MANAGING RISKS IN FOREIGN FUNDED PROJECTS IN SRI LANKA: A CASE STUDY OF WATER SUPPLY AND WASTE WATER PROJECTS

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Degree of Master of Science in Project Management

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DECLARATION

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ABSTRACT

Managing risks in foreign funded projects in Sri Lanka: a case study of water supply and waste water projects

Increase in population and economic development in recent past results increasing in demand for treated water for the domestic and industrial sectors. This applies immense pressure on government to implement projects to meet these increasing demands efficiently and effectively. As a result, many foreign funded water projects have been commenced in recent past. Although the government has accepted the need for more investments to increase the water supply coverage and enhance the quality of the service, the successful implementation of the water supply projects has always been a challenge and many issues related to projects affecting the foreign funded projects in Sri Lanka. The purpose of studying the risk factors affecting the foreign funded projects is to make recommendations to improve the degree of the success of implementation of water supply projects in the future.

A comprehensive literature was conducted to acquire knowledge to analyze risk related to foreign funded projects. Further questionnaire survey, expert interviews were conducted with project directors of foreign funded projects in National Water Supply and Drainage Board.

Base on the study findings in total, 26 critical risk factors were identified through a detailed literature review. The factors were tabulated in a questionnaire form and sent out to gather owner's perception on the rating of each risk factors regarding probability of occurrence and impact on foreign funded projects. A risk matrix having four risk levels as "low risk – (green)", "moderate risk – (yellow)", "high risk – (orange)" and "extreme high risk- (red)" is developed to evaluate significant risk factors. The analysis indicates that thirteen factors are located in the green zone, eight factors are located in the yellow zone, one factor is located in the orange zone and seven factors are located in the red zone of the risk matrix. The predominant risk factors that are located in the red zone are considered for developing risk management framework. Risk control measures were identified through in-depth interviews which were conducted with five experts, including 3 project directors of NWSDB and 2 project managers. Based on the findings, a risk management framework was developed which will be benefit the risk management of foreign funded water projects.

Keywords: *foreign funded water projects, risk, risk identification, risk matrix, risk response measure.*

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LIST OF ABBREVIATIONS

ADB	-	Asian Development Bank
DAC	-	Development Assistance Committee
DANIDA	-	Danish International Development Agency
DI	-	Ductile Iron
E&M	-	Electrical and Mechanical
FF	-	Foreign Funded
GOSL	-	Government of Sri Lanka
HDPE	-	High Density Poly Ethylene
ID	-	International Development
JICA	-	Japan International Cooperation Agency
MCP	-	Management Control Plan
NWS&DB	-	National Water Supply and Drainage Board
PD	-	Project Director
PM	-	Project Manager
PMU	-	Project Management Unit
RFP	-	Request for Proposals
RII	-	Relative Importance Index
SPSS	-	Statistical package for social science
UN	-	United Nations
VH	-	Very High
VL	-	Very Low

CHAPTER 01
INTRODUCTION

1.1 Background

Countries are divided into two major categories namely developed and developing countries. According to various definitions development of a country can be measured in various ways. In fact, development of the infrastructure in a country directly affects to the development process of a country. Sri Lanka, as a developing country has commenced various infrastructure development projects in different categories such as energy, transport, water, civil, telecommunication and social infrastructure. Among them, infrastructure projects represent large percentage of assets in the county, and support nation's social, cultural and economic stability, productivity, development and prosperity. Due to the importance of these development projects Government of Sri Lanka has given a higher attention.

A project can be defined as an activity with a specific goal occupying a specific period of time (Wild, 2002 as cited in Asare et al, 2017). Project management is defined as an application of knowledge, skills, tools and techniques to project activities to meet project requirements (Kloppenburg, 2012).

Projects create productive assets. It is only through projects resources are converted into productive assets. Since projects convert resources that lie idle into productive assets, projects act as prime movers of economic development of any country (Nagarajan, 2012). Since projects can be successfully completed only with a focused attention on goals by the project team members, projects act as a means for consolidating the experience and expertise of the organizational members effectively, create a learning environment, encourage-team spirit and help to achieve organizational objectives. Based on these characteristics, it would seem that project management, if introduced properly, would fill a natural need in the developing countries for a better and more economical way of managing their ever-growing number of projects.

Foreign funding plays a vital role in financing development projects in Sri Lanka, especially in the water supply sector, in addition to general infrastructure development. In recent years, water supply projects were implemented with assistance from foreign funds such as Japan International Cooperation Agency (JICA), Asian Development Bank (ADB), Danish International Development Agency (DANIDA), and German etc. with complement funding by the Sri Lankan Government (GOSL). After 2009, there are number of water supply projects, completed and ongoing under Chinese and Indian funds. Most of them are commercial loans from China Exim Bank and Indian Exim Bank.

National Water Supply and Drainage Board (NWSDB), had 989,395 total water connections in 2007 and this figure had doubled by the end of 2017. Another feature illustrating the evolution of Sri Lanka's water supply sector is the increased use of community managed water supply systems. In 1980s, aside from a few urban pipe-borne water supply networks, the bulk of the rural population was served by small gravity systems and dug wells. At the beginning of 1990, a series of programs got under way for scaling up district level rural water supply systems that were to be operated by the communities themselves so called community-based organization schemes. Total number of Water Supply Connections as at end of the 2017 was 2,219,172 as against the target of 2,323,669. (Summary of progress status on the corporate action plans as at end fourth quarter 2017; figure 1.2) Total piped water connected coverage was 49.20% against the target of 52.30%. (Figure 1.1).

Water supply projects in Sri Lanka take place in massive scale. The investment on this is too large. Accordingly, the outcomes of these projects should be more effective and less defects in the functioning process. But it was identified and evaluates the most significant risk factors that strongly affect the implementation of water supply projects. Water supply infrastructure services has seen continued growth over the past two decades, following public sector's budgetary constraints and inability to provide infrastructure-based water services efficiently and cost effectively. However, these projects are often subjected to major risks leading to failures.

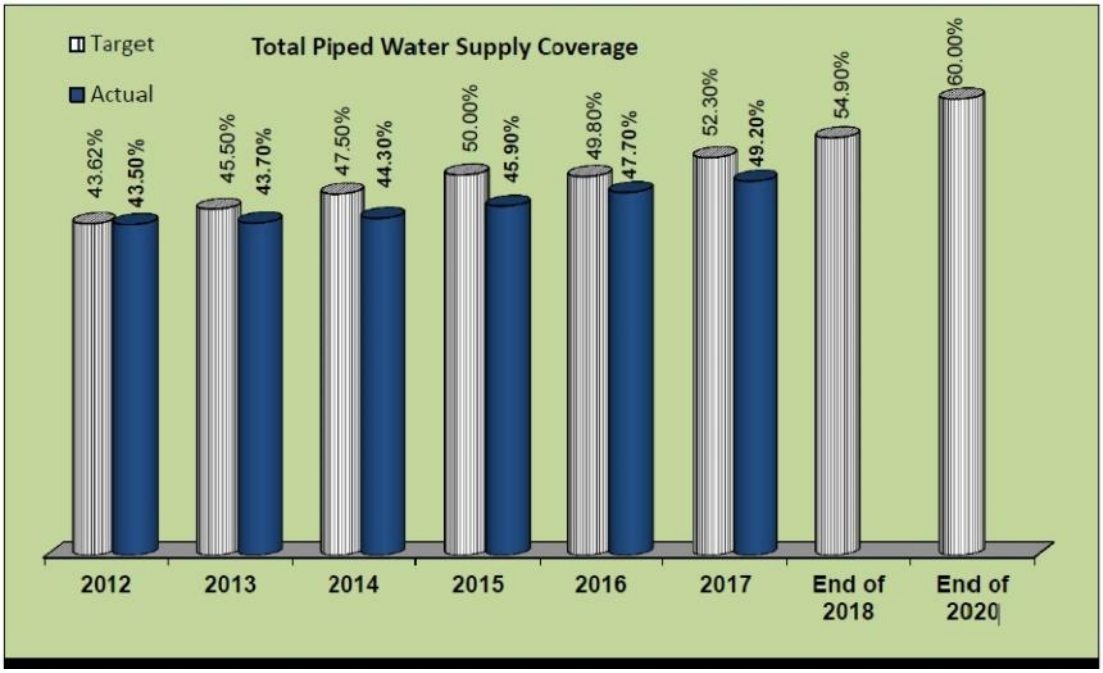


Figure 1. 1**: Total piped water coverage**

Source: CPA 4th Qtr.2017 Progress, (2017)

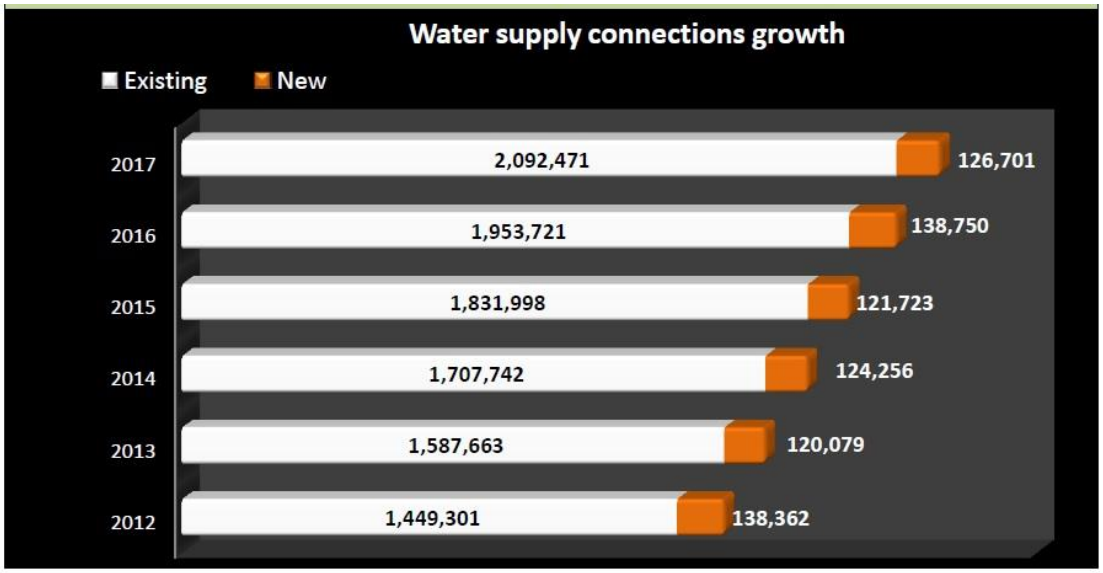


Figure 1. 2: Water supply connection growth

Source: CPA 4th Qtr. 2017 Progress, (2017)

Risk management is a systematic and continuous process of understanding, identifying, and Classifying potential risks associated with a project (Bajaj et. al., 1997) Risk assessment is the evaluation of how identified risk factors can affect the success of a project and its outcomes by determining their significance (i.e. probability and consequence).

However foreign funded projects have their own risks. Thus, managing risks is vital in project success. Research into risk identification is directed toward enumerating risk factors specific to projects in specific infrastructure sectors or countries through review of extant literature, interviews and surveys with experts, case studies, expert judgment, brainstorming, and Delphi technique (Ameyaw and Chan, 2013).

Considering the above facts this research is conducted to evaluate the key risks in foreign funded water supply and waste water projects, established in Sri Lanka and to establish management strategies.

1.2 Research Problem

All the governments give a due respect to develop the infrastructure facilities of the country as that is considered as an important measure in local economic development aspects. Therefore, every country has to allocate high capital investment for this type of infrastructure developments and lots of major projects have been introduced to facilitate these developments. Most of the capitals required for these developments have been gained through foreign funds and loans, where the central governments even sign some irrevocable agreements that even the future generations of the country get affected.

Whatever the plans made by the authorities, unless the country receives the required funds though the donors, they will not be able to conduct the development schedules as planned within the given time frame in line with other development activities.As per the previous data and records, in the analysis of projects carried out under JICA, DANIDA, ADB it was observed that risks in construction phase of the projects were relatively minimum comparing with current projects under Chinese and Indian funds.

As mentioned in the background, infrastructure projects which are crucial to development of the country are inherent with several risks. Further as we discussed when they are operated with foreign funding, risks related under such circumstances in construction phase are involved with many stakeholders. Despite the importance of considering risks, most of the projects are not properly addressed this concern.

As a result, ineffective project planning and preparation, problems in start-up and activation, inadequate project execution, operation and supervision etc. have been experienced (Why development projects fail problems of project management in developing countries, (Project Management Institute).

1.3 Aim & Objectives

The aim of this research is "Establishing risk mitigation framework in foreign funded water supply and waste water projects" with following objectives.

Objectives:

- Identify the risks in foreign funded water projects
- Establish effective pro-active control measures to manage the risks in foreign funded water projects
- Develop a frame work for mitigate critical risks and identifying the most genetic risks to water projects

1.4 Methodology

In order to achieve the above-mentioned aim and objectives following research methodology was adopted.

A comprehensive literature survey was carried out by referring a range of books, journals, articles, conference proceedings, related dissertations, government publications and World Wide Web to identify the Managing risks related to the research area. Based on the literature findings, interviews were conducted with the related experts to obtain input towards the questionnaire design, especially towards identifying issues and how to manage them. Then, a detailed questionnaire survey was carried out to determine the significant issues with related to the foreign funded water projects. Sample was selected from the professionals who are involved in the foreign funded water projects in mainly in National water Supply and Drainage Board. The data collected through questionnaire survey was analyzed by using mean score method, relative importance index. Finally, interviews were conducted in order to extract expert views to confirm the questionnaire findings.

1.5 Scope and Limitations

The study is limited only with the foreign funded water projects which was carried out under separated contracts and further narrows down to evaluate the risks in foreign funded projects for easily conduct the study.

As the National Water Supply and Drainage Board is the only employee for the foreign funded water projects in Sri Lanka, all the respondents were from NWS&DB projects.

1.6 Chapter Breakdown

Arrangement of chapter breakdown of this research can be depicted as follows;

Chapter 01 - Introduction

This chapter discusses the background to the research topic, research problem, aim and objectives, scope and limitations, methodology in brief and the organization of the report.

Chapter 02 – Literature Review

This chapter reviews the existing literature to identify the concept of risk, risk management, risk factors with related to the foreign funded projects and risk response measures.

Chapter 03 – Research Methodology

This chapter describes the research methodology adopted for this study including research approach, data collection and data analysis techniques in detail.

Chapter 04 – Data Analysis and Results

This chapter presents the analysis of the collected data and research findings.

Chapter 05 – Conclusion and Recommendations

This chapter concludes the achievements of research aim and the objectives and further includes recommendations and directions for further researches.

CHAPTER 02
LITERATURE REVIEW

2.1 Introduction

The construction industry is typically a place having lots of risks in the processes. Therefore, project objectives in terms of time, cost and quality can be adversely affected by these issues. Hence, Regular and proper management in those issues is an important part of the decision-making process of all construction companies and it becomes an essential part of construction project.

In this chapter risk, risk Management process infrastructure project, water supply and sanitation projects in Sri Lanka, construction Project Funding, Foreign Funded Water Projects in Sri Lanka, challengers facing the implementation of these projects, construction Risk, project Risk, risk Identification.

2.2 Risk

We can categorize risk in various ways. According to the Oxford Advance Learner's dictionary the word "risk" is defined as the ''chance of failure or the possibility of meeting danger or of suffering harm or loss'' that means the likelihood of something bad happening in sometime in the future. The concept of risk varies according to viewpoint, attitudes and experience of different people such as engineers, designers and contractors view risk from the technological perspective; lenders and developers tend to view it from the economic and financial side; health professionals, environmentalists, chemical engineers take a safety and environmental perspective. Therefore, risk is generally seen as abstract concept whose measurement is very difficult (Baloi & Price, 2003).

2.3 Risk Management Process

Several authors formulated Different risk management approaches. Wang et al. (2004) described that a systematic approach to risk management in construction industry consists of three main stages as;

- Risk identification
- Risk analysis and evaluation
- Risk response

According to his explanation, risk management process begins with the initial identification of the relevant and potential risks associated with the construction project. It is of considerable importance since the process of risk analysis and response management may only be performed on identified potential risks. Risk analysis and evaluation is the intermediate process between risk identification and management. Similarly, Merna (2003) formulated risk management approach as shown in figure 2.3 which is consisting of risk identification, risk analysis and risk response. Further he explained that the risk management system is dynamic and must be continuous over the project life cycle.

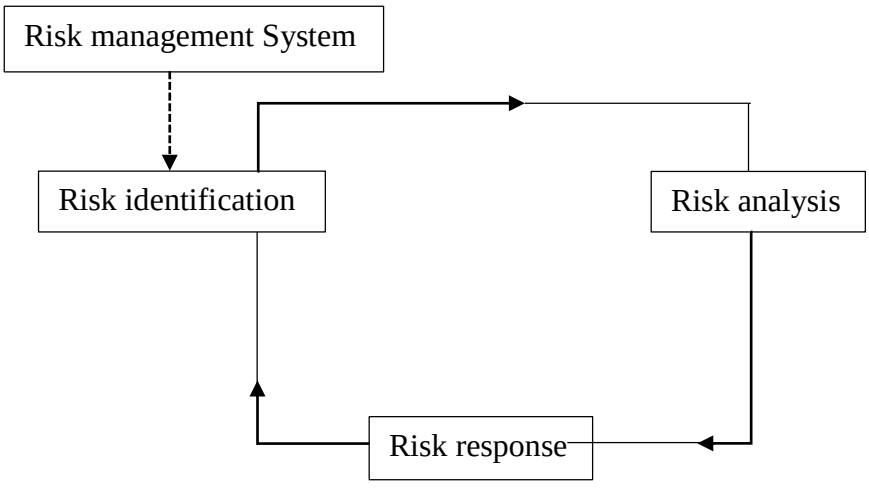


Figure 2. 1: Risk Management process

Source: Merna (2003)

According to the Flanagan and Norman (1993), process of risk management system was broken down into stages as

- Risk identification
- Risk classification
- Risk analysis
- Risk attitudes
- Risk response

Figure 2.2 shows the sequence for dealing with risk.

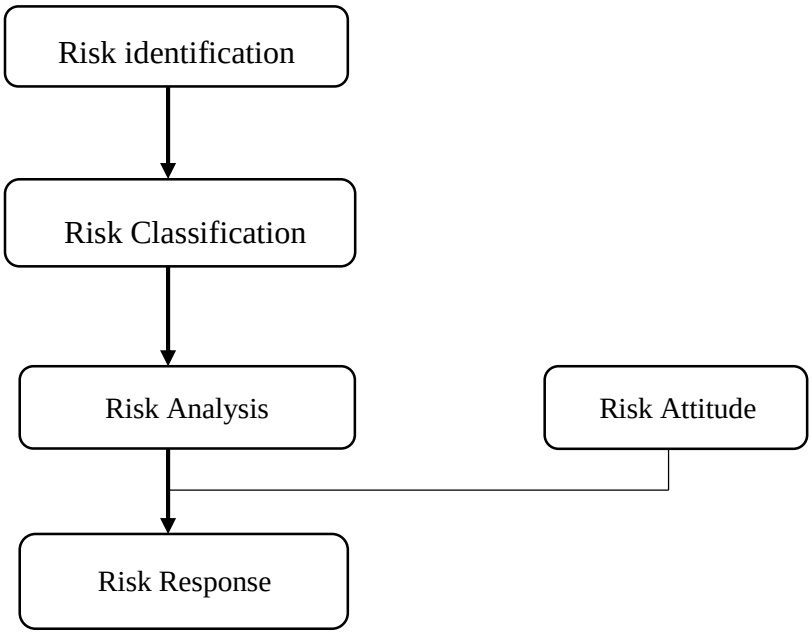


Figure 2. 2: **Risk Management framework**

Source: Flanagan and Norman (1993)

Further, Baker, Ponniah and Smith (1999) has showed a similar management process is involved five steps including Risk identification, Risk estimation, Risk evaluation, Risk response, Risk monitoring.

If these five stages maintained properly, it yields a controlled risk environment. Moreover Tummala, Rao, Nkasu and Chuah (as cited in Tummala & Burchett, 1999) identified certain core elements in risk management process comprising with risk identification, risk measurement, risk assessment, risk evaluation, risk control and

monitoring. However, these approaches slightly differ from one another, one can identify certain core elements which are common all these approaches.

Many researches like Al-bahar and Crandall (1990); Dey (2001); Wang et al. (2004); Merna (2003); Raftery (1994) have also took three processes,

- Comprising of risk identification,
- Risk analysis
- Risk response

2.4 Infrastructure Projects

The Infrastructure refers to the fundamental facilities and systems serving a country including the services and facilities necessary for its economy to function. Demographic development, economic growth and other factors are increasing the necessity for investments in infrastructure. Infrastructure plays a critical part of a country's development. Infrastructure is one driver of economic development, enabling globalization Straub (2008), Henckel, McKibbin (2010), the most basic infrastructure, water supply, highlights the importance of infrastructure for any development: Access to drinking water is necessary for human life and a sufficient waste water treatment extends life expectancy by reducing the risk of water related infections. Access to clean water is essential for development and economic progress. Among the United Nations (UN) millennium development goals it is one cornerstone. In 2010, 89% of the world's population, about 6.1 billion people, had access to safe drinking water Gronewegen, Künneke, Anger (2009). While water is the most basic aspect within the topic of infrastructure, other sectors are equally of high importance.

In most of the countries the existing infrastructure is sufficient at the current level, although investments in maintenance and quality improvements, as well as increasing capacity are constantly requested. This is in contrast to developing countries, where still an increasing demand for infrastructure investments in terms of construction, based on economic and social expectations and needs is pressing.

2.5 Water supply and sanitation projects in Sri Lanka

With the increasing of high water demand GOSL tended to invest lot of money to cater this demad. The Government of Sri Lanka (GOSL) estimates the total investment requirements for water and sanitation through to 2020 to be about SLRs800 billion ($5.38 billion). Of this total, about 80% (SLRs564 billion) is estimated as being required to achieve the sector targets of 60% piped water supply coverage and 7% piped sewerage coverage by the year 2020.

29 large scale donors funded, and 15 local bank water supply projects are in progresses which are in various stages of implementation. These new/augmented and existing water supply projects contributed towards the change in piped water supply coverage. Although the projects. Details of Ongoing and Proposed projects in implementation stage as shown in Table 2.1 and Table 2.2

Table 2. 1**: Ongoing water supply and sanitation projects in Sri Lanka**

Category	TCE (Rs. Million)	Output Beneficiaries
Foreign Funded Water Supply Projects (18)	183,233	2,801,100
Small & Medium Water Supply Projects (46) (Continued with NWSDB funds Rs. 613 Mn)	17,265	1,439,240
Local Bank Funded Projects (13)	50,434	801,488
Total	250,932	5,041,828

Table 2. 2**: Proposed water supply and sanitation projects in Sri Lanka**

Category	**TCE (Rs. Million)**	**Output Beneficiaries**
JICA – Korea	50,325	1,522,689
CKD	205,709	1,272,689
Foreign Funded Other than CKD	263,182	4,813,626
Local Bank Funded	16,885	291,538
Augmentation of Existing Facilities	16,019	608,000
Total	**552,120**	**5,372,54**

2.6 Construction Project Funding

Funding is the means by which financial resources, typically capital, but sometimes also time, skills, land, information, etc., are provided for the purposes of a project. Funding tends to refer to reserves that are internal to the organization, while the external sourcing of capital is referred to as financing (although the terms are sometimes used as if they are interchangeable). Funding can come from reserves that are already allocated to capital expenditure, which results in the acquisition, construction or enhancement of significant fixed assets including land, buildings and equipment.

In many countries, limitations upon the public funds available for infrastructure have led governments to invite private sector entities to enter into long term contractual agreements for the financing, construction and or operation of capital intensive projects. For the public procurer, there is an obvious need to ensure that value-for-money has been achieved. To the project sponsors, such ventures are characterized by low equity in the project vehicle and a reliance on direct revenues to cover operating

and capital costs, and service debt finance provided by banks and other financiers. Risk evaluation is complex, requiring the analysis of risk from the different perspectives of the public and private sector entities.

According to the Development Assistance Committee (DAC) of the Organization for Economic Co-operation and Development (OECD), foreign aid is defined as "financial flows, technical assistance, and commodities that are designed to promote economic development and welfare as their main objective (thus excluding aid for military or other non-development purposes); and are provided as either grants or subsidized loan".

According to Hellowell, Vecchi (2012) project finance is defined by the fact that a private consortium raises capital to finance investments in construction and the operation of infrastructure.

According to the Ahsan and Gunawan (2010), the process of project environments for international development projects is far more complex than the domestic projects because there are many parties involved. Generally this kind of projects include the lender or donor, the Ministry of Finance of the host country, the client, stakeholders, a project management or co-ordination unit and a multitude of contractors who carry out physical implementation of most components and activities of the project (Ahsan & Gunawan, 2010). Following figure 2.3 showed the International Development (ID) project network model and where solid arrows represent usual communication between involved parties and the dotted arrows represent likely communication between parties.

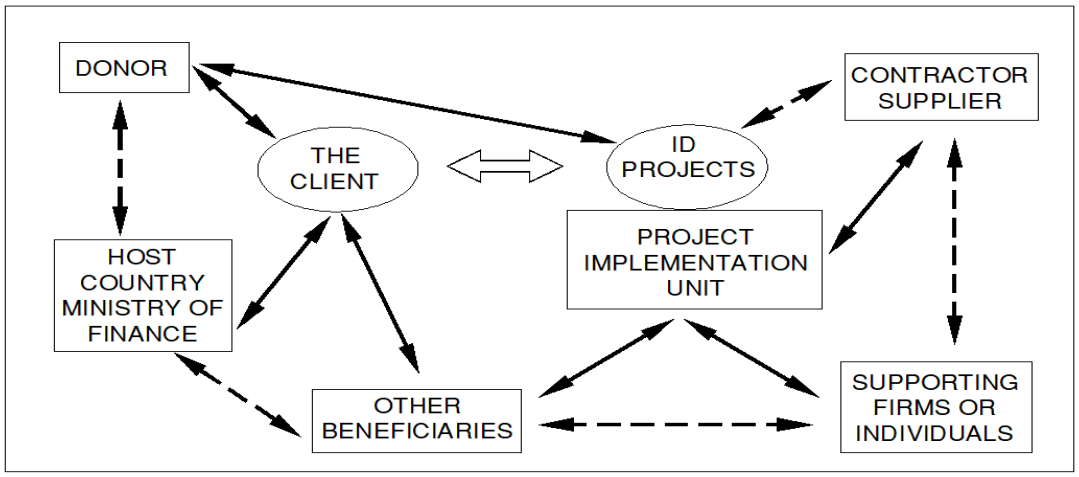


Figure 2. 3: ID Project Network Model

Source: Asham and Gunawan (2010)

The adverse impacts of large scale, capital intensive MDB projects on third world development (Boston College Third World Law Journal) traditional third world development schemes have focused on the introduction of large-scale, capital-intensive projects, to the developing country. This strategy is based on two assumptions: first, that third world development is best realized through rapid expansion of industry and infrastructure and promotion of modernized agriculture; and second, that the benefits of this process will "trickle down" to the vast majority of citizens who must watch from the sidelines. Neither of these assumptions, however, has proven reliable.

2.7 Foreign Funded Water Projects in Sri Lanka

Development assistant agencies continuously supported Sri Lanka to achieve the water demand of the country, the water supply and sanitation sector in Sri Lanka has achived very positive outcomes over the years. As an example, in coastal regions in the aftermath of the tsunami of 2004, countless donations were received between 2005 and 2008 to rehabilitate and improve water and sanitation facilities. After the conclusion of 30 years of civil conflict in 2009, started development of water and sanitation facilities for the people who lived in the north and east of the country.

Water has always played an essential role in human societies while providing important economic, health, and environmental benefits. Therefore, development

activities in the water sector are essential to upgrade the socio-economic standards of beneficiaries. The demand for pipe borne water has increased significantly in line with rapid expansion in commercial and industrial activities and urbanization.

The water supply and drainage functions are carried out by the NWS&DB which functions under the Ministry of City Planning and Water Supply. The NWS&DB had its beginning as a sub department under the public works department with responsibility for water supply and drainage systems of Sri Lanka. From 1965, it functioned as a division under various ministries until January 1975 when it was converted to a Statutory Board by an Act of Parliament.

There are 312 major, minor and small water supply schemes in operation under the NWS&DBs' purview. According to the statistics, 84.1% of the population has safe access to drinking water of which 43.5% is through piped water supply system (NWS&DB, 2011).

The NWSDB was provided with Rs.19, 484 million as foreign funds for capital works on water supply and sewerage projects (NWS&DB, 2011). The GOSL contribution was Rs.7, 148 million as counterpart funds (NWS&DB, 2011). In addition, Rs.2, 050 million of local consolidated funds were allocated for small and medium water supply projects (NWS&DB, 2011). For the reconstruction of tsunami affected water supply systems, a sum of Rs.881 million in foreign funds and Rs. 275 million in local counterpart funds were provided.

When taking into consideration of above information, it is proved that most of water projects are financed by foreign funding agencies.

However, it is noted that the most of the foreign funded water projects encountered schedule delays and cost over runs due to the various reasons. The major causes of delays are related to host country government procedures, lengthy contract and procurement, land acquisition, construction works and natural calamities. On the other hand, costs over runs are occurred due to the price escalations, physical changes to original scope and changes in laws and regulations. Therefore, it is imperative to

identify and understand the impact of the inherent risks in order to implement appropriate risk response strategies to cope with them.

Estimated cost and water supply and sanitation projects listed on the NWS&DB (2018)
shown in Table 2.3.

Table 2. 3**: Water supply and sanitation projects and estimated cost in Sri Lanka**

Project Name (Donor)	**Total Estimated Cost (Rs. million)**
Water Sector Development Project 1 Sub Project 4 Greater Kandy WS Phase I Stage II (JICA)	4,164.00
Greater Dambulla WS - Stage 1 (INDIA)	9,593.00
Eastern Coastal Towns of Ampara District (ECTAD) WS Phase II (Australia)	11,078.20
Eastern Province Water Supply Development Project (JICA)	6,526.00
Integrated Water Supply Scheme for the Unserved Area of Ampara District Phase III (Australia)	18,012.00
Jaffna Killinochchi Water Supply & Sanitation (ADB VI)	18,328.20
Killinochchi Rehabilitation Water Supply Project (JICA)	1,900.00
Immediate Arragements to provide Water Supply to Kilinochchi (New 2 KR) (JICA)	260.00

Thambuttegama WS (China)	1,805.00
Anuradhapura North Intergrated Water Supply (JICA)	9,736.00
Ruhunupura WS Development (Korea)	13,131.30
Kirama, Katuwana, Middeniya & Angunakolapelessa Integrated WS (China)	2,662.00
Rehabilitation & Augmentation of Kirindioya Water Supply (Austria)	2,104.83
Badulla - Haliela and Ella Integated WS (US Exim Bank)	10,396.50
Mahiyangana Water Supply (Austria)	1,785.00
Water Sector Development Project I	6,490.00
Towns North of Colombo WS -stage II (JICA)	
Kelani Right Bank WTP (DANIDA)	12,000.00
Rehabilitation & Augmentation of Labugama - Kalatuwawa WTP (Hangary)	8,100.00
Augmentation of Negombo WS (DUTCH)	7,302.00
Water Sector Development Project I	4,785.00
Greater Colombo Water Rehabilitation (JICA)	
Water Sector Development Project II (JICA)	10,846.00
Kaluganga Water Supply Project Phase I -Stage II & Non-Revenue Water Reduction in Colombo City (NRW Master Plan)	
Consultancy Services for Non-Revenue Water (NRW) Engineering Study, Master Plan Update and Institutional Development	412.10
Energy Conservation Project at Ambatale WTP (GERMAN)	6,220.00
Capacity Development Project for NRW reduction in Colombo City (JICA)	201.00

Colombo Water Supply Service Improvement Project (ADB)	28,800.00
Katana WS (China)	1,641.00
Water Treatment Facilities Moratuwa / Panadura, Ambatale and in Negombo (Spanish) [formerly Galagoda WSS]	2,690.00
Greater Ratnapura Water Supply Project (Spain)	9,928.00
Kolonna/ Balangoda Water Supply Project (Belgium)	4,658.00
Greater Kurunegala (China)	11,943.00
Secondary Towns Rural Community Based WS & Sanitation (ADB 4th project)	29,680.00
Dry zone urban Water & Sanitation Project(ADB V)	13,029.60
Hambantota/ Ambalantota/ Weligama/ Kataragama Implementation Project & Badulla, Bandarawela Integrated Feasibility Studies (UNIHA)	2,126.00

Source: http://waterboard.lk/ (2018)

2.8 Risks facing the implementation of these projects

Based on their nature, the identified challenges were classified into four categories, namely,

- Engineering Challenges
- Human Development Challenges
- Managerial and Political Challenges
- Sustainability Challenges

Because of the fact that many challenges resulted from more than one factor, many of these challenges fall under more than one classification category. Bob Muir, PE (Challenges Facing Today's Construction Manager-2005) some of the construction issues include workforce considerations, safety, time constraints, and the changing nature of the work.

Governments in developing countries, where approximately 85.4% of the world's population lives in, develop (MCPs) to achieve their social and economic sustainable development objectives. This is accomplished through constructing infrastructural, industrial, educational, cultural, transformational, medical, and residential projects that provide societies with their needs and fulfill their requirements. (MCPs) are complex, risky and time-consuming undertakings that are usually commissioned by governments and delivered by national and international participants with a variety of cultural differences, backgrounds, political systems, and languages. They attract high levels of public attention and political interest due to the substantial cost, direct and indirect impact on the community, environment, and budgets. On the one hand and due to their unique nature and characteristics, (MCPs) require high design knowledge and technical skills, competent human resources, professional managerial capabilities and large-scale investment. (Challenges of mega construction projects in developing countries, Ayman Ahmed Ezzat Othman, Architectural Engineering Department, Faculty of Engineering, The British University in Egypt (BUE))

Risks of foreign funded projects can be categorized as construction related. A construction risk can be defined as any exposure to possible loss. Because every construction project is different, each offers a multitude of varying risks. To ensure the success of a project, a contractor starting on a construction project must be able to recognize and assess those risks. And then the contractor must be able to manage those risks. (Construction-Risks-2013.pdf)

2.9 Project Risk

Where causes of individual risks can be described in a hierarchical risk breakdown structure in increasing degrees of detail (Hillson, 2002), overall project risk arises from wider influences in the environment and context of the project. Risk identification techniques can use a variety of frameworks to structure the search for overall project risk, including:

- PESTLE – Political, Economic, Social, Technological, Legal, Environmental
- PESTLIED – as PESTLE, with the addition of International (or Informational) and Demographic
- STEEPLE – as PESTLE, with the addition of Ethics

- InSPECT – Innovation, Social, Political, Economic, Communications, Technology
- SPECTRUM – Socio-cultural, Political, Economic, Competitive, Technology, Regulatory/legal, Uncertainty/risk, Market
- TECOP – Technical, Environmental, Commercial, Operational, Political
- VUCA – Volatility, Uncertainty, Complexity, Ambiguity

Each of these frameworks can act as a prompt list, suggesting potential causes of overall project risk. They can be used as inputs for a structured

2.9.1 Contractual Related

Most risk pricing models in existence operate on the basis of applying a contingency margin once the level of risk has been identified. There is little research to support that there is systematic pricing of risks in the construction industry (Laryea & Hughes, 2008). In practice there is often a systematic undercutting of the identified risk so that contractors could stay competitive (Mbachu, 2011). The models for pricing risks generally do not take into account the realities of the market and specific needs of the contractor such as the desire to win the job or outbid competitors, or the expectation of more profitable future contracts following successful completion of the job at hand (Mbachu, 2011).

There is little research on the subject matter of contractual tendering risks. Also, there is a lack of practical risk response deployment method that contractors could use. The literature is therefore lacking in terms of the knowledge of how contractors move from their understanding of risk factors to then setting a price (Laryea & Hughes, 2011). According to Smith and Bohn (1999), most risk and contingency studies has tended to focus on purely theoretical and analytical models for determining the level of risks in a contract. These models generally describe a set-loading of a fixed percentage contingency to cover risks. This study aimed to establish what the leading contractual risk factors are in construction industry, their risk profiles, and holistic risk response deployment strategies for addressing the risk.

- Lengthily period of Tendering

- Delay in Negotiations in RFPs
- Delay in awarding contracts

2.9.2 Foreign Contractor Related

Most water Supply contracts do not meet set cost or time target as a result of improper assessment of project management challenges in construction. The majority of time and cost overruns are attributable to either unforeseen or foreseen project management challenges for when uncertainties were not properly accommodated. The Sri Lanka practice is to complete the projects even with time and cost overruns and keep moving onto the next project without a proper lesson learned as tacit knowledge. (Nishan, 2014).

Based on the studies on Kumaraswamy (as cited in Gamez, 2009) managerial risk referred to resource management to achieve cost, quality and time targets. They were directly affecting the progress of the project.

Technical risk is also a part of foreign contractor's related risks. In this risk there are both design risk and construction related risks. The following technical related risks were identified based on the researches done by ElSayegh (2008); Jaafari and Anderson (as cited in Mills, 2001); Mustafa and Al-Bahar (1991) and Tummala and Burchett (1999).

Based on these finding following risk can be discussed as foreign contractor related risks

- Ineffective management of
- Foreign contractor (lack of effective leadership, poor monitoring in financial management)
- Lack of communication between the client, contractor and consultant
- Labor disputes and strikes occur during the constructions
- Shortage of resources (material, manpower and equipment)
- Delay in shipments of imported materials
- Departure of qualified Staff during the construction period

- Conflicts between standards and specifications of two countries
- Limited implementation experience of the foreign contractor
- Lack qualified staff

2.9.3 Local Authority and Regulations Related

Irrespective of the category of a project in Sri Lanka, local authority and regulation involvement is much high. Accordingly, this is one of the critical risks we find in the implementations of any projects in Sri Lanka. Gamez (2009) extracted following managerial risk factors to his study by considering implementation agency's performance as a key element to project success.
Institutional changes, Slow land acquisition by agency, Local agencies miscommunication. Based on these following risks can be taken as Local Authority and Regulations Related risks.

- Land Acquisition delay in identified lands due to government's lengthy process
- Requirement for permits and their approvals
- Changes in Regulations in host country

2.9.4 Funding Related

Ideally your project moves out of Sales and into the actual engagement stage with expectations properly set and a solid timeline and budget in place. But we all know that there can be bumps in the road and incorrectly documented or relayed expectations, requirements, etc. (Brad Egeland,2016).

Most risks which are associated with construction projects are financially related. Project funding is obviously a potential economic risk for contractors. Merna and Njiru (as cited in Bokharey, Vallyutham, Potty & Bakar, 2010) have defined financial risk as the impact on the financial performance of any entity exposed to risk. Inadequate sources of project funds by an owner or funding agent may create time delays and financing problems.

Based on the literature and according to the Sri Lankan foreign funded project industry following risks can be taken as funding related risks.

- Delay in Treasury bonds approval
- Delay in Fund releasing from Funding Agent
- Delay in Fund releasing from Treasury (GOSL component**)**

2.9.5 Political Risks

Based on Mustafa and Al-Bahar (1991) political and environmental related risks may arise from the interactions between the contractor, the host government and the surrounding environment or society.

Following risk factors can be listed as political risks based on the literature which were extracted from the studies conducted by El-Sayegh (2008); Mustafa and Al-Bahar (1991); Tummala and Burchett (1999) and Xu et al. (2011)

- Changes in laws and regulations in foreign policies
- Political influences for water demand in project area
- Change in country priority (when the government changes the priorities or lose the motivation to keep supporting the project)
- Corruptions and bribes

2.9.6 Act of God

The risk of acts of god describe events that are unpredictable and beyond anyone's direct control. These events occur as a result of nature and are often referred to as natural phenomena (Mustafa & Al-Bahar, 1991).

According to the literature, most of the authors like El-Sayegh (2008); Mustafa and Al-Bahar (1991) and Tummala and Burchett (1999) identified following risk factors under act of god;

- Flood

- Landslide
- Fire
- Extreme Weather conditions

CHAPTER 03
RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the procedure, used for this research study. It expands the research process and accordingly describes the research design including research approach, data collection and analyzing techniques in detail.

3.2 Research Process

Research process consists of a series of steps in the desired sequence that is necessary for the effective execution the research (Kothari, 2004). Research process for this particular research illustrates using following

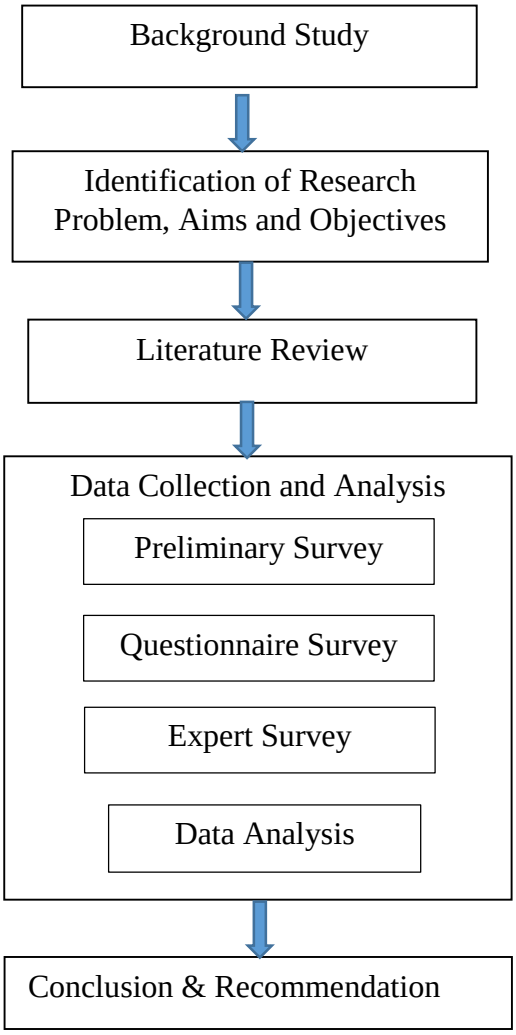


Figure 3. 1: Research process

3.3 Research Strategy

Research strategy set up methodical procedure to address the research problems as definitely as possible. It may be either quantitative approach with stress on gathering of arithmetical data and focus on numbers or qualitative approach with emphasize on analysis of complex data in terms of its content or native interpretation (Taylor, 2010). The following sections describe the research design of this research study.

3.3.1 Research approach

Research approaches are classified mainly into two categories namely quantitative approach and qualitative approach. Survey researches and experimental researches are coming under quantitative approach where case study, ethnography, action research and grounded theory approach can be taken under qualitative approaches (Taylor, 2010). In this research it is a mix of both quantitative approach and qualitative approach.

By considering the nature of research problem, it is reasonably highly important to identify the substantial risk factors affecting to the FF water projects in Sri Lanka and identify risk control measures to overcome such risks. Therefore, survey research approach was selected as the most appropriate for this research study. It involves collecting data from a fraction of population (sample) and simplifying the findings to the population with quantitative descriptions (Kraemer, 2002).

3.3.1.1 Survey approach

Research problem is the leading criterion of selecting among the various types of research approaches According to Yin (2009). Kraemer (2002) stated that survey research is especially well-suited for answering questions about "what", "how much" and "how many". In addition, he mentioned that the survey approach is appropriate when:

a) The independent and dependent variables are not possible or not desirable to control

b) The phenomena should be studied in its natural setting

c) The phenomenon which is studied is occurring or has occurred in the recent past.

According to the research, it is significant to quantitatively investigate and identify risk factors which are affecting to the FF water projects and figure out risk response measures to overcome the problems. Above mentioned characteristics of survey

approach are standing with the characteristics of this research, proving that survey approach is applicable to this research.

Consequently, it is decided to carry out a questionnaire survey to discover the risk factors with related to the Foreign Funded water projects. Following the analysis of questionnaire, interviews were designed to carry out with individual experts in order to confirm the questionnaire survey findings and to find out the risk response measures for each critical risk factor.

3.3.2 Data collection

3.3.2.1 Preliminary survey

After preparing the draft questionnaire based on the literature findings and preliminary survey which was conducted with NWSDB officials in order to find out the current dominant condition of the risk in foreign funded water projects and to identify risk factors relate to foreign funded water projects other than factors identified by the literature survey. For achieving objectives of the research few experts were selected in the field of foreign funded water projects and identified risk factors from the literature survey were discussed with them and from their opinions most relevant risk factors in the Sri Lankan context were identified.

Identified risk factors which are relevant to Sri Lankan context are listed in below Table 3.1;

Table 3. 1**: Risk factors with relate to FF water projects in Sri Lanka**

Issues Category	**Factors**
Contractual Related	Lengthily period of Tendering
	Delay in Negotiations in RFPs
	Delay in awarding contracts
Foreign Contractor Related	Poor management of Foreign contractor (lack of effective leadership, poor monitoring in financial management)

	Lack of communication between the client, contractor and consultant
	Labour disputes and strikes occur during the constructions
	Shortage of resources (material, manpower and equipment)
	Delay in shipments of imported materials
	Departure of qualified Staff during the construction period
	Conflicts between standards and specifications of two countries
	Limited implementation experience of the foreign contractor
	Lack qualified staff
Local Authority and Regulations Related	Land Acquisition delay in identified lands due to government's lengthy process
	Requirement for permits and their approvals
	Changes in Regulations in host country
Funding Related	Delay in Treasury bonds approval
	Delay in Fund releasing from Funding Agent
	Delay in Fund releasing from Treasury (GOSL component)
Political Related	Laws and regulations' variation in in foreign policies
	Political influences for water demand in project area
	Change in country priority (when the government changes the priorities or lose the motivation to keep supporting the project)
	Corruptions and bribes
Act of God	Flood
	Landslide
	Fire
	Extreme Weather conditions

3.3.2.2 Questionnaire survey

Target population

Professionals from client's side including Project Managers, Engineers and Quantity Surveyors who have been participated in foreign funded water projects in Sri Lanka are the target population for this research study.

Sample selection

The sample for the survey was selected randomly from the list of project managers, engineers and quantity surveyors who are involved in Foreign Funded Water projects. The contacts for these professionals were collected from Project Management Units of National Water Supply and Drainage Board.
This research study approached to the key persons
- having more than 10 years of experience,

- have been involved in foreign funded water projects

Sample size

The sample size is very important in reflecting the characteristics of the population and in order to use parametric statistics, the size of the sample must be sufficiently large (Taylor, 2010). As thumb rule, it should be at least 30. By considering all these factors and the time limitation the sample size of this research study was 40 selected from project managers, engineers and quantity surveyors in FF water projects.

Questionnaire design

The list of appropriate risk factors for FF water projects was developed based on the detailed literature review and preliminary survey. Then, the questionnaire was structured to get the owners' perception with relate to foreign funded water projects in Sri Lanka.
The questionnaire consisted of three sections namely 'Section I', 'Section II'.

Section I – Demographic characteristics

The Section I was intended to gather information about the respondents' profile. Accordingly, the questions asked in this section includes the respondent name (Q1), respondent designation (Q2), respondent experience in construction industry (Q3) and years of experience in foreign funded project (Q4).

Section II – Impact and probability of risk

The section II was designed to gather perception on the rating of each risk factors regarding probability of occurrence and impact on foreign funded water projects. The questionnaires have used 5 point Likert Scale where 1- Very Low, 2-Low, 3-Medium, 4-High and 5-Very High.

Conducting the questionnaire survey

The final questionnaire was delivered to professionals associated with FF water projects by hand as well as through emails. The completed responses were collected by personally and received through emails and regular postal mails.

3.3.2.3 Expert survey

Following the analysis of questionnaire survey, expert interviews were conducted in order to find the risk control measures for most significant risk events identified in FF water projects. The interviews were conducted based on extreme high risk and high risks in un-structured type. The number of interviews was decided based on the accomplishment of the research objective and the time limitation. Accordingly, five numbers of interviews were conducted.

Insert a table showing experts details as follows;

Expert name	Designation	Experience in PM	Experience in FFP
P1R1	Project Director	28 Years	20 Years
P2R2	Project Director	26 Years	18 Years
P3R3	Project Director	30 Years	15 Years
P4R4	Project Manager	15 Years	10 Years
P5R5	Project Manager	17 Years	10 Years

3.3.3 Data analysis

3.3.3.1 Identification of critical risk factors

Descriptive analysis

Descriptive statistics involves the arrangement, summary, and presentation of data, to enable meaningful interpretation, and to support decision making through graphical techniques such as graphs, charts, percentages, tables and descriptive measures including mode, median, mean, range etc. (Taylor, 2010).

Section A (demographic characteristics) of the questionnaire was analysed using graphical analysis techniques. The used technique was pie chart.

Mean Score Method

Mean score method was used to compute the risk of each factor. The formula used for this method is as follows (Tiware & Kulkarni, 2013);

$$\text{Mean Score} = \Sigma (f * s / N)$$

Where, f - frequency of the respondent
s - Score given by the respondent
N - Total number of responses

Accordingly, above formula was adopted to analyses the section B of the questionnaire to find the mean score of each risk factor's probability and impact.

Risk matrix

Risk matrix is defined as "a mechanism to characterize and rank process risks that are typically identified through one or more multifunctional reviews" (Markowski & Mannan, 2008).

Risk matrices are used to rank the risk events by using 4x4 or 5x5 matrices having event consequences along one axis and event frequency along the other axis (Elmontsri, 2014). According to the Panthi, Ahmed and Azhar (n.d) risk matrix is an

effective to develop risk response strategies when risk events have been identified and assessed based on the probability and the impact. Further it helps one to get insight into the relative risk of various scenarios that might be encountered in a considered system.

According to the Ristic (2013) an effective risk matrix has following characteristic.

- Simple to use
- Easy to understand and can get a clear idea of its applicability
- No need to worry about extensive knowledge of quantitative risk analysis methods
- Clearly defined tolerable and intolerable risk level
- Provide clear guidance to take action in order to mitigate the intolerable risk levels into tolerable risk level

Following figure 3.2 shows the standard 5x5 risk matrix with impact ranging from VL (Very Low) to VH (Very High) on the horizontal axis and probability from VL to VH on the vertical axis which is used to determine the risk zone for each risk factor where the probability and impact are combined to be able to prioritize risk (Tiware & Kulkarni, 2013). Similar kind of matrix has been used by Mahamid (2011) in his study to rank the risk factors affecting time delay in road construction projects

Table 3. 2**: Risk matrix**

	Very low (1)	Low (2)	Medium (3)	High (4)	Very High
Very low (1)	1	2	3	4	5
Low (2)	2	4	6	8	10
Medium (3)	3	6	9	12	15
High (4)	4	8	12	16	20
Very High (5)	5	10	15	20	25

Impact Probability

Once the mean score was calculated to obtain the impact and probability score of a risk, a score is assigned to that risk, multiplying the impact by the probability. Following scale (Table 3.3) used to determine the impact of each risk factor and its probability of occurrence towards the FF water projects.

Table 3. 3**: Scale used to identify risk factor's impact and probability**

Scale	Priority Level	Risk Zone
1 – 3	Low Risk	Green
4– 6	Moderate Risk	Yellow
8 – 12	High Risk	Orange
15 – 25	Extreme Risk	Red

Green zone	Risks in these zones are low level, and can be ignored
Yellow zone	Risks in this zone are of average and can cope and eliminate with some reasonable steps
Orange zone	Risks in this zone should be eliminated by immediate actions or risk management strategies. Otherwise it will create lots of barriers in the progress of the project
Red zone	Risks in this zone are of critical importance. These are the top priorities and should be solved wisely

3.4 Summary

This chapter described and justified the research methodology adopted to achieve the aim and objectives of study. Through an extensive literature survey, it was studied issues and mitigations and actions with relate to the construction of foreign funded projects. Identified issues from the literature survey were further discussed with

experts of FF water projects having experience over 15 years and the risk response measures were also identified.

Survey approach was the research methodology with data collection through questionnaire survey and unstructured interviews for further confirmation of results. Mean score method and risk matrix were used to identify the critical risk factors with relate to FF projects.

CHAPTER 04
DATA ANALYSIS AND RESULTS

4.1 Introduction

The research methodology adopted for collecting and analyzing data was described in Chapter three. Through this chapter analyses the collected data of the questionnaire survey in accordance with the above-mentioned methodology.

This chapter is having main five sections. First section reviews the findings of the preliminary survey. Second section is for the analysis of respondent information in questionnaire survey. Third section comprises the analysis of probability and impact of each risk factors using risk matrix to recognize the major risk factors with relate to FF projects. Fourth section analyzes the risk response measures and last section confirms the questionnaire findings through literature and expert review.

4.2 The Questionnaire Survey

4.2.1 Response rate

The questionnaire survey was carried out by delivering forty (40) questionnaires to project managers, engineers, quantity surveyors who were selected as mentioned in section 3.3.2.2 (Questionnaire survey). Out of 40 distributed questionnaires, thirty-four (35) questionnaires were returned however, one of them was not properly completed, thus only 34 were used for the analysis. As illustrated in Figure 4.1, the response rate of reasonably completed questionnaires is 85%.

4.3 The Expert Survey

4.3.1 Interviewee Information

The detail of the interviewees participated in the interview survey is indicated in Table 4.1 below

Table 4. 1**: Details of experts**

Ref No	Experience	Number of FF projects Involved	Designation
P1R1	28 Years	12	Project Director
P2R2	26 Years	10	Project Director
P3R3	30 Years	11	Project Director
P4R4	15 Years	7	Project Manager
P5R5	17 Years	8	Project Manager

4.4 Critical Risk Factors in Foreign Funded Water Projects

Mean score was calculated for each risk factor based on probability of occurrence and impact. After the mean score was calculated for obtaining the impact and probability score of a risk, a score is given in the risk matrix, multiplying the impact by the probability. After that Risk factors were plotted in a risk matrix chart as mentioned in chapter 3. The results are presented in following tables and figures.

4.4.1 Contractual Related Risks

Table 4.2 specifies the risk score for factors under Contractual Related risk category.

Table 4. 2**: Risk score of contractual Risks**

No	Issue	Probability	Impact	Risk Score
		Mean Score	Mean Score	Mean Score
1.1	Lengthily period of Tendering	2	2	4

1.2	Delay in Negotiations in RFPs	4	4	16
1.3	Delay in awarding contracts	3	2	6

Table 4. 3**: Risk matrix for contractual related risk**

	Very Low	Low	Medium	High	Very High
Very Low					
Low	1.1	1.3			
Medium					
High				1.2	
Very High					

Low Risk	-	Lengthily period of Tendering
Moderate Risk	-	Delay in awarding contracts
High Risk	-	
Extreme High Risk	-	Delay in Negotiations in RFPs

Figure 4. 1**:Risk zone for contractual risks**

It can be seen that Delay in Negotiations in RFPs is the extreme high risk in this contractual risk zone.

4.4.2 Foreign Contractor Related

Table 4. 4**: Risk score of foreign Contractor related**

No	Issue	Probability	Impact	Risk Score
		Mean Score	Mean Score	Mean Score
2.1	Ineffective management of Foreign contractor (lack of effective leadership, poor monitoring, poor financial management)	2	3	6

2.2	Lack of communication between the client, contractor and consultant	4	5	20
2.3	Labour disputes and strikes occur during the constructions	3	2	6
2.4	Shortage of resources (material, manpower and equipment)	2	3	6
2.5	Delay in shipments of imported materials	4	4	16
2.6	Departure of qualified Staff during the construction period	3	2	6
2.7	Conflicts between standards and specifications of two countries	3	3	9
2.8	Limited implementation experience of the foreign contractor	3	2	6
2.9	Lack qualified staff	1	1	1

Table 4. 5**: Risk Matrix for Foreign contractor related**

	Very Low	Low	Medium	High	Very High
Very Low	2.9				
Low			2.1, 2.3, 2.6 2.8		
Medium		2.4	2.7		
High				2.5	2.2
Very High					

Low Risk	-	Lack of Qualified Staff
Moderate Risk		Poor management of Foreign contractor (lack of effective leadership, poor monitoring in financial management)

		Labour disputes and strikes occur during the constructions Limited implementation experience of the foreign contractor
	-	Departure of qualified Staff during the construction period
	-	Shortage of resources (material, manpower and equipment)
High Risk	-	Conflicts between standards and specifications of two countries
Extreme High Risk	-	Delay in shipments of imported materials Lack of communication between the client, contractor and consultant

Figure 4. 2**: Risk zone for foreign contractor related risks**

It can be seen that Delay in shipments of imported materials, Lack of communication between the client, contractor and consultant are the extreme high risk and Departure of qualified Staff during the construction period, Shortage of resources (material, manpower and equipment), Conflicts between standards and specifications of two countries are high risks in this foreign contractor related risk zone.

4.4.3 Local Authority and Regulations Related

Table 4.6 specifies the risk score for factors under Local Authority and Regulations Related category.

Table 4. 6**: Risk score for Local Authority and Regulations related risks**

No	Issue	Probability	Impact	Risk

				Score
		Mean Score	Mean Score	Mean Score
3.1	Land Acquisition delay in identified lands due to government's lengthy process	5	5	25
3.2	Requirement for permits and their approvals	4	4	16
3.3	Changes in Regulations in host country	2	2	4

Table 4. 7**: Risk matrix for Local Authority and Regulations related risks**

	Very Low	Low	Medium	High	Very High
Very Low					
Low	3.3				
Medium					
High				3.2	
Very High					3.1

Low Risk	-	Changes in Regulations in host country
Moderate Risk	-	
High Risk	-	
Extreme High Risk	-	Land Acquisition delay in identified lands due to government's lengthy process Requirement for permits and their approvals

Figure 4. 3**: Risk zone for Local Authority and Regulations related risks**

It was found that Land Acquisition delay in identified lands due to government's lengthy process, Requirement for permits and their approvals are the extreme high risks.

4.4.4 Funding Related

Table 4.8 specifies the risk score for factors under Funding Related category.

Table 4. 8**: Risk Score for Funding Related risks**

No	Issue	Probability	Impact	Risk Score
		Mean Score	Mean Score	Mean Score
4.1	Delay in Treasury bonds approval	2	2	4
4.2	Delay in Fund releasing from Funding Agent	3	3	9
4.3	Delay in Fund releasing from Treasury (GOSL component)	5	5	25

Table 4. 9**: Risk matrix for Funding Related risks**

	Very Low	Low	Medium	High	Very High
Very Low					
Low	4.1				
Medium		4.2			
High					
Very High					4.3

Low Risk	-	Delay in Treasury bonds approval
Moderate Risk	-	Delay in Fund releasing from Funding Agent
High Risk	-	
Extreme High Risk	-	Delay in Fund releasing from Treasury (GOSL component)

Figure 4. 4**: Risk zone for Funding Related risks**

It can be seen that Delay in Fund releasing from Treasury (GOSL component).

4.4.5 Political Related

Table 4. 10 specifies the risk score for factors under Funding Related category.

Table 4. 10**: Risk Score for Political Related risks**

No	Issue	Probability	Impact	Risk Score
		Mean Score	Mean Score	Mean Score
5.1	Changes in laws and regulations in foreign policies	2	2	4
5.2	Political influences for water demand in project area	4	4	16
5.3	Change in country priority (when the government changes the priorities or lose the motivation to keep supporting the project)	2	2	4
5.4	Corruptions and bribes	2	2	4

Table 4. 11**: Risk matrix for Political Related risks**

	Very Low	Low	Medium	High	Very High
Very Low					

Low	5.1, 5.3, 5.4				
Medium					
High				5.2	
Very High					

Low Risk	-	Changes in laws and regulations in foreign policies Change in country priority (when the government changes the priorities or lose the motivation to keep supporting the project) Corruptions and bribes
Moderate Risk	-	
High Risk	-	
Extreme High Risk	-	Political influences for water demand in project area

Figure 4. 5**: Risk zone for Political Related risks**

It can be observed that only political influences for water demand in project area as the extreme high risk under this category.

4.4.6 Act of God Related

Table 4.12 specifies the risk score for factors under Act of God Related category.

Table 4. 12**: Risk Score for Act of God Related risks**

No	Issue	Probability	Impact	Risk Score
		Mean Score	Mean Score	Mean Score
6.1	Flood	2	2	4
6.2	Landslide	1	1	1

6.3	Fire	1	1	1
6.4	Extreme Weather conditions	3	2	6

Table 4. 13**: Risk Matrix for Act of God Related risks**

	Very Low	Low	Medium	High	Very High
Very Low	6.2, 6.3				
Low	6.1				
Medium		6.4			
High					
Very High					

Low Risk	-	Flood Landslide Fire
Moderate Risk	-	Extreme Weather conditions
High Risk	-	
Extreme High Risk	-	

Figure 4. 6**: Risk zone for Act of God related risks**

It can be observed that no extreme high risk or high risks under Act of god risks

4.4.5 Identified extremely high risks and high risks in Foreign funded Water Supply Projects

Extreme Risks

1. Delay in Negotiations in RFPs
2. Lack of communication between the client, contractor and consultant
3. Delay in shipments of imported material
4. Land Acquisition delay in identified lands due to government's lengthy process
5. Requirement for permits and their approvals
6. Delay in Fund releasing from Treasury (GOSL component)

7. Political influences for water demand in project area

High Risks

8. Conflicts between standards and specifications of two countries

1. Delay in Negotiations in RFPs

It has been observed that selecting a contractor for a project is a long procedure as it requires fulfilling the donor requirement as well as GOSL. Project delay caused due to negotiations in the RFPs. As well as it is additional cost to the project and another delay to select another contractor to carry out the works.

Therefore, the interviewers P1R1 and P3R3 mentioned that "*This risk can be managed by adopting proper qualification and evaluation criteria in the negotiation stage*". In addition to that, the interviewers P2R2 and P5R5 mentioned that "*the selected contractor can be given a proper advises on the technical requirements of the client. It helps both parties to go for win –win situation".* Accordingly based on these interviews following risk controls can be taken to overcome these issues

- Assigning qualified and experienced officers for relevant activities
- Ensure relevant guidelines are compiled properly (donor and GOSL guidelines)
- Conduct a pre-qualification in assessing contractor's and consultants' capabilities based on their past experience
- Proper time management

2. Lack of communication between the client, contractor and consultant

This is a common issue in all foreign funded projects. This occurs due to the three different parties' involvement in larger scale. Specially the role of client and consultant was irregularly identified by the client and consultant. During the project period due to lack of communication of these parties some works can be delayed which directly affecting to the progress of the project.

Therefore all the respondents stated that, this risk can be mitigated by building a good communication platforms under client such as proper scheduling meetings, assigning officers for relevant activities from each parties etc. This can be called as an action plan with responsibilities and time frame. In this kind of action plan there will be no lack of communications. Based on that following risk controls can be taken to overcome these issues

- Coordinate closely with all the parties
- Adhere to proper site management practices
- Following a realistic action plan

3. **Delay in shipments of imported material**

In a foreign funded water projects almost all the materials such as DI, HDPE pipes and fitting, E&M equipment are imported. Hence the project progress is heavily depending on the timely supply of materials. It's been identified that delay in shipments of imported materials in a risk in foreign funded projects. The respondents stated this risk can be minimized by performing following activities in foreign funded projects.

The interviewers P2R2 and P5R5 mentioned that *"considering the time taken to deliver the goods a proper action plan can be established with a realistic loan disbursement schedule"*. And also, the interviewers P3R3 and P4R4 stated that *"as the client the contractor can be facilitated by for financial issues in importing such as opening LC's*". P5R5 also mentioned that "*due to the failure of product at the quality inspection also causes delay for the shipments."* Based on that following risk controls can be taken to overcome these issues.

- Following a realistic loan disbursement schedule
- Conducting pre-qualification statuses of all the local and foreign suppliers

4. **Land Acquisition delay in identified lands due to government's lengthy process**

According to the entire respondent's point of view, land acquisition risk is the one of the significant risk which can be expected in water projects. Timely acquisition of land is very important to complete the projects on time. Land acquisition process will

normally take minimum one and half years. In order to minimize the risk, it is not easy it changes the government acts and policies to speed up the process.

Accordingly, risk can be addressed by starting the acquisition process in the planning stage of the projects where the required lands are identified. So that project implementers can start the acquisition while the project processing in different stages. On the other hand, respondent suggested that public and government official's awareness campaigns will be helpful.

- Identifying the most suitable land in the planning stage based on the requirement
- Better coordination with local authorities and stake holders

5. Requirements for permits and their approvals

Most of the projects has experienced in schedule delay due to inability of obtaining required permits and their approvals in time. Once the project started there are several stakeholders like Road Development Authority, Electricity Board, Telecommunication, Sri Lanka police etc. are involved to the project in different ways. Accordingly client needs to obtain approvals from relevant authorities.

The interviewers P2R2, P3R3, P5R5 mentioned that "*identification of institutional aspects and better co-ordination among the various agencies will help to manage the said risk*". And further, P1R1 stated *"maintaining good relationship with the stakeholders and making sufficient awareness of them support to completion of project without hindrance"*. Accordingly based on these interviews following risk controls can be taken to overcome these issues.

- Better coordination with local authorities and stake holders
- Maintain good relationship between stakeholders
- Conduct public awareness campaigns
- Comply with the environmental and other regulations in the country

6. Delay in Fund releasing from Treasury (GOSL component)

In foreign funded water projects there is a counter-part fund from government of Sri Lanka also. Taxes, duties, VAT and land acquisition costs etc. have to bear by the

GOSL. As an implementing agency client organization is the institute executes the project.

Even though they make reservation from the treasury at the outset of the project, sometimes treasury will not issue sufficient money on time in executing stage. Then the client has to arrange their own funds to deal with the above situation.

However, as per the all the interviewers, "*Prepare a proper financial plan for fund requirement is one of the response measures for dealing with the lack of counter-part funds or delay in allocation of host country fund*". However, it is difficult to control the said risk if the treasury does not have enough money even though there is financial plan. Accordingly based on these interviews following risk controls can be taken to overcome these issues.

- Prepare a proper financial plan for the total project activities
- Following a realistic loan disbursement method

7. Political influences for water demand in project area

Since the pipe born water becomes a major requirement of every people, the demands for the water generated from projects are very high. In Sri Lanka the political structure has been subjected to a very corrupted system. Regional, Provincial councilors as well as the parliamentarians are using these people water demand as a weapon to their election campaign. All politicians want to cover their area from relevant project even though those areas are not in the original scope.

Accordingly, PMU's receive lots of political requests for water connections and extensions. The interviewers P1R1, P2R2, P5R5 said" *this risk can be minimized by frequent awareness programmes for the people with the help of other government officials such as Divisional Secretary, Social welfare officials, Grama Niladharis etc*". In this awareness programmes the people will get to know about the actual coverage, the maximum capacities to be provided to serving area, maximum extensions can be given, details of future projects. P3R3 mentioned that "PMU frequently contacted the regional NWSDB officials for the proper network modeling for future extensions after the commissioning of the project"

Accordingly based on these interviews following risk controls can be taken to overcome these issues.

- Coordinate closely with all the parties
- Maintaining good relationship between stake holders
- Conducting public awareness programmes
- Frequently contact with regional NWSDB officials

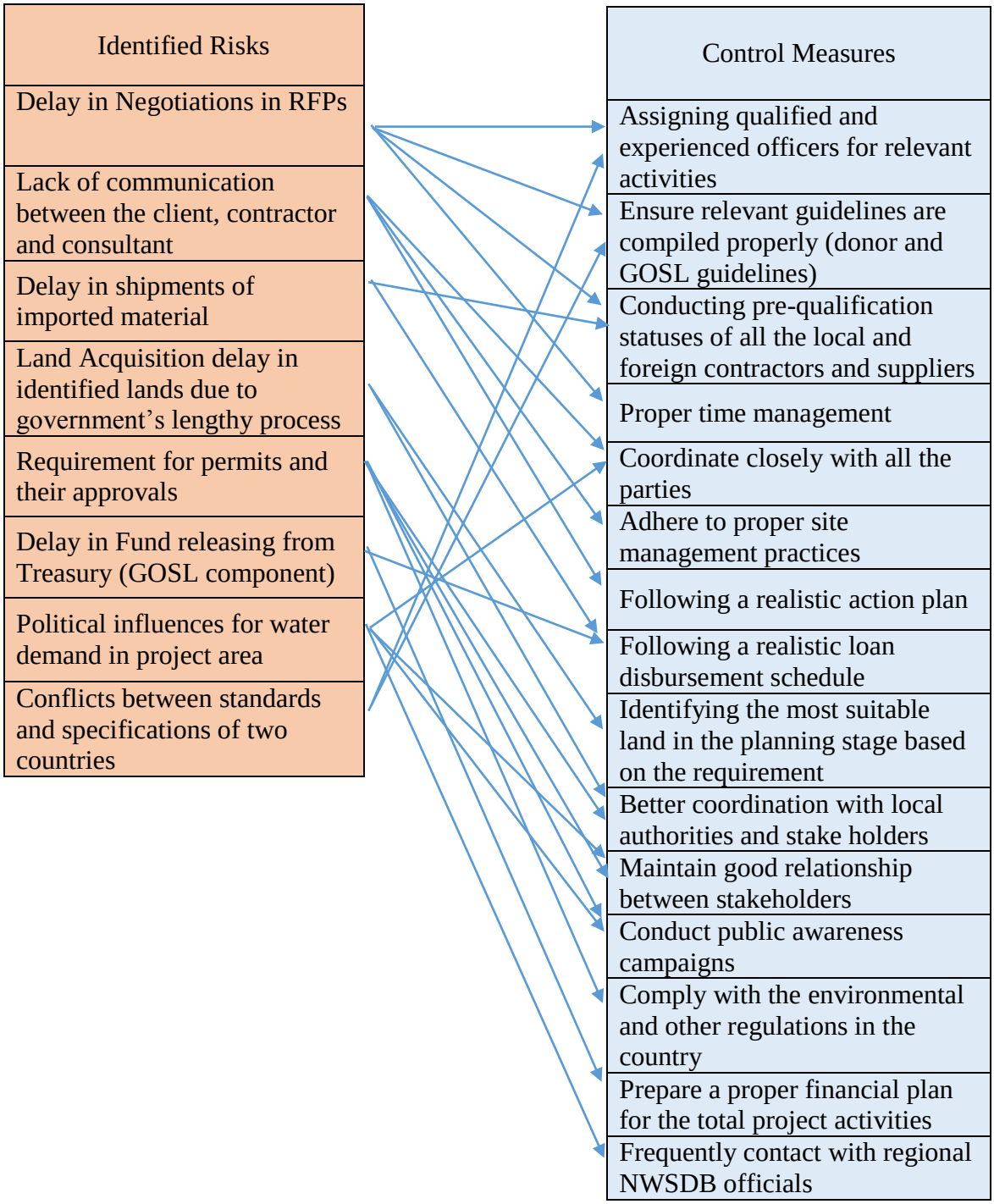
8. Conflicts between standards and specifications of two countries

During any kind of projects where two different countries involving, there can be conflicts in every aspect of the project. When it comes to standards and specification there are some conflicts during the project period. Due to these kinds of conflicts the progress of project is affected. The interviewers mentioned most of times the issue occurs in PMUs due to unawareness of the standard and specification of the foreign contractor. As the client, in approving certain activities this issue occurred.

It is observed from the interviewers that the risk can be addressed by adding relevant and similar standards and specifications of Sri Lankan practices for contractor's country standards and specifications in contract documents in the initial stage of the project. Accordingly based on these interviews following risk controls can be taken to overcome these issues.

- Assigning qualified and experienced officers for relevant activities
- Ensure relevant guidelines are compiled properly (donor and GOSL guidelines)

4.4.6 Critical risk mitigating framework and Identifying the most genetic risks to water projects



1. Since the various components are included in a water supply project, handling the negotiations in RFP's much tougher comparing to other infrastructure projects. Hence assigning qualified and well experienced officers, ensuring relevant guidelines in both parties (Donor and GOSL) will be vital in this stage.

2. Basically most of the materials such as pipes, specials, fittings etc. used in water supply projects are imported from other countries. So that delay in shipments will largely affect to progress of the project. Accordingly, the reliability of the supplier is essential. PMU should conduct pre-qualification status and experiences with those suppliers before awarding the supply contracts.

3. Not like other infrastructure projects in a water project the beneficiaries could not see the final result till the end of the project. In a road project, irrigation project, building project beneficiaries could see the benefit at the beginning of the project. But people could not see the pipe coverage till the end of the project. This could result some public conflicts where regional politician will involve to get water for their people. This risk can be addressed with regular public awareness programmes, coordinating closely with all the stake holders and frequently contact with regional NWSDB officers who know the real situation and base facts.

CHAPTER 05
CONCLUSIONS

5.1 Conclusion

In Sri Lanka, most of the water supply and waste water projects were implemented under the funding aid of foreign country with collaboration of Government of Sri Lanka. It was observed that, though foreign funding agencies and a huge amount of money was invested by the Government of Sri Lanka. Yet the risk involvement is unavoidable in this project. With the intention of mitigate those risk effectively, a all-inclusive method for mitigating risk during the project life cycle should be applied. The aim of this research was to develop a risk management framework for foreign funded water projects in Sri Lanka for managing the risks. The research methodology used to achieve the aim was survey approach with data collection through questionnaire survey and details from the employees of the National Water Supply and Drainage Board.

In the process of achieving the research's aims and objectives', it began with identifying the risks related with foreign funded water projects, which was set as first objective of the research. There were twenty-six risk factors identified from the literature review and feedback from NWSDB employees under the categories of Contractual Related, Foreign Contractor Related, Local Authority and Regulations Related, Funding Related, Political related and Act of God related. The recognized risk factors were further studied through a questionnaire survey. The analysis of the identified twenty-six risk factors using 5x5 risk matrix indicates that ten factors are located in the green zone, eight factors are located in the yellow zone, one factor is located in the orange zone and seven factors are located in the red zone of the risk matrix. The extreme high risk factors that are located in the red zone are: Delay in Negotiations in RFPs, Lack of communication between the client, contractor and consultant, Delay in shipments of imported material, Land Acquisition delay in identified lands due to government's lengthy process, Requirement for permits and

their approvals, Delay in Fund releasing from Treasury (GOSL component) , Political influences for water demand in project area. High risk factor is Conflicts between standards and specifications of two countries

Delay in Negotiations in RFPs, Lack of communication between the client, contractor and consultant, Delay in shipments of imported material, Land Acquisition delay in identified lands due to government's lengthy process, Requirement for permits and their approvals, Delay in Fund releasing from Treasury (GOSL component), Political influences for water demand in project area. As above factors are having extreme high risk those factors were studied further to develop the risk management framework.

The second objective of this research was to establish effective risk control measures for those risk factors. Risk control measures have been identified from the expert survey. There were fifteen risk control measures and those were evaluated based on its effectiveness. Some of the control measures can be adapted to different risk factors. Based on that frame work was developed for Managing risks in Foreign Funded Projects in Sri Lanka

Last objective of this research was to identify the most genetic risks to water projects and the mitigate those risks. Accordingly, those mitigation methods can be adopted in ongoing and further coming foreign funded water projects.

5.2 Recommendation

Considering the finding of this research, following can be recommended as implementations to the foreign funded water projects

1. The developed framework for managing critical risks can be provided to foreign funded water supply project PMUs as a guideline for their project implementation

2. Based on the findings all the stakeholders, relevant government officials and general public of water supply projects can be aware about the framework and can be guided to implement the control measures of the projects.

5.3 Limitation

National Water Supply and Drainage Board is the only client of foreign funded water projects in Sri Lanka, accordingly all the interviews surveys were carried among the NWSDB staff

5.4 Further Research

A research can be carried out to find out the barriers to the implementation of risk control measures to the FF water projects.

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APPENDIXES

APPENDIX – A

QUESTIONNAIRE

Section A: Demographic Characteristics

Q1. Your Name (Optional):
……....

Q2. Your Designation / Position:
…….....

Q3. Your experience in the construction industry: …….
(Number of years)

Q4. How many foreign funded projects have you involved……

Section B: Impact and probability of risks

In your opinion please indicate the probability and impact of the following risk factors that may exist in Foreign Funded Water Projects. Please note that 'probability' and 'impact' denotes the following meanings

Probability- Likelihood of occurrence of each risk

Impact- If the risk occurs, its magnitude of consequence to the foreign funded water projects in terms of time, cost, quality, safety and environmental sustainability.

Section B - Impact and Probability of Issues

	Managing Practical Issues in Foreign Funded Projects in Sri Lanka: A Study of Water Supply and Waste Water Projects	Probability					Impact				
		1	2	3	4	5	1	2	3	4	5
		Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
1	**Contractual Related**										
1.1	Lengthily period of Tendering										
1.2	Delay in Negotiations in RFPs										
1.3	Delay in awarding contracts										
2	**Foreign Contractor Related**										
2.1	Ineffective management of Foreign contractor (lack of effective leadership, poor monitoring, poor financial management)										
2.2	Lack of communication between the client, contractor and consultant										
2.3	Labour disputes and strikes occur during the constructions										
2.4	Shortage of resources (material, manpower and equipment)										
2.5	Delay in shipments of imported materials										
2.6	Departure of qualified Staff during the construction period										
2.7	Conflicts between standards and specifications of two countries										
2.8	Limited implementation experience of the foreign contractor										
2.9	Lack qualified staff										
3	**Local Authority and Regulations Related**										
3.1	Land Acquisition delay in identified lands due to government's lengthy process										
3.2	Requirement for permits and their approvals										
3.3	Changes in Regulations in host country										

No	Managing Practical Issues in Foreign Funded Projects in Sri Lanka: A Study of Water Supply and Waste Water Projects	Probability					Impact				
		1	2	3	4	5	1	2	3	4	5
		Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
4	**Funding Related**										
4.1	Delay in Treasury bonds approval										
4.2	Delay in Fund releasing from Funding Agent										
4.3	Delay in Fund releasing from Treasury (GOSL component)										
	Political Related										
4.1	Changes in laws and regulations in foreign policies										
4.2	Political influences for water demand in project area										
4.3	Change in country priority (when the government changes the priorities or lose the motivation to keep supporting the project)										
4.4	Corruptions and bribes										
5	**Act of God**										
5.1	Flood										
5.2	Landslide										
5.3	Fire										
5.4	Extreme Weather conditions										