requesting to revised the BOQ and scope changes to adequate the BOQ amount for any variation work (Risk Mitigation)

- Requesting the additional amount for variation work from the Line Ministry (Risk Transfer)

- Determine the limitation of project scope of work up to original contract sum (Risk Mitigation)

9 How did you identify the quality measures in stages of project proposal?

Determine the adequate provisions of Original BOQ

9.1 Who were the responsible parties for handling the risk for quality measures work of this project?

Employer

9.2 What were the risk handling techniques used in this project?

Employer – Deployed adequate technical staff to apply the quality control techniques throughout the project work (Risk control)

APPENDIX: 4 Interview Transcript Sample of Case Study – Contractor

Date:

General Information

1. Name (Optional):
2. Organization (Optional): Private Organization
3. Role in this Organization: Deputy General Manager (Quality)
4. Experience in Road Projects: 15 years
 - 4.1 Experiences in Unsolicited Projects: 4 Years
 - 4.2 Project (Optional):
5. How did you prepare the Request for Qualification (RFQ) in this project proposal?

Submitting the similar experience of road project

Submitting the line of credit facilities provided by the funding agency (Local Bank)
6. If there were more adequate responses to the Request of Qualification (RFQ), how did you prepare the Request for Proposals (RFP)?

The Request for Proposal prepared with,

The length of the proposed road, preliminary investigation report of feasibility study, Hydrological, typical cross sections & drawings, scope of work, Cash draw down of the project period and Bill of Quantities
7. What were the key reasons for submitting an unsolicited proposal for this particular project?

The project was Class A road of National road list.

The capability of construction work was gained the upgrade of the institution in construction industry.

The adequate resources and techniques were deployed to implement the construction work in specified project period.
8. How long did it take from the submission of project proposal to the awarding of contract?

Approximately 03 months

Risk related Information

1. Once a project is selected what are the main factors you consider in preparing the preliminary unsolicited road project proposal?

Considered the project period with considering schedule of work specified in master work programme

Prepared the all preliminary design details to submit the design report for tentative design drawings and pavement design

Prepared procurement of resources plan

2. How did you determine the scope of work for this particular project proposal?

Considered the field investigation report and typical cross sections

Identified the rehabilitation and improvement required the existing road with proposed design parameters

3. Once a scope of work is determined, how did you consider the project period of unsolicited road project proposal?

Considered the length of the road and the rehabilitation the existing & proposed structures of the road

4. Can you briefly explain the stages you went through from project inception to the awarding of contract?

Submitted the project proposal

Submitted the technical proposal with the letter of funding facilities from local banks and capabilities to construction work to secretary of the Line Ministry

Submitted the details and any classification to project committee of Dept. of Public Finance

Project committee submitted their recommendation to standard Cabinet Appointed Procurement Committee of office of the Cabinet Ministers

Obtained cabinet approval

Signed loan agreement with bank and RDA Issue a letter of accept ion by RDA

- 4.1. How did you develop the preliminary description of the project proposal for this particular project?

Identified the advantages to rehabilitation and improvement of the project

Importance to development of road network for infrastructure facilities of the area

Identified the locations of resources supply to project work

Identified the project staff and equipment to implement the project

Identified the construction of structures and prepare the detail investigation report for design work

Identified external organization to involvement of the construction stage to prepare the schedule of work

Considered the public request for development work and Environmental issues for improvement work.

4.2. What was the level of details provided in this preliminary project proposal?

Conceptual design report and typical cross section were used to prepare the preliminary project proposal

The BOQ was prepared on the preliminary investigation report and scope of work

5. Can you identify any key risks involved to prepare the project proposal in this project?

Possession of site to initiate the section of road

Structural & Pavement Design changes due to site condition

Changes of Project period due to extension of time and quantity variations

Procurement of resources with the schedule of work plan

Time frame to discuss the public and environmental issues

Discussion with relevant organization and explained any objection to the draft project proposal

5.1. Who were the responsible parties for handling the risk in that stage?

Employer, Contractor and relevant organizations

5.2. What were the risk handling techniques used in this project?

Possession of site – Employer (Risk Mitigation)

Design Changes – Contractor (Risk Mitigation)

- Employer (Risk Mitigation)
- Engineer (Risk Mitigation)

Public Issues – Contractor (Risk Mitigation)

- Employer (Risk Mitigation)

Project period -Employer (Risk Retention/Risk Transfer)

Contractor (Risk Retention/Risk Transfer)

6. What were the main risks associated with funding for this project?

Capability to select the funding facilities from local banks

Obtained the treasury guarantee to funding facilities

6.1 Who were the responsible parties for handling the risk for funding of this project?

Employer/ Contractor

6.2 What were the risk handling techniques used at this stage of the project?

Employer – Request required amount of particular project from the treasury (Risk Mitigation)

Contractor – Provide adequate liabilities to obtain funding facilities from the bank (Risk Mitigation)

7. How did you identify the quality measures in stages of project proposal?

Provided the adequate provision of quantities and items in BOQ

7.1 Who were the responsible parties for handling the risk for quality measures work of this project?

Quality control techniques implemented and monitored by the Employer

7.2 What was the risk handling techniques used in this project?

Quality measures implemented with qualified staff with equipment in frequently to maintain the necessary standard of quality work with reference to specifications.