CHAPTER 05

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

Most of the water supply projects in Sri Lanka were implemented with the assistance from foreign funds and counterpart funding by the Government of Sri Lanka. Though huge amount of money invested by foreign funding agencies yet the risk involvement is inherent in these projects and it is unavoidable. In order to manage those risk effectively, a comprehensive method for managing 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 from the client's perspective. The research methodology used to achieve the aim was survey approach with data collection through questionnaire survey and unstructured interviews for further confirmation of results.

In order to accomplish the above aim, first attempt was to identify the critical risk factors associated with foreign funded water projects, which was set as first objective of the research. There were forty nine risk factors identified from the literature review under the categories of financial and economic risk, political and environmental risk, managerial risk, technical risk, physical risk, act of god and other risk. The identified risk factors were further studied through a questionnaire survey. The analysis of the identified forty nine risk factors using 5x5 risk matrix indicates that one factor is located in the green zone, twelve factors are located in the yellow zone, twenty two factors are located in the orange zone and thirteen factors are located in the red zone of the risk matrix. The predominant risk factors that are located in the red zone are: Inflation, Exchange rate fluctuation, Lack of counter-part funds or delay in allocation, Change in laws and regulations of the host country,

Requirement for permits and their approvals, Pollution, Procurement delay, Slow land acquisition by agency, Design changes, Different site condition, Contractor incompetence, Damage to structure or property and Extreme weather condition. 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 use of risk response measures for those risk factors. Risk response measures have been identified from the literature review and preliminary survey under the categories of risk avoidance, risk retention, risk mitigation and risk acceptance. There were twenty five risk response measures and those were evaluated based on its effectiveness. Then the response measures have been ordered in descending with respect to their importance, from best practiced measures to the lowest under each category of risk avoidance, risk acceptance risk transfer and risk mitigation.

Last objective of this research was to develop a risk management framework for handling risk in foreign funded water projects from the client's perspective. For each of the identified risks, effective response measures were provided. Consequently, the expert views also integrated into the response measures of each risk. Based on the findings on risk factors and risk response measures, the risk management frame work was developed for the predominant risk factors in foreign funded water projects in Sri Lanka.

5.2 Recommendation

Considering the finding of this research, following can be recommended as implementations to the foreign funded water projects carrying out by the client organization.

- The developed risk management framework can be used as a guideline to future projects to identify significant risk factors and risk response measures.

- Client can provide risk management awareness programs to the professionals in FF water projects, thus introducing risk management strategies would help to deal with risk and ensure the better performance achievement in future projects.

5.3 Limitation

- As the National Water Supply and Drainage Board is the only client for the foreign funded water projects in Sri Lanka, when receiving the clients' perception in data collection, all the respondents were from NWSDB.
- This research deals only with the foreign funded water projects carrying out under separated contracts.

5.4 Further Research

1) The present research was done to develop risk management framework for foreign funded water projects in Sri Lanka from client's perspective. Further researches on all other involved parties such as contractor and government can be done.

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

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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.

No	Risk factors in foreign funded 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	**Financial & Economic risks**										
1.1	Inflation										
1.2	Exchange rate fluctuation										
1.3	Loan interest										
1.4	Availability of funds										
1.5	Lack of counter-part funds or delay in allocation *(Delay or insufficient allocation of host country fund)*										
1.6	Disbursement difficulties										
2	**Political & Environmental risks**										
2.1	Change in laws and regulations of the host country										
2.2	Changes in laws and regulations in foreign policies										
2.3	Requirement for permits and their approvals										
2.4	Change in country priority (*when the government changes the priorities or lose the motivation to keep supporting the project*)										
2.5	Pollution *(Environmental policies)*										
2.6	Political/social instability (*civil unrest, strikes etc.)*										
2.7	Corruption & bribes										
2.8	Expropriation (*Gov. take private property*)										
2.9	Embargoes (*Trade barriers*)										
3	**Managerial risk**										
3.1	Institutional changes (*Restructuring of implementing agencies, key staff, changes in ministries and coordination personnel*)										
3.2	Slow land acquisition by agency										

No	Risk factors in foreign funded 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
3.3	Procurement delay (*Inability of implementation agency to award contracts to designers, consultants or contractors in a timely manner*)										
3.4	Ineffective management of Agency (*lack of effective leadership, weak administrative capacity; poor monitoring, poor financial management and accountability of agency staff*)										
3.5	Local agencies miscommunication *(Disconnect between agencies in the host country, creating either duplication and conflicting efforts, or areas with lack of responsible party)*										
3.6	Delay compiling data (Sponsor requirements) by agency *(Inadequate familiarity with sponsor's procurement guidelines. Problems with progress reports, performance indicators, insufficient understanding of loan system etc.)*										
3.7	Limited implementation experience (*Lack of experience in international bidding process and contracting, Inexperience staff employed*)										
4	**Technical risk**										
4.1	Incomplete design scope										
4.2	Design changes										
4.3	Design errors and omissions										
4.4	Inadequacy of specifications										
4.5	Deficiency in drawing										
4.6	Labour disputes and strikes										
4.7	Defective work										
4.8	Different site condition										

No	Risk factors in foreign funded 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
4.9	Inappropriate technology selection										
4.10	Contractor incompetence										
4.11	Lack or departure of qualified staff										
4.12	Shortage in material availability										
4.13	Shortage in manpower availability										
4.14	Shortage in equipment availability										
5	**Physical risk**										
5.1	Damage to structure or property										
5.2	Damage to equipment & material										
5.3	Occupational safety and health issues (*Labour injuries & death*)										
5.4	Equipment damage										
5.5	Theft										
6	**Act of God**										
6.1	Flood										
6.2	Landslide										
6.3	Fire										
6.4	Extreme weather condition										
7	**Other risks**										
7.1	Delays in resolving contractual issues										
7.2	Delays in resolving disputes										
7.3	Delayed payments on contracts										
7.4	Unfairness in tendering										

Section C: Risk response measures

Please indicate the effectiveness of following risk response measures related to the **Foreign Funded Water Projects**. And you may indicate relevant risk event which could be covered by the each risk response.

No	Risk Response Measures	Effectiveness					Remarks (Which risk event could be addressed by the each risk response measures)
		1	2	3	4	5	
		Very low	Low	Medium	High	Very High	
1	**Risk Avoidance**						
1.1	Tendering a high bid						
1.2	Placing conditions on bid						
1.3	Plan alternative methods/options as stand-by						
1.4	Pre bid negotiations						
1.5	Reducing scope						
1.6	Extending the schedule						
1.7	Assigning more talented resources to ensure the project completion						
1.8	Make proper time estimation and produce a proper programme by referring to previous and ongoing similar projects						
2	**Risk Transfer**						
2.1	Transfer risk to contractor						
2.2	Transfer risk to insurance company						

3	**Risk Retention**						
3.1	Accept the risk						
3.2	Accept the risk and have a contingency plan						
4	**Risk Mitigation**						
4.1	Adhere to proper design norms						
4.2	Adhere to proper construction practices						
4.3	Adhere to proper site management practices						
4.4	Personnel training and education						
4.5	Physical protection to reduce risk						
4.6	Brainstorming to identify new risks						
4.7	Thorough review of specification						
4.8	Review of scope						
4.9	Adopting less complex processes						
4.10	Provide close supervision to subordinates						
4.11	Coordinate closely with contractors						
4.12	Detailed site investigation reports submitted with the bid document						
4.13	Understanding of perception of payment obligation in relation with global standards						