A WIN-WIN APPROACH TO SUBCONTRACTING IN BUILDING CONSTRUCTION OF SRI LANKA

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A WIN-WIN APPROACH TO SUBCONTRACTING IN BUILDING CONSTRUCTION OF SRI LANKA

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DECLARATION

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ABSTRACT

The issues prevalent amongst main contractors and subcontractors have continued to grow in the absence of mitigation methods that are favourable to both parties with the increased use of subcontracting in the construction industry. The aim of this research is to develop a 'win-win' approach to subcontracting by further developing a strategy proposed in prior literature for implementation in the building construction projects of Sri Lanka. This study has shown that effective management of identified critical factors affecting the subcontracting relationship and effective management of identified critical factors affecting the performance of a non-specialised subcontractor can produce a 'win-win' outcome for both parties. In this study the critical factors were identified via a questionnaire distributed to decision makers of main contractors and further explored through semi-structured interviews with project managers representing the main contractors. Main contractors have responded that '*Mutual trust and good communication between the main contractor and the subcontractor*', *'Flexibility, cooperation and active participation of the main contractor'* and *'Clear understanding of the work scope by the subcontractor'* are the most critical factors affecting the relationship whilst *'Time & cost management capability of subcontractor'*, *'Availability of finance/working capital for main contractor and subcontractor'* and *'Design errors, late design changes, specialised design etc.'* are the most critical factors affecting the performance of a subcontractor. This study concluded it is possible to successfully implement this proposed 'win-win' approach in the industry due to the changing landscape of subcontracting in building construction of Sri Lanka where main contractors are increasingly treating subcontractors as equal partners. It is emphasised in the study that overcoming the challenges in implementation requires careful consideration of the satisfaction of the other party by the both parties during each step of subcontracting by following the recommendations given to improve the critical factors identified in this study.

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ABBREVIATIONS

CIDA	-	Construction Industry Development Authority
EOT	-	Extension of Time
GDP	-	Gross Domestic Product
MEP	-	Mechanical, Electrical and Plumbing
QA/QC	-	Quality Assurance/ Quality Control
Rs	-	Sri Lankan Rupees
UK	-	United Kingdom
USA	-	United States of America
USD	-	United States Dollars

CHAPTER 1 INTRODUCTION

1.1. Background of the Study

Main contractors in the construction industry rely on subcontractors during the execution of a project. Subcontractors are employed by the main contractor (also referred to as general contractor, head contractor or prime contractor in literature) to carry out specific portions of a project; supplying labour, material, equipment, tools or design (Shimizu and Cardoso 2002).

Classification of subcontractors has been the subject of many studies conducted over a number of years. In a study conducted in 1993, as shown in Table 1.1 below, subcontractors were classified according to the task they were employed for i.e. basic or specialised tasks. Subcontractors carrying out specialised tasks were specifically referred to as specialised subcontractors. In a study conducted in 1994 subcontractors carrying out specialised tasks were further categorised according to the extent of their speciality. As seen in the table below, subcontractors were categorised in 2001 according to their service or supply to the building projects.

Table 1.1: Classification of subcontractors in building construction (Shimizu and Cardoso 2002)

Author	**Classification**	**Examples of activities**
Farah (1993)	Subcontractors of basic activity	Formwork, mortar, concrete, masonry, rendering and ceramic coatings
	Subcontractors of stages and specialized jobs	Jobs done by workers with specific qualifications
Villacreses (1994)	Subcontractors of basic activity	Formwork, mortar, concrete, masonry, rendering and ceramic coatings
	Subcontractors of special techniques	Electric fittings, plumbing, air conditioning

	Subcontractors of special work and/or materials	External waterproofing, painting, floor, glasses, external rendering, foundations
Pereira (2001)	Subcontractors supplying manpower	Masonry, painting
	Subcontractors supplying manpower and materials	Electric fittings, plumbing, joinery
	Subcontractors supplying manpower, materials and designs	Waterproofing, gypsum wallboard
	Subcontractors supplying manpower, materials, designs and maintenance	Air conditioning, sprinkler-system, special fittings

Subcontractors can also be categorised as; domestic subcontractors, nominated subcontractors and named subcontractors. Domestic subcontractor is a subcontractor employed by the main contractor to carry out a part of the main contract. Nominated subcontractor is a subcontractor imposed upon the main contractor, to carry out a part of a project, by the client after the main contractor is appointed (Tesha and Luvara 2017). Named subcontractor is a subcontractor that is employed by the agreement of both the main contractor and the subcontractor. The difference between the three types of subcontractors categorised in this method of categorisation is the method of engagement; by the client, main contractor or both.

Main contractors choose to employ subcontractors for their projects due to several reasons. Construction projects often comprise of specific tasks that require skilled craftsmen and specialised equipment. However, it is not efficient and economical for the average main contractor to employ such personnel full-time or own specialised equipment required for each task (Arditi and Chotibhongs 2005). According to Laryea and Lubbock (2013), by subcontracting, the main contractors can save the cost of recruitment, screening, training, managing employees and even the cost of

unemployment insurance, pensions and other employment benefits. Therefore, main contractors tend to employ subcontractors to carry out work at a lower cost and at a faster pace. This also helps main contractors to downsize their firms (Hsieh 1998).

Moreover Jamieson et al. has stated subcontractors are sometimes employed owing to increasingly complex projects (Choudhry 2012). The construction industry worldwide has evolved over the years with innovative state-of-the-art technology to design and construct complex structures such as skyscrapers, dams, bridges, tunnels etc. The required skilled labourers and specialised equipment due to the intricacy of such projects are sought through subcontracting. Hence subcontracting is increasingly becoming popular in complex projects.

In recent times there is a developing trend of main contractors employing subcontractors for general tasks in building construction such as formwork, masonry, concrete work etc. These subcontractors are supplied with necessary material by the main contractor. Since the subcontractor only provides labour, they are often referred to as labour subcontractors. Shortage of labour in the Sri Lankan construction industry is a widely known issue that in turn causes cost and time overruns in projects (Praveen et al. 2011). Subcontracting is an effective mitigation strategy for labour shortages since it not only ensures a steady supply of labour but also maintains labour rates without drastic fluctuations. Accordingly, main contractors sometimes use subcontractors to survive the volatility of the construction business cycle and unstable market conditions (Dainty et al. 2001; Hsieh 1998).

Furthermore, main contractors use subcontractors in projects to reduce or control their risks. When the main contractor employs a subcontractor and enters into an agreement they are able to transfer some risks to the subcontractors. However, this transfer may certainly develop new risks that are different in nature to the original risks especially if sub-subcontracting is involved. Sub-subcontracting is when subcontractors sublet some portions of their work to other parties creating another lower-tier. The widespread use of labour subcontracting has also introduced several tiers to subcontracting. Nevertheless, main contractors continue to employ subcontractors

perhaps since the newly developed risks are trivial as opposed to the original risks they are able to transfer or mitigate.

Shimizu and Cardoso (2002) summarises aspects of subcontracting in building construction as given in the Table 1.2 below. As explained in the table, subcontracting increases flexibility and productivity of a project. However, generates mixed results in other aspects such as quality, costs, controls, planning, technology, training, safety and consumption of materials.

Table 1.2: Aspects of subcontracting in building construction
(Shimizu and Cardoso 2002)

Aspects	**Comments**
Flexibility	Subcontracting appears as an answer to market uncertainties.
Quality	Subcontracting, on the one hand, can improve product quality as it uses specialized manpower. But on the other hand quality can get worse since subcontracting may lead to problems of control and coordination.
Costs	Fixed costs reduce, whilst the transaction costs increase; fixed costs are less as subcontracting eliminates the need for specialised equipment maintenance and reduces underutilized manpower. Transaction costs can be higher since each new contract negotiation can involve some proposals by subcontractors, review of sub-contractor invoices, etc.
Productivity	Subcontracting tends to further tie the labourer to a firm subcontractor. Thus, the effects of replication, continuity and learning lead to higher productivity by the employees. Easy access to specialized equipment and constant training also improves the productivity.
Controls	Controlling the quality of work is difficult with subcontracting, because a higher number of independent organizations in the site makes the control of work progress and quality difficult.
Planning	The intensive subcontracting of manpower makes the planning process difficult. Moreover, conflicting interests can intervene

	negatively with the programming of activities.
Technology	Market instability leads the contracting firms not to establish stable agreements with the subcontractors, thus not allowing technology transfer.
Training	The main contractors tend to pass the responsibility of training to subcontractors, but generally they are not apt to accomplish the training requirements due to financial issues and the time commitment for training.
Safety at work	The final responsibility of safety lies on the contracting company, as well as the implementation of a safety program, the commitment and supervision of the subcontractors. The disinterest of the contractor in investing in programs regarding safety for floating and unknown workers and the lack of familiarity of the workers within the working atmosphere aggravates this problem.
Consumption of materials	Subcontracting can magnify material wastage as subcontractors tend to finish the job as fast as possible, without controlling the use of materials.

It is in the best interest of all stakeholders to manage subcontracting in such a way that benefits are amplified and negative outcomes are controlled or reduced.

1.2. Problem Statement

Main contractors have increasingly come to rely on subcontractors as a result of the structural transformation that has taken place in the construction sector worldwide (Eom et al. 2008). Many studies were conducted over the years to investigate the main contractor-subcontractor relationship as well as the effect of subcontracting on the overall performance of projects.

The prior literature reveals that there are numerous issues created due to subcontracting that affect project performance negatively. There are many improvements that can be made between the main contractor and the subcontractor to navigate away from these issues. Consequently, research was conducted to explore

mitigation methods for such subcontracting issues with the final objective of executing successful construction projects.

Jin et al. (2013) carried out a critical review of this relationship and discovered that the main contractor bears the greatest exposure to risk and also is in the traditional position of power. Dainty et al. (2001) explains that the traditional approach of vertically differentiating the construction process in the construction industry has resulted in a subordinate position for subcontractors within the hierarchy of relationships.

Jin et al. (2013) also discovered that the main contractors cannot take subcontractors for granted because subcontractors are the most important resource available to main contractors in modern construction. The study reveals, main contractors have understood the need for, as well as the value of fair and reasonable contracts with subcontractors for successful project completion. This study in conclusion identified two fundamental elements regarding the main contractor-subcontractor relationship: relations between the two parties are controlled generally by the main contractor, however, maintaining high quality relations is beneficial to both parties (Jin et al. 2013).

Thus far, it can be understood that it is the main contractors who must initiate improvements since they are in a greater position of power than the subcontractor. It is equally important that the subcontractors reciprocate with the same interest for the improvements to be successfully implemented. The mitigation methods must be adequately favourable for both parties to ensure that both parties will embrace the improvements. However proposed recommendations in research were often unilateral and seldom acknowledged the need for a solution acceptable to both parties.

A recent study by Lee et al. (2017) has proposed a 'win-win' strategy validated by subcontractors as a solution that benefits both parties. 'Win- win' strategy is a well-known negotiation philosophy in which all parties to an agreement or a deal stand to realise their fair share (<100%) of the benefits and/or profits. The International construction industry is currently moving away from the traditional ways of working

to collaborative ways of working which is influenced by effective relationship management on successful project performance (Meng 2012). The ‘win-win’ strategy proposed by Lee et al. (2017) is based on this concept of relationship and performance management. Such an approach that considers expectations of both parties and improves both the relationship and management can provide a long-term solution to subcontracting issues in Sri Lankan building projects than the methods proposed in earlier studies.

Therefore, in this study the applicability of a ‘win-win' approach to subcontracting is investigated in building construction projects of Sri Lanka.

1.3. Objectives of the Study

The main objective of this study is to propose a ‘win-win' approach to subcontracting applicable to building construction projects of Sri Lanka.

The other objectives are:

- To identify critical factors affecting the relationship between the main contractor and non-specialised subcontractor
- To identify critical factors affecting the performance of the non-specialised subcontractor
- To develop the findings as a win-win approach to subcontracting in building construction projects of Sri Lanka

1.4. Significance of the Study

It is said that the progress and development of a country is primarily determined by the level of excellence of its construction companies (Bassioni et al. 2004). According to the Annual Report published in 2017 by the Central bank of Sri Lanka Gross Domestic Product (GDP) at current market prices was estimated at Rs. 13,289.5 billion (USD 87.2 billion) in 2017 out of which contribution by the construction sector was 7.1%. The Annual Report of 2018 states the value added of industry activities to have grown marginally by 0.9 per cent in 2018, compared to the growth of 4.1 per

cent in 2017. The same report further explains the slowdown in industry activities was mainly due to the contraction in construction and mining activities in 2018. Moreover, it claims the slowdown in mining and quarrying activities was also due to subdued performance seen in construction activities. It can be clearly understood that the contraction in construction industry performance by 2.1 per cent in 2018, compared to a growth of 4.3 per cent in 2017 has adversely affected the overall economy in 2018. This is a clear indication of the significance of the construction industry in the local economy.

Recently subcontracting has become a critical factor determining the performance of the construction industry. Chamara et al. (2015) claims subcontractors are employed for more than half of the total cost of the project. This means more than half of the contribution of the construction industry to the Sri Lankan economy is from subcontracting. Hence, to boost growth of the economy in Sri Lanka it is important that subcontracting in construction is continuously successful.

This study aims to contribute to the development of the construction industry as well as the economy of Sri Lanka at large.

1.5. Scope and Limitations of the Study

Previous studies indicate that particularly in the building (residential and non-residential) sector, subcontractors are employed more than in any other construction sector and they are commonly assigned 80-90% of a building project (Clough and Sears 1994; Hinze and Tracey 1994). Consequently Matthews et al. (1996) states in Eom et al. (2008) it is only logical that if the building construction sector wants to improve its performance that it focuses on the relationship between the main contractor and subcontractor. Hence this research study intends to test the concept of a 'win-win' approach specifically in building construction projects of Sri Lanka with the expectation of discovering more meaningful findings. Geographically this research is limited to projects in Sri Lanka.

In the study conducted by Lee et al. (2017) the concept of a ‘win-win' strategy in subcontracting was validated by the subcontractors. However, as the main contractors are in control of the relationship it is unlikely that any changes can be made without their support. Therefore, this research aims to gauge the opinion of the main contractors with regards to the 'win-win' approach. Accordingly, Sri Lankan contractors who have a high CIDA grading (C1 to CS2) for buildings were approached on the basis that they are predominantly involved in projects as main contractors. CIDA grading is a categorisation based primarily on financial capacity of the contractor as given in the Table 1.3 below, where financial capacity is established by assessing working capital or net worth and the availability of permanent overdraft facilities, credit facilities, fixed deposits, bonds & guarantee facilities etc. from a reputed bank.

Table 1.3: CIDA grades and financial limits
(Construction Industry Development Authority 2015)

Grade	**Financial Limit (X) (Rs. Million)**
CS2	X>3000
CS1	3000≥X>1500
C1	1500≥X>600

However, in recent years as International construction companies from China, India, South Korea etc. has entered the Sri Lankan construction industry, even the leading local construction companies were pushed to the status of subcontractors for some projects. This research has acknowledged the possibility that some respondents may represent both the main contractor and subcontractor for different projects at any given time, whilst focusing on the findings that stem from their experience ***only*** as a main contractor.

Furthermore, it is understood that the representatives of the main contractor based in head office and site may have varying opinions with regard to the subcontractors. Therefore, for a holistic picture there is a need to encompass the opinions of both decision makers at head office and project managers at site. According to Saunders et al. (2009) managers generally prefer to be interviewed, rather than complete a questionnaire especially when the interview topic is relevant and interesting to their

current work. Thus, for the first phase of this research critical factors were identified via a questionnaire given to a decision maker from the head office. Whilst the second phase was conducted through semi-structured interviews with project managers of main contractors to further explore the findings of the questionnaire. It is the top management who often make the final decision and has the ability to implement change. However, it is the site staff who are responsible to implement any changes introduced by the management at sites. Therefore, they could provide better insight of the difficulties at site and how best to smoothen the implementation process. Thus, investigating the opinions of both decision makers (top management) and project managers are equally important.

In this study the term 'subcontractor' is used to represent non-specialised civil subcontractors carrying out basic activities of a building project such as formwork, masonry, concrete works etc. and no other distinction such as domestic, nominated and named subcontractors etc. were made.

The ‘win-win’ strategy proposed by Lee et al. (2017) is developed by identifying critical risks that affect the main contractor-subcontractor relationship and the performance of the subcontractor. This research also follows a similar path by commencing from identification of critical factors. Data was collected from a selected sample of the target group considering relationship and performance management concepts. Thereafter quantitative and qualitative data was analysed separately within the scope specified above and considering the limitations to achieve the objective of the study.

1.6. Framework of the Study

The framework of the study is based on the findings from the literature review carried out at the beginning of the study. The concept of a ‘win-win’ strategy is exclusively referred from Lee et al. (2017). In addition similar prior literature is referred to identify the critical factors to be included in the questionnaire.

In the first stage of the study a questionnaire survey was conducted to identify the critical factors determining the subcontracting relationship and the performance of the subcontractor. Thereafter to better understand the findings semi-structured interviews were carried out. After considering all findings a 'win-win' approach was proposed to suit subcontracting in building construction projects of Sri Lanka.

1.7. Summary

In this first chapter the background of study is explained before presenting the problem statement. It is explained that since subcontracting plays a large role in building construction projects it is important to find solutions that favour both the main contractor and the subcontractor. The main objective of the study is stated as proposing a ‘win-win' approach to subcontracting applicable to building construction projects of Sri Lanka. The contribution and impact of construction and subcontracting for the economy of Sri Lanka is also described to explain the significance of the study. Then scope and limitations of the study are specified before briefly explaining the framework of the study. Representatives of main contractors with CIDA grading above C1 for building projects were approached to collect quantitative and qualitative data regarding non-specialised civil subcontractors. According to their responses to a questionnaire survey and a semi-structured interview, critical factors for both the relationship of main contractor-subcontractor as well as the performance of the subcontractor were identified to develop the ‘win-win' approach.

CHAPTER 2 LITERATURE REVIEW

2.1. Introduction

As explained in the first chapter the objective of this study is to propose a win-win approach to subcontracting in building construction projects of Sri Lanka. Before developing such an approach, it is essential to examine the previous research carried out on the subject. Accordingly, in this chapter previous literature is reviewed to determine the existing body of knowledge with regards to a 'win-win' (gain-gain) approach to subcontracting.

Many studies were conducted since the nineties to extensively investigate diverse and numerous aspects of subcontracting: management, selection, registration, evaluation, quality, safety, productivity etc. However, Sri Lankan research on subcontracting is few and limited to few aspects of subcontracting.

After reviewing such studies carried out across the world including Sri Lanka, findings that are only closely relevant to the objective of this study are included in this chapter.

Initially the current nature of the relationship between the main contractor and subcontractor is examined. Then issues in subcontracting are identified before exploring previous research on subcontractor management. Next the relationship management approach as well as a risk management approach is explored to mitigate issues in subcontracting. Thereafter partnering in construction is examined before finally reviewing previous research on a ‘win-win’ approach to subcontracting.

2.2. Relationship between Main Contractor and Subcontractor

Many initial studies regarding subcontracting have attempted to explore the nature of the relationship between the main contractor and the subcontractor.

According to Shimizu and Cardoso (2002), Pagnani defined 'subcontracting as a legal-economic relationship between two parties that is characterised by substitution and subordination' in a study conducted in 1989. In subcontracting substitution would mean the subcontractor executing work on behalf of the main contractor whilst assuming technical and financial risks. Subordination would mean that the subcontractor is compelled to follow instructions of the main contractor. Therefore, it can be established that the main contractor is the stronger party in the relationship. Consequently, implementing any changes in subcontracting would definitely require support from the main contractor.

Another early study carried out by Hinze and Tracey (1994) investigated the main contractor-subcontractor relationship from the perspective of a subcontractor. This was conducted as an exploratory study in Washington, USA via personal interviews. Responses received regarding bidding practices, subcontracting arrangements, administrative practices, payment procedures and project closeout portrayed subcontractors are often contractually required by the main contractors to assume risks and obligations that they would otherwise not assume. Subcontractors responded that they felt the main contractor does not have the best interest of the subcontractors. But not all subcontractors had the same perception; some subcontractors found their relationship to be a team arrangement or a partnership. Thus, according to the findings of this study subcontractors were generally at a disadvantage and there seem to be room for improvement to enhance the benefits especially to the subcontractor.

It is encouraging to note that a study conducted by Kale and Arditi (2001) has revealed that the main contractors have a positive view about maintaining high quality relationships with subcontractors. These findings were resulted from a questionnaire survey administered in USA. Main contractors seem to know that quality of the relationship is strongly associated with project performance. It can be understood that main contractors have somewhat changed their attitude in recent times to consider the perspective of the subcontractors since they have understood that their relationship with subcontractors is vital for their performance.

It is evident in this subchapter that the relationship between the main contractor and subcontractor is adversarial with a great amount of distrust especially since main contractors seem to be in control of the relationship. Nevertheless, both parties also agree that the relationship needs to be improved for better performance. Accordingly, it is pertinent to properly identify the areas that are problematic before proposing a 'win-win' approach to subcontracting as stated in the first chapter.

2.3. Issues in Subcontracting

After establishing that the main contractor and subcontractor relationship can be improved, studies have explored the issues that are prevalent between the two parties.

Arditi and Chotibhongs (2005) investigated the issues in the main contractor-subcontractor relationship from all perspectives of the main contractor, subcontractor and the client via three customised surveys conducted in USA. While confirming that there exist issues between the main contractor and subcontractor this study also revealed some unexpected findings. Table 2.1 given below includes the findings and recommendations for the investigated issues.

Table 2.1: Findings and recommendations of Arditi and Chotibhongs (2005)

Investigated issue	**Findings and Recommendations**
Timeliness of Payments to subcontractor	Subcontractors are often paid late due to the pay-when-paid and pay-if-paid clauses in the contract. As a consequence, subcontractors increase their quotations which results in an increased total project cost for clients. To improve this situation owner must pay the main contractor on time and the main contractor must pay the subcontractors immediately after the work is done.
Retention from subcontractors	The study reveals this is not a considerable problem except for small subcontractors. The amount of retention must be decided by the main contractor after considering the past work performance of the subcontractor.

Post-award bid shopping	This practice is justified if there is a change of scope. In other cases, this causes an adversarial relationship between main contractor and subcontractor. This practice can be stopped if clients prohibit the main contractor to replace the subcontractor without approval.
Subcontractor bonds and insurance	Subcontractors have responded to this as not a problem area. It is noted that careful examination of matters related to bonds and insurance can stop excessive risk transfer.
Site Safety	There is confusion about who is responsible for site safety. A solution would be for the main contractor to supervise site safety while the subcontractor carries out on-the-job safety programmes.
Partnering agreements	All parties agree partnering would benefit both the main contractor and subcontractor.
Site productivity	It is agreed that subcontractors familiar with modern construction methods must be employed.

As given in Table 2.1 above, this study has identified the main problem areas between main contractors and subcontractors as; timeliness of payments, site safety and productivity. However, the solution to timeliness of payments must be initiated by the client, thus improvements in this regard are beyond the scope of both the main contractor and subcontractor.

The findings of this study suggest that unjustified post-award bid shopping can produce an adversarial relationship between the two parties. Bid shopping in simple terms is to disclose a bid price provided by a subcontractor to its competitors in an attempt to obtain a lower bid resulting in higher profits for the main contractor. Accordingly, it can be understood that this practice is best avoided for a smooth relationship between the two parties.

The most important finding of this study is that all parties agree that partnering must be seriously considered since it is mutually beneficial. This opens a dialogue to explore the concept of partnering for subcontracting in succeeding research.

It is worthwhile to investigate if subcontracting in the Sri Lankan construction industry also suffer from the same issues and if similar recommendations have been suggested in previous literature.

A recent study conducted in Sri Lanka by Chamara et al. (2015) revealed that the main contractor and subcontractor have different perceptions about performance of the subcontractor. This was determined from a questionnaire survey conducted between the parties. Although subcontractors are satisfied with their own performance, main contractors are not satisfied with the performance of the subcontractors. Accordingly, findings of this study can be interpreted as a significant gap existing between the required level of performance and current performance level of subcontractors. Therefore, the aim of the study was to fulfil this gap by investigating issues that affect the performance of the subcontractor.

The study through a survey identified ten issues that affect time, cost and quality of a project. However, the main contractor and subcontractor have ranked them in a different order. The main contractor has ranked subcontractor selection, site coordination, subcontractors' labour migration and site safety as most significant issues. Subcontractor on the contrary has ranked delay of payments, subcontractor selection, site coordination and subcontractors' labour migration as the most significant issues. It is pertinent when proposing a 'win-win' approach to subcontracting that issues of both parties are taken into consideration.

It is noted again that punctuality of the payments and site safety are significant issues in subcontracting. Mitigation methods for those two issues are the same as the methods proposed in the aforementioned study by Arditi and Chotibhongs (2005). Other common issues in these two studies are retention, bonds and guarantees as well as insurance.

The study concludes that although there are differences in ranking of some problem areas, generally there is a positive correlation between opinions of the main contractor and subcontractor. Even though the same study proposes mitigation methods for the identified ten issues as given in Table 2.2 below, they are not explained in detail.

Table 2.2: Proposed mitigation methods for performance issues of subcontractors (Chamara et al. 2015)

	Issue	**Mitigation method**
Significant Issues	Subcontractor Selection	Selection must be transparent and must consider working capacity and previous experience of the subcontractor.
	Delay of subcontractors' payments	Clients should pay the main contractor punctually.
	Providing site safety for subcontractors	Main contractor should provide full-time safety staff and the subcontractor should provide a job safety program.
	Migration of subcontractors' labours	Appoint labourers to several projects and enhance the labour policies in construction.
	Critical site coordination	The main contractor has to take direct responsibility.
Moderate Issues	Bonds and Guarantees from Subcontractors	Educate subcontractors regarding these matters.
	Insurance from Subcontractors	
	Retention from subcontractors	Subcontractors should consider the amount of retention before entering into the contract.
	Back charging	Back charging is when the main contractors collect an attendance fee from subcontractors unnecessarily and when subcontractors give up paying the attendance fee. Both parties should identify responsibilities.
	Involvement of main contractor persons for projects	Main contractor should be present during site visits and also involve subcontractors for site meetings. The main contractor should maintain good coordination with workers.

As discussed in this subchapter there are some significant issues in subcontracting identified by both the main contractor and subcontractor. Additionally, it seems both parties agree that solving these issues are important. Therefore, when developing a win-win approach to subcontracting as stated in the first chapter it is essential to address these issues prevalent in Sri Lanka.

2.4. Subcontractor Management

The preceding subchapter reveals that there exists a need to tackle widespread issues in subcontracting to improve project performance. As a result, many studies have explored various aspects of subcontractor management.

In one study Thomas and Flynn (2011) explored best practices of industry professionals on how to manage subcontractors. Collaboration between interviewees, who are industry professionals, and the research team yielded a list of fundamental principles for subcontract management. Then those principles were ranked and categorised to manage people and the subcontract work as given in Table 2.3 below. It is stated in this study that these principles can also be used in the form of a "to do" list by main contractors to improve productivity and performance. From the 21 principles, 8 principles are recommended to manage people whilst 13 are recommended to manage work.

Table 2.3: Final list of principles published by Thomas and Flynn (2011)

A -Managing People	
1	Involve all subcontractors in developing the project schedule
2	Build a trust-based relationship by treating subcontractors fairly
3	Do not engage in the practice of bid shopping
4	Seek commitments from all parties at a pre-bid meeting
5	Help the subcontractor do timely work by providing assistance and resources as appropriate
6	Walk the job frequently; get to know the subcontractor’s workers and offer assistance as appropriate
7	Host a mandatory pre-bid meeting: explain expectations to subcontractors prior to

	bid submission
8	Meet regularly with the subcontractor’s supervisors individually
B- Managing the Work	
1	Identify the lead subcontractor
2	Write a fair and balanced subcontract
3	Develop a submittal schedule and change order log
4	Pay subcontractors on time
5	Prequalify subcontractors on the basis of their previous work, safety record, and financial capacity
6	Require the subcontractors to hold weekly toolbox meetings
7	At regular intervals, evaluate the subcontractor’s performance
8	Require subcontractors to maintain good housekeeping
9	Require subcontractors to maintain safe working practices
10	Consider the development of coordination drawings
11	Enforce the contract
12	Require every proposed change order to be reviewed by all subcontractors
13	Meet regularly with subcontractors collectively

It is evident from this study that relationship management and performance management are both important in subcontracting. According to Perera et al. (2016) many studies in the past have focused on improving the performance of the subcontractor because as Nelson states in his study conducted in 2007 success/failure and profit/loss of a construction project ultimately depends on the performance of the subcontractor. It was recognised in recent studies, similar to the findings of Thomas and Flynn (2011) that relationship management should also be given due attention.

As given in the first chapter, the objective of this research is to propose a 'win-win' approach to subcontracting. When developing such an approach, as established in this subchapter, it is vital to also consider relationship management as opposed to traditional subcontract management that focuses only on performance management.

2.5. Relationship Management in Subcontracting

As discussed in the previous subchapter relationship management is essential in solving issues prevalent in subcontracting. Therefore, it is worthwhile to further investigate this area of study to understand how relationship management affects subcontracting. Relationship management is a soft management approach, highlighting the importance of relationship development in performance improvement.

A study was conducted by Meng (2012) to explore the specific characteristics of supply chain relationships in construction and to assess their impact on project performance. As given in this study Christopher (1999) defines supply chain as a network of organisations involved through upstream and downstream linkages in different processes that deliver value in the form of products and services to end users. The linkage between the main contractor and subcontractor in construction is downstream.

A questionnaire survey was developed by Meng (2012) in this study after identifying 10 relationship indicators through a comprehensive literature review and a group discussion. This questionnaire survey was further refined through a pilot study and was distributed to stakeholders of building projects in the United Kingdom. According to the responses 30.5% of the respondents were main contractors, 11.4% were subcontractors whilst majority were management consultants. Therefore, the focus of this study was not exclusively on main contractor-subcontractor relationship. In the final stage of the study ten industry experts were interviewed to complement the questionnaire survey.

According to the participants of this study, relationship management has become popular in the construction industry in recent times. This shift in management focus does not mean neglecting management of time, cost and quality which are the parameters of project performance management. The purpose of relationship driven management is to find a more effective ways of working and improving performance.

It is recognized in this study that performance management is frequently used at operational level whilst relationship management is useful at a strategic level.

According to this study the deterioration of relationships is a major reason for the occurrence of poor performance. All participants agree building and maintaining a harmonious relationship within the project environment provides a solid foundation for good performance and project success. Then the study investigated how performance parameters can be improved by improving certain aspects of the relationship. These findings are summarised in Table 2.4 given below.

Table 2.4: Extract of main conclusions of the study conducted by Meng (2012)

Occurrence	**Ways to improve relevant aspects of the relationship**
Time Delays	Encouraging joint & collaborative working
Cost overruns	Open & effective communication, Clear & fair risk allocation, Abandonment of the blame culture, Regular performance measurement, Effective problem solving
Quality defects	Establishing an effective problem-solving mechanism

It is discovered in this study that relationship management has a significant impact on the occurrence of cost overruns than on time delays. Greater attention is paid to improve aspects of the relationship that are relevant to cost overruns as given in the Table 2.4 above. This study reveals that stakeholders must assess the relationship on a regular basis due to the dynamic nature of relationship management. Strengths and weaknesses of the current relationship can be identified through such assessment. Stakeholders can anticipate project performance and take early action to improve the relationship accordingly.

Finally, this study concludes that in conjunction with relationship management, strategic partnering should also be utilised to strengthen the project management system. This new combination of management styles is found to be far more effective than traditional project management approaches.

It is evident from this subchapter that relationship management plays a significant role in improving project performance by managing the relationship between the main contractor and subcontractor in construction projects. It is imperative to focus on improving relationship management as much as performance management to achieve the objective given in the first chapter of this study. Moreover since the past studies regarding relationship management reveal that it is important to combine strategic partnering with relationship management, it would be also fruitful to investigate partnering when developing a win-win approach to subcontracting.

2.6. Subcontracting to Partnering

Latest research has opened a dialogue about incorporating the essence of partnering in subcontracting to improve performance. According to Dainty et al. (2001) Harris and McCaffer has defined partnering as a strategic arrangement whereby a contractor is engaged in a series of projects or in a short-term single project with the aim of lowering costs and improving efficiency.

Dainty et al. (2001) conducted a study in UK as in-depth semi-structured interviews to examine subcontractor perspective on supply chain alliances. It was uncovered from this study that subcontractors are not adequately recognised in prior partnering research. As discussed earlier in this chapter, one of the main problem areas of subcontracting is payments. The findings of this study indicate partnering has the potential to resolve most of the payment issues given the main contractor is willing to make arrangements. Subcontractors generally held negative views of partnering as they felt the main contractors does not understand the principles of partnering. They also believed motivations of main contractors to implement partnering were not to prompt mutual trust, support or benefits for all stakeholders. Interestingly, subcontractors thought it was possible for partnering with clients to be successful but problematic with main contactors because of several identified issues: financial issues, programming/time issues, quality of information and related issues, attitudinal issues. Accordingly, this study concludes that an overall attitudinal change is required preferably stemming from the client for partnering to be successful.

Another study conducted by Black et al. (2000) analysed the success factors and benefits of partnering in construction. This research was carried out in UK via a postal questionnaire. It again confirms the findings of the study by Dainty et al. (2001) that considerable effort from all parties are required for partnering to be successful, however the glaring limitation is that Black et al. (2000) has not included subcontractors in the research. Clients and main contractors who have responded were supportive of partnering. But consultants were less supportive seemingly because of the fear of losing control. Most importantly all respondents agree partnering will play an increasing role in construction.

Furthermore, the findings of the study indicate respondents believe that there are several benefits of partnering: less adversarial environment, increased end-client satisfaction, an improved understanding of the difficulties faced by other parties. Black et al. (2000) state barriers to partnering are less important than the potential benefits to all parties and therefore there is willingness in the industry to implement partnering. However, it is also noted that partnering cannot thrive without trust, communication, commitment, a clear understanding of roles, consistency and a flexible attitude.

In the literature review of this study according to findings of previous studies it is stated that success of partnering is based on the commitment to a common goal that promotes a 'win-win' relationship as the objective of the project stakeholders. As per the review Bennett and Jayes has presented a sophisticated strategy for producing 'win-win' relationships based on the willingness to improve joint performance that results in remarkable potential savings: 40-50% in both cost and time. Therefore, when developing a 'win-win' approach to subcontracting it is worthwhile to incorporate the principles of partnering.

Greenwood (2001) conducted a questionnaire survey among subcontractors in UK to determine if there is a change in the nature of relationships between the main contractor and subcontractor. Findings indicate although both parties are interested in a closer relationship, the relationship still remains traditional, arms-length and cost-

driven. The study aptly concludes that “few contractors are flirting with subcontractor partnering, while for the majority it is business as usual."

According to the research discussed in this subchapter partnering is increasingly becoming popular in the construction industry and has proven to be beneficial for all parties. However, subcontractors remain sceptical and partnering approach is not yet widely used to improve subcontracting. It is clearly evident from prior literature that partnering cannot succeed without an attitudinal change and commitment of all stakeholders. When developing a 'win-win' approach to subcontracting as stated in the first chapter, it is important to consider the principles of partnering since partnering appears to encourage a 'win-win' outcome.

2.7. Risk Management in Subcontracting

Risk management, over the years has become an important research area in construction studies. Since subcontracting originates new risks, risk management is particularly important in subcontractor management. Accordingly, some studies have investigated risks associated with subcontracting and then recommended ways to better manage those risks. Such management of risks would result in preventing any issues that might arise due to subcontracting.

A study was conducted by Perera et al. (2016) in Sri Lanka to develop a risk register and a risk matrix that can be used as a guideline to allocate risks between the main contractor and the subcontractor. It is important to allocate the ownership of the identified risks to the appropriate party; the party who is best able to manage it to avoid disputes and/or claims later.

The first step carried out in the study was to identify risks associated with subcontracting through an extensive literature survey in order to develop the questionnaire. Thereafter four informal expert interviews (with two main contractors and two subcontractors) were conducted to refine the initial questionnaire. The experts noted that in Sri Lanka risks such as ‘unstable government’, ‘force majeure’ and ‘staff crises’ are not passed down to subcontractor level and therefore these three risks were

removed from the initial questionnaire. Four new risks were added as recommended by the interviewees: ‘political support’, ‘price increasing of materials’, ‘working capital’ and ‘specialized design’. This resulted in the final questionnaire having 29 risk factors consisting of two main sections. The first section focused on developing the risk register which is a list of categorised risks and risk factors. The second section focused on developing a risk matrix which is the allocation of risks in the risk register. This questionnaire was distributed among main contractors in building construction (CIDA C1 grading) and MEP subcontractors (CIDA EM1 grading) which is also a limitation of this study since only MEP subcontractors were considered. Accordingly it is beneficial to investigate if the findings of this study are applicable also for non-specialised subcontractors.

The findings of the survey identified 17 significant risk factors according to the frequency of occurrence and the impact on the project. As seen in the Table 2.5 given below 'working capital' was the highest ranked risk in the proposed risk register while ‘inadequate experience of the contractor’ was ranked lowest. When considering relationship related risks ‘Inadequate distribution of responsibilities and risks’ is ranked as the second highest in the risk register. The other two risks of the relationship category (Inadequate distribution of authority in partnership and Bid shopping) are comparatively ranked low.

Table 2.5: Proposed risk register by Perera et al. (2016)

Risk meta level	**Risk factor category**	**Risk factors**	**Overall Rank**
Macro level risks	Political and government policy	Political support	13
	Macroeconomic	Price increasing of materials	6
		Inflation rate volatility	11
	Legal	Legislation change	10
	Natural	Weather	8
		Geotechnical conditions	16

Meso level risks	Project Finance	Working capital	1
		Availability of finance	7
	Design	Design deficiency	4
		Specialized design	15
		Delay in project approvals and permits	17
	Construction	Construction time delay	3
		Construction cost overrun	5
		Late design changes	14
Micro level risks	Relationship	Inadequate distribution of responsibilities and risks	2
		Inadequate distribution of authority in partnership	9
		Bid shopping	12

Then these 17 risks were allocated between the main contractor and subcontractor as seen in the proposed risk matrix given below in Table 2.6. Interestingly the main contractor and subcontractor had contradictory views regarding the highest ranked risks. According to the study, allocation of the three highest ranked risks (Working capital, Inadequate distribution of responsibilities and risks, Construction time delay) have to be decided after further negotiation. This is due to either party trying to transfer the risk to the other party or because one party is not willing to share the risk. In summary both parties agreed to allocate 3 risks to the main contractor, 2 to the subcontractor and 5 risks to both parties whilst disagreeing on allocation of 7 risks. It would be meaningful to further investigate the root causes for disagreement between the main contractor and subcontractor in allocating the 7 balance risks. The biggest issues in subcontracting may also stem from these highest ranked risks that are not clearly allocated.

Table 2.6: Proposed risk matrix by Perera et al. (2016)

Risk factor	**Risk Allocation**			
	Main contractor	Subcontractor	Shared by both	To be decided after further negotiations
Political support	√			
Price increasing of materials				√
Inflation rate volatility				√
Legislation change			√	
Weather			√	
Geotechnical			√	
Working Capital				√
Availability of finance				√
Design deficiency	√			
Specialized design	√			
Delay in project approvals and permits			√	
Construction time delay				√
Construction cost overrun			√	
Late design changes	√			
Inadequate distribution of responsibilities				√
Inadequate distribution of authority in				√
Bid Shopping	√			
Total	**3**	**2**	**5**	**7**

In summary it can be seen from this subchapter that the risk management approach can be central in preventing subcontractor issues from occurring. However, when allocating risks, it is important to consider both perspectives of the main contractor and subcontractor. Neither party should be placed at an unfair disadvantage especially

when dealing with highest ranked risks. Accordingly, when developing a 'win-win' approach to subcontracting as given in the first chapter, it is important to consider risk management.

2.8. A Win-Win Approach to Subcontracting

As explained in the first chapter a ‘win-win’ approach is a widely popular negotiation philosophy that strives to benefit both parties involved. However, there are only few previous studies that have explored the principles of ‘a win-win’ approach with the purpose of improving subcontracting practices in the construction industry.

Hsieh (1998) conducted a questionnaire survey in Taiwan amongst main contractors and subcontractors to investigate the impact of subcontracting on site productivity. In this study while focusing on productivity nine possible scenarios between the main contractor and subcontractor were investigated as given in Table 2.7 below.

Table 2.7: Scenarios of productivity improvement/loss in subcontracting (Hsieh 1998)

Scenario	**Main Contractor**	**Subcontractor**	**Analysis**
I	Gain	Gain	Highly feasible and favoured by both parties
II	Gain	No Gain or Loss	Ignored by the subcontractor
III	Gain	Loss	Not feasible, opposed by the subcontractor
IV	No Gain or Loss	Gain	Ignored by the main contractor
V	No Gain or Loss	No Gain or Loss	No action, indifferent by both parties
VI	No Gain or Loss	Loss	Not feasible
VII	Loss	Gain	Ignored by the main contractor
VIII	Loss	No Gain or Loss	Not feasible
IX	Loss	Loss	No action, avoided by both parties

After analysing the above scenarios Hsieh (1998) conclude that both parties only find Scenario I highly feasible as it benefits both of them. Therefore, when developing a ‘win-win’ approach to subcontracting as stated in the first chapter, it is imperative to set the end goal as a scenario similar to Scenario I that favours both parties.

Lee et al. (2017) conducted a study in South Korea with the aim of creating a framework that considers the risks of subcontractors in international construction projects. The final expected outcome of this study was a "win-win strategy" for a sustainable relationship between the main contractor and the subcontractor. In this research Lee et al. (2017) defines ‘win-win’ occurs when both parties earn a sufficient profit through the same project.

It is vital to review this study by Lee et al. (2017) in detail since it is the most relevant publication which provides guidance to achieve the objective of proposing a win-win approach to subcontracting in Sri Lankan building construction as given in the first chapter.

The proposed strategy is founded through the collaboration of the main contractor and subcontractor in managing shared risks for successful project delivery. In addition, interface performance perspective of the subcontractor is also taken into consideration when developing the framework and strategy matrix. This overcomes the limitation of previous studies. Limitation of previous research shows that assessments of subcontractors were conducted without considering the performance results from a win-win perspective between the main contractor and the subcontractor.

Accordingly, the first step of the study was to identify the risks that are associated with subcontracting in international construction projects. 77 risk factors were identified from previous literature and categorised as seen in the Table 2.8 below. Since subcontract work outside of South Korea is considered, country level risks that are outside of the project boundaries were also considered. Then project level risks that are within the project boundaries were identified. Finally, corporate level risks that are related to the organisation of the subcontractor were considered since these affect the performance of the project.

Table 2.8: Breakdown of identified 77 risk factors (Lee et al. 2017)

Risk Level	Category	No of Risk factors
Country Level	Political Risks	4
	Macroeconomic Risks	5
	Owner's Risks	6
Project Level	Bid-Contract Risks	12
	Procurement Risks	6
	Physical Risks	4
	Social Environment Risks	4
	General Contractors Risks	9
Cooperate Level	Organisational Management Levels	6
	Construction Management Risks	11
	Localisation Risks	4
	Construction Technology Risks	6

This research used the theory of interface management for the next phase. Interface management in simple terms is a field of study in project management that focuses on different participants of a certain project. Main contractor and the subcontractor are physical entities who depend on each other during a construction project. Therefore the 9 risks identified as general contractor risks under project level risks in Table 2.8 were used to represent the relationship risks between these two entities. These directly affect the satisfaction of the main contractor regarding the partnership which in turn affects the relationship. The 9 risks were further divided into four categories for ease of analysis as given in Table 2.9 below.

Table 2.9: General contractor risks (Lee et al. 2017)

General Contractor Risks	Fairness and clarity risks	1	Fairness of subcontractor selection
		2	Clarity and adequacy of work scope
	Financial Risks	3	Timeliness of progress of payments
		4	Retention payment risks
	Relationship cooperation risks	5	Cooperation and active participation by the general contractor

		6	Relationship and mutual trust
		7	Difficulties in communication
	Capability risks	8	Differences in business management practices
		9	Lack of management capability of the general contractor

The next step of the research was to conduct a questionnaire survey among subcontractors to identify the critical risks that affect subcontractor performance. A correlation analysis was also performed to support the results so that risks that are truly critical in terms of cost, time and quality of a project can be identified. This risk assessment revealed 14 risk factors (y-axis) as given in Table 2.10 below that have a correlation with at least one out of cost, time and quality of a project.

Table 2.10: Risk factors that have correlation to at least one of cost, time and quality (Lee et al. 2017)

Risk Category	**Risk factor**
Political Risks	Corruption, collusion, underground trade risk
Bid-contract Risks	Adequacy of bid preparation period
	Adequacy of provisions for design errors
	Adequacy of claim and arbitration provisions
Procurement Risks	Local labour's procurement conditions
Physical Risks	Climate and weather conditions for construction execution
Organisational Management Risks	Utilisation of experts and human resources
	Flexibility and cooperation level of the organization
Construction Management Risks	Scheduling management capability
	Document management capability
Construction Technology Risks	Lack of standards and understanding of criteria
	Reconstruction due to errors and defects
	Design change risk (redesign, additional designs, etc)
	New technology, new method utilisation

Then the proposed framework was approached from two sides. The x-axis of the matrix is the partnership degree while the y-axis of the matrix is the performance of the subcontractor in terms of cost, time and quality of a project. Accordingly, 9 risks given in the Table 2.9 represent the x-axis while 14 risks given in the Table 2.10 represent the y-axis.

The correlation analysis also revealed that 9 general contractor risks (x-axis) are positively correlated with satisfaction. When the satisfaction increases both firms are able to have a successful project. This leads to a 'win-win' relationship. Therefore, to achieve a 'win-win' outcome both the partnership and the performance need to be positive as seen in the upper-right-hand corner of Figure 2.1 given below.

Apart from the 'win-win' quartile, this strategy matrix also illustrates three other possibilities. When both the performance and partnership is weak, it produces the worst-case scenario where both parties lose. If only the performance is strong then the relationship is project based and may not last beyond this specific project. If only the relationship is strong then the project performance may suffer. Therefore, to improve both project-based and relation-based scenarios both parties must focus on the lacking factor. Improving this wanting factor will result in a sustainable relationship which will eventually produce a win-win outcome.

This research in the final phase applies the developed framework to 32 real projects and verify that for a win-win outcome both the main contractor and the subcontractor have to improve their relationship as well as their performance.

This study is unique from the existing body of knowledge since previous studies only focused on one side or did not attempt to integrate two controversial factors; project performance and partnership satisfaction. Furthermore, this study can be used as a subcontractor selection tool where the main contractor can assess and choose a subcontractor who has the potential to contribute to a win-win outcome. After the subcontractor is chosen, this study can be useful to determine which factors require attention to improve the performance as well as partnership so that the final outcome will be ‘win-win’ for the two parties.

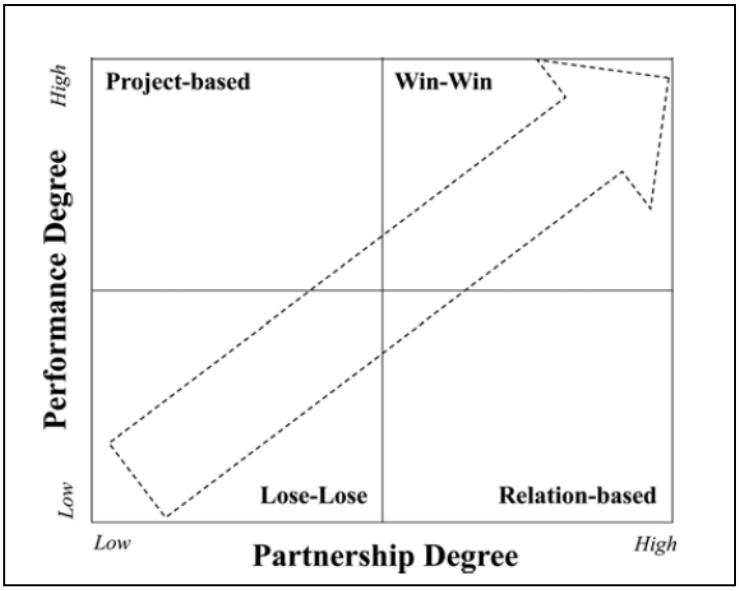

Figure 2.1: Proposed strategy matrix (Lee et al. 2017)

However, this study has one significant limitation. This study investigated a win-win strategy fundamentally based on the view of the subcontractor. Thus, for this research to be more meaningful and reliable follow-up studies should examine the opinion of the main contractor.

Therefore, as understood in this subchapter the best scenario in subcontracting is when both the main contractor and subcontractor gain from the project. Achieving such an outcome is possible when the relationship between the two parties and the performance of the subcontractor are both improved by paying attention to the critical risks. It is required to further examine this novel approach in order to achieve the objective stated in the first chapter of this study.

2.9. Summary

Studies that explored the nature of the relationship between the main contractor and subcontractor in construction found it to be adversarial. The main contractor who was in control of the relationship did not adequately consider the perspective of the subcontractor in some aspects, creating issues in certain situations. Therefore, to eliminate such issues subcontract management was introduced. It was later discovered that traditional subcontract management that only focuses on performance was not sufficient to smoothen the relationship between the two parties. Hence in recent times

relationship management has gained popularity in subcontracting. Studies have found relationship management to be far more effective when implemented together with partnering. Partnering encourages a ‘win-win’ outcome that seems to be directly in line with the objective of this study given in the first chapter. The previous research on a ‘win-win’ approach to subcontracting has established that it is beneficial for the main contractor and subcontractor when due attention is given to manage both the relationship aspect and project performance aspect of subcontracting. When developing a ‘win-win’ approach, it is also important to consider risk management as it assists in identifying critical factors for relationship and project performance. The overall findings of the studies reviewed in this chapter provided the necessary back drop in achieving the objective of proposing a 'win-win' approach to subcontracting applicable to the Sri Lankan building construction industry.

CHAPTER 3 METHODOLOGY

3.1. Introduction

This chapter describes the methodology followed in order to achieve the objectives given in the first chapter. Firstly, the research approach is explained to better understand the research design that is followed in this study. Thereafter, design of the questionnaire and semi structured interview is described in detail in the succeeding subchapters. The subchapters pertaining to the questionnaire explain the development process of the questionnaire, population and sampling, the execution of the survey, data analysis and data representation whilst subchapters pertaining to the semi structured interview explain the development of the outline for the interview and the execution of the interviews.

3.2. Research Approach

This research study has both characteristics of a deductive and an inductive approach. A deductive approach is defined by Saunders et al. (2009) as a research approach involving the testing of a theoretical proposition by the employment of a research strategy specifically designed for the purpose of its testing. On the other hand, an inductive approach is defined as a research approach involving the development of a theory as a result of the observation of empirical data.

Firstly, by critical review of prior literature the concept of a ‘win-win’ approach was recognised as a potential solution to the research problem identified in the first chapter. Accordingly, findings of Lee et al. (2017) were further examined through a questionnaire and semi-structured interviews conducted in Sri Lanka.

However before distributing, this questionnaire was altered to match the Sri Lankan construction industry according to the findings of similar prior research conducted in Sri Lanka and the feedback from the evaluators of the preliminary questionnaire.

Therefore the ‘win-win’ strategy developed by Lee et al. (2017) itself was not tested as defined in the deductive approach.

After analysis of quantitative and qualitative data, a ‘win-win’ approach was developed to better suit subcontracting in the Sri Lankan building construction industry. Thus, this last stage of the research followed an inductive approach. Hence both deductive and inductive approaches were utilised for the research design.

3.3. Research Design

The research design of this study was based on the findings of the literature review (Chapter 2) that was conducted at the beginning.

A survey method has been predominantly adopted in this research as it is suitable to obtain the expected outcome. Although surveys are widely known to mean questionnaire there are other techniques of data collection such as structured observation and structured interviews. The literature survey carried out at the initial stage can also be categorised as a form of survey.

In this research design, firstly questionnaire technique is utilised as it allows collecting quantitative data that is easy to analyse. Furthermore, by way of sampling it is possible to generate findings that are representative of the whole population. Findings of Lee et al. (2017) and similar prior research were assessed via a questionnaire to determine the adjustments required to develop a ‘win-win’ approach in Sri Lanka.

Once the preliminary questionnaire was designed according to the findings of the literature review, an evaluation was carried out with industry experts to further refine it. Thereafter this finalised questionnaire was distributed to the selected sample to rank critical factors that must be considered when developing a ‘win-win’ approach in Sri Lanka. Accordingly, the questionnaire was extremely useful in identifying the general critical factors that affect the relationship between the main contractor and subcontractor as well as the project performance. This questionnaire can be categorised under attitude and opinion questionnaires of descriptive research.

After analysing the quantitative data, further research was required to understand the reasons behind the data as well as its implications on the objectives of the study. At this stage, research design slightly followed the method of grounded theory. The findings of the questionnaire were validated via semi-structured interviews that were conducted with an inductive approach before drawing a conclusion. A semi-structured interview following a questionnaire is frequently used for exploratory and explanatory research. Semi-structured interviews were extremely useful in exploring the findings that emerge from questionnaire responses and to obtain comprehensive explanations of the quantitative data.

Accordingly, both quantitative and qualitative data were collected separately in this research design. Then this data was analysed separately to achieve the objectives stated in the first chapter. The flow chart of this mixed method research design is given in the Figure 3.1.

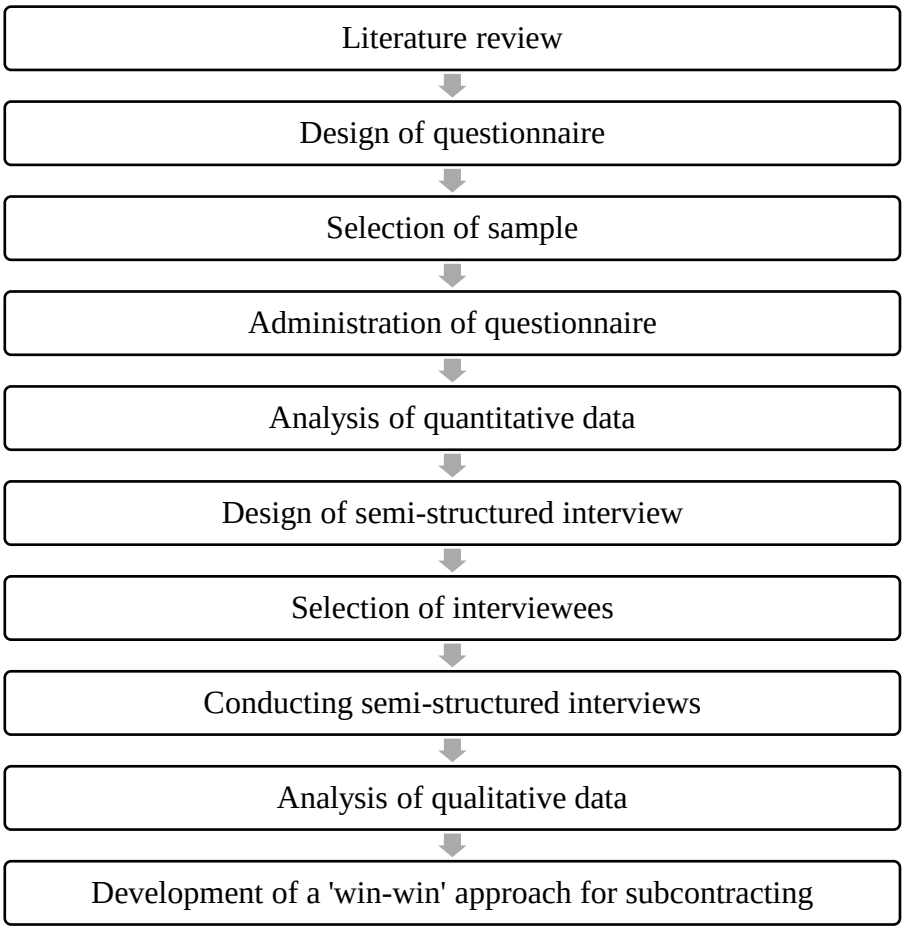

Figure 3.1: Flow chart of the research

3.4. Design and Execution of Questionnaire Survey

The questionnaire of this study was designed in three steps. In the first step the preliminary questionnaire was compiled by referring to the previous research that was relevant to the objective of this study. Then in the next step the questionnaire was evaluated by distributing it to five industry experts. In the final step it was refined and further developed, ready to be administrated by considering feedback received from the evaluation.

Thereafter the questionnaire was distributed and the collected data was analysed to form the outline for the semi-structured interview.

3.4.1. Design of Preliminary Questionnaire

The preliminary questionnaire was designed in four parts and consisted of opinion variables. The first part (Part A) was designed to collect information of the respondent and the organisation in order to obtain the demographic characteristics relevant to this research.

The second part (Part B) was designed to gauge the criticality of the factors that can affect the relationship between the main contractor and the subcontractor. Lee et al. (2017) initially identified 9 risks (Table 2.9) that affect the relationship but later after the survey concluded 2 of them were deemed to be not critical. However, since these were not tested in Sri Lanka all 9 of the risks were included in the preliminary questionnaire as factors. Thereafter similar prior research conducted in Sri Lanka were examined to identify more factors relevant to Sri Lanka. Perera et al. (2016) in their research which is most relevant initially identified 6 risks but discarded 3 of them after the survey. Since this study was conducted recently in Sri Lanka only the 3 risks (micro level risks of Table 2.5) ranked as critical were included in the preliminary questionnaire as factors. Accordingly, the preliminary questionnaire consisted of 12 factors identified by prior literature.

The third part (Part C) of the questionnaire was designed to establish the criticality of factors that can affect the performance of the subcontractor. Lee et al. (2017) identified 14 critical risks out of 77 risks considered in the research (Table 2.10) but only 13 were included in the preliminary questionnaire as factors discarding '*corruption, collusion, underground trade risk*' risk. This risk was excluded since it was relevant for subcontracting in International Markets and therefore was not within the scope of this research. Similarly, in Sri Lanka, Perera et al. (2016) identified 14 risks (macro and meso level risks of Table 2.5) but only 12 were included in the preliminary questionnaire as factors since 2 risks were duplicated from the study by Lee et al. (2017). Accordingly, the preliminary questionnaire consisted of 25 factors.

The fourth and final part (Part D) of the questionnaire was designed to obtain the concluding opinion of the respondents regarding the 'win-win' approach as well as the applicability of such an approach in Sri Lanka. Another objective of Part D was to discover interesting findings that can be followed up in the semi-structured interviews.

Special consideration was taken to remember that respondents have limited time to complete this questionnaire and therefore questions were kept as concise as possible. When designing the questionnaire, method of data analysis was also considered to avoid any issues that may arise during analysis. The appropriate type of question format (multiple choice, open ended, Likert scale etc.) was chosen to enable collection of the data required to achieve the objective of the study.

3.4.2. Evaluation of Preliminary Questionnaire

The preliminary questionnaire was evaluated through five informal expert interviews.

They were requested to carefully examine:

- Suitability of questions
- Structure of the questionnaire
- Clarity of questions and instructions
- Unfamiliar terms

They were also inquired if there are any other factors that should be added to or omitted from the questionnaire according to their work experience in the industry. Finally, their general comments were requested with regards to the duration taken to respond to the questionnaire as well as the layout.

The following Table 3.1 provides demographic characteristics of the five experts who evaluated the preliminary questionnaire.

Table 3.1: Demographics of preliminary questionnaire evaluators

	Grading for Buildings of the current affiliated company	**Total Experience (years)**	**Experience in Sri Lanka (years)**	**Educational Background**	**Current Designation**
P	C1	10	7	Quantity Surveying	Senior Quantity Surveyor
Q	C1	13	13	Quantity Surveying	Senior Quantity Surveyor
R	CS2	11	9	Architectural Design, Construction Law	Director
S	C1	41	41	Civil Engineering	Chairman/ Managing Director
T	CS2	7	5	Civil Engineering	Assistant Vice President

According to their experience they found some factors to be irrelevant for the Sri Lankan construction industry. Such factors were discarded. They also suggested rewording some factors according to the targeted respondents and the terminology used in Sri Lankan construction. Furthermore, they recommended to explain explicitly in the questionnaire what the researcher mean by terms such as a 'win-win' outcome, bid shopping etc. and who the researcher refers to by subcontractor since there are many categories. This was especially important as the questionnaire was designed to be filled by the respondents themselves without any involvement from the researcher. As per the feedback from these industry experts, simple English words were used as much as possible so that questions will be well understood by all respondents. Since

construction in a developing country and a developed country is different in some aspects such as safety, quality etc. they also suggested to add more factors to include these areas. They also suggested compiling some factors together so as not to exhaust respondents by too many factors. Furthermore, questions and factors of Part B and Part C were reorganized to assist respondents in their answering process with the expectation that it would produce better findings. These suggestions and recommendations were accommodated during the revision of the questionnaire.

3.4.3. Finalised Questionnaire

The final questionnaire (Appendix I) consisted of four parts similar to the initial questionnaire and was designed using a free online tool Google Forms due to the advantages it offers: ease of design, ease of administration, ease of collection of data, ease of storage of data for analysis etc.

Part A of the final questionnaire was designed to gauge the demographic characteristics of the respondents as given in Table 3.2 below.

Table 3.2: Design of part A of questionnaire

	Question No	**Question**	**Type of Question**
Part A- Respondent Information	1	Please choose the CIDA grading of your organisation for buildings.	Multiple Choice
	2	Please state your experience in building construction.	Multiple Choice
	3	Were you involved in any building project in the capacity of the subcontractor?	Multiple Choice
	4	Please choose your educational background.	Multiple Choice
	5	Please choose your current designation.	Multiple Choice

In the distributed final questionnaire Part B had two questions. First question given in a five-point Likert scale ranging from least critical to most critical requested the respondents to rank the criticality of the factors on the relationship between the main contractor and a non-specialised subcontractor. The final 15 factors of Part B and the source of the factors can be seen in Table 3.3 given below. As seen 2 factors were introduced to Part B by the evaluators of the preliminary questionnaire.

Table 3.3: Factors of part B in the final questionnaire and their sources

	Factor	**Source of factor**
1	Fairness when main contractor is selecting the subcontractor.	Lee et al. (2017)
2	Main contractor engaging in practice of Bid Shopping (Definition given in the questionnaire).	Perera et al. (2016)
3	The type of subcontract (Measure & Pay, Lump sum etc) & payment conditions.	Preliminary questionnaire evaluators.
4	Conditions regarding the retention in the subcontract.	Lee et al. (2017)
5	Timeliness of progress payments to the subcontractor.	Lee et al. (2017)
6	Fairness in profit sharing from variations and extra works.	Preliminary questionnaire evaluators.
7	Clear understanding of the work scope by the subcontractor.	Lee et al. (2017)
8	Clear distribution of responsibilities during subcontracting.	Perera et al. (2016)
9	Adequate distribution of authority during subcontracting.	Perera et al. (2016)
10	Flexibility and cooperation of the main contractor during subcontracting.	Lee et al. (2017)
11	Active participation of the main contractor during subcontracting.	Lee et al.

		(2017)
12	Differences in business management styles of the main contractor and the subcontractor.	Lee et al. (2017)
13	Management capability of the main contractor.	Lee et al. (2017)
14	Good communication between the main contractor and the subcontractor.	Lee et al. (2017)
15	Mutual Trust between the main contractor and the subcontractor.	Lee et al. (2017)

The second question of Part B was an open-ended question which asked the respondents to add any factors not mentioned in the first question but they feel is critical for the relationship.

Part C follows the same format as Part B. The first question asked the respondents to rank the criticality of the factors on the performance of a non-specialised subcontractor. The final 15 factors of Part C and their sources can be seen in Table 3.4 given below. As shown below, 1 factor was introduced to Part C by the evaluators of the preliminary questionnaire.

Table 3.4: Factors of part C in the final questionnaire and their sources

	Factor	**Source of factor**
1	Political support for the main contractor and the project.	Perera et al. (2016)
2	Legislation and policy changes in Sri Lanka.	Perera et al. (2016)
3	Fluctuation of inflation rate when material is supplied by the subcontractor.	Perera et al. (2016)
4	Price increase of materials when material is supplied by the subcontractor.	Perera et al. (2016)
5	Adequate bid preparation time given to the subcontractor.	Lee et al. (2017)

6	Unforeseen weather conditions.	Perera et al. (2016), Lee et al. (2017)
7	Unforeseen Geotechnical conditions	Perera et al. (2016)
8	Availability of finance/working capital for main contractor and subcontractor.	Perera et al. (2016)
9	Design errors, Late design changes, Specialised design etc in the project.	Perera et al. (2016), Lee et al. (2017)
10	Time and cost management capability of the subcontractor.	Perera et al. (2016), Lee et al. (2017)
11	Document management capability of the subcontractor.	Lee et al. (2017)
12	Expertise of the subcontractor staff.	Lee et al. (2017)
13	Use of new technology/methods by the subcontractor.	Lee et al. (2017)
14	Adequate claim and arbitration provisions in the subcontract.	Lee et al. (2017)
15	Safety management capability of the subcontractor.	Preliminary questionnaire evaluators.

Similar to Part B the second question of Part C is an open-ended question which asked the respondents to add any factors not mentioned in the first question but they feel is critical for the performance of the subcontractor.

Part D of the final questionnaire consisted of four questions.

The first question asked the respondents if they agreed or disagreed with the following statement derived from the research of Lee et al. (2017):

Management of critical factors for
1. The relationship between the main contractor and the subcontractor &
2. The performance of the subcontractor
will result in a **'win-win'** outcome.

The second and the follow up question was an open-ended question that asked the respondent to explain the reasons if they disagreed with the above statement.

The third question referring to the prior experience of the respondents requested them to rank the difficulty of implementing a win-win approach to subcontracting in the Sri Lankan construction industry on a scale of 1-5 (1-impossible, 5-very possible). The final question of Part D and the questionnaire was a follow up question asking the respondents to explain their reasons if they marked 1-3 on the scale.

3.4.4. Population and Sampling

As at 27th August 2019 there were 8 organizations registered as CS2, 1 organization as CS1 and 29 organizations registered as C1 for building construction in the CIDA website. Accordingly, decision-makers of 38 organisations were eligible to be invited to respond to the questionnaire.

Convenience sampling was utilised to administer this questionnaire. Therefore 15 organisations out of the 38 organisations that the researcher has access to was chosen. Then to manage bias five decision-makers with different educational backgrounds were requested to participate from each organisation. Thus 75 participants were invited to answer the questionnaire.

3.4.5. Execution of the Survey

A representative, known to the researcher, from each organisation that was eligible as per the scope was established as the primary contact person. Thereafter contact details were obtained of five decision makers from each organisation. Then questionnaires

were sent via email (as a link for the questionnaire on Google forms) with a cover letter. Then it was followed up until a reasonable response rate was achieved.

Prior studies in Sri Lanka on subcontracting show a response rate between 67% to 80% and thus a similar response rate was expected from the invited respondents. After a month from distribution a response rate of 58% was achieved and it seemed further responses were unlikely. According to Baruch (1999) a response rate of 35% for most academic studies involving top management is considered generally reasonable. Therefore, the questionnaire was closed and the data was extracted for analysis.

3.4.6. Method of Data Analysis and Data Representation

The data collected by Google Forms was summarised in a spreadsheet. Thereafter data analysis tool of Microsoft Excel was utilised to analyse the data as well as for data presentation in the succeeding chapter.

3.5. Design and Execution of Semi-structured Interviews

Semi structured interviews are a type of non-standardised (qualitative) research interviews where the interviewer has a list of themes or questions to be covered that can vary according to the flow of the conversation during the course of the interview (Saunders et al. 2009). Accordingly, initially an outline for the semi-structured interview was designed based on the findings from the questionnaire. According to Saunders et al. (2009) semi-structured interviews provide opportunities to 'probe' answers and therefore can add significance and depth to the data obtained from the questionnaire. Then project managers representing the main contractors were interviewed to gather further information required to develop a 'win-win' approach that is suitable for building construction in Sri Lanka.

3.5.1. Outline of the Semi-structured Interview

The outline of the interview was divided into five sections (Appendix II).

In the first section, which is the opening remarks of the interview, a brief introduction was provided regarding the interviewer and the research. In this section interviewee was explained of the 'win-win' approach derived from Lee et al. (2017) and the progress of the research so far. After stating the objective of the semi-structured interview and how confidentiality as well as anonymity is ensured, consent was requested from the interviewee for audio recording. Thereafter the interviewee was explained that the interview will follow a semi-structured interview format and thus there is no strict order of questions. Finally, in this first section of the interview the scope of the research was stated so that the interviewee can provide more meaningful insight.

The second section of the interview is similar to Part A of the questionnaire where the interviewee was asked of their demographic characteristics such as CIDA grading of their organisation (for buildings), their experience in building construction, their educational background, current designation etc.

In the third section of the interview, the interviewee was shown the categorisation of the 15 factors of Part B into least critical, less critical, critical, more critical and most critical by the respondents of the questionnaire. Each of these factors starting from factors categorised as most critical were discussed with the interviewee in this section. The interviewee was encouraged to give their opinion regarding the categorisation, how they observe these factors affecting the relationship between the main contractor and the subcontractor at site, how these factors can be improved and any other remarks they may have.

The fourth section of the interview was similar to the third section. In this section, 15 factors of Part C were discussed with the interviewees. They were again asked of their opinion regarding the categorisation by the respondents of the questionnaire, their observations at site regarding how these factors affect the performance of a subcontractor, ways to improve these factors and any other relevant remarks.

The purpose of the fifth and last section of the interview was to gain the overall opinion of the interviewee for a 'win-win' approach to subcontracting in the Sri

Lankan building construction industry. The possibility of implementation and ways to improve the implementation process was discussed as the concluding remarks.

Although this general outline was followed, as per the nature of semi-structured interviews there were slight variations with each interviewee. Care was taken to prepare the outline with open ended and probing questions as they encourage interviewees to provide developmental answers. Moreover, according to Saunders et al. (2009), Easterby-Smith et al. state open questions can assist in avoiding bias. Another step taken to avoid bias and incomplete interpretation during the interview was to summarise the response of the interviewee at the end of each question. Healey and Rawlinson according to Saunders et al. (2009) have established that this practice allows interviewees to 'evaluate the adequacy of interpretation and correct where necessary'. Although the outline was prepared in English, both English and Sinhala languages were used during the interview as preferred by the interviewees.

3.5.2. Execution of Semi-structured Interviews

As explained in the first chapter, project managers representing the main contractors of building projects were approached for the semi-structured interviews. Contact details of a project manager was requested from the same primary contacts of the 15 organisations chosen for convenience sampling during the execution of the questionnaire survey. Interviews with five project managers were arranged considering logistical factors as well as time constraints. Fewer participants are considered satisfactory when testing the applicability of an existing theory in order to develop it to better suit the testing surrounding through interviews (Saunders et al. 2009).

A location convenient to the Project Managers were chosen and effort was made to choose a location that is unlikely to be disturbed especially with any construction noise.

The interviewees were informed in advance that the interviews would require approximately 30 minutes. In some circumstances this was exceeded and therefore

special attention was given to manage time during the interviews considering the busy schedule of the project managers.

The audio recordings were then summarised on Microsoft Word in order to detect findings that can help in achieving the objective of the research.

3.6. Summary

At the beginning of this chapter it is explained that both deductive and inductive approaches were taken during this study. Firstly, a preliminary questionnaire was designed as per the findings of the literature review. Then this questionnaire was developed by incorporating the feedback that was received from the evaluation. After analysing the quantitative data collected by administering the finalised questionnaire, semi-structured interviews were organized to further understand the findings. Accordingly, a mixed method of research design was employed in this study. This chapter also describes in detail the development of the final questionnaire that consisted of four parts. The questionnaire was administered utilising convenience sampling and was distributed to the target group by sending the link of the questionnaire from Google Forms via email. The quantitative data was analysed and later represented using Microsoft Excel. Thereafter the outline of the semi-structured interview was formed to assist when conducting the interviews. Interviews were carried out with five project managers representing the main contractor in building projects to further explore the findings of the questionnaire. Then the findings were summarised with the aim of developing a ‘win-win’ approach to subcontracting in building construction of Sri Lanka.

CHAPTER 4 DATA ANALYSIS AND DISCUSSION

4.1. Introduction

This chapter includes the analysis of data that was collected via the questionnaire survey and thereafter the findings from the semi-structured interviews.

Firstly, the demographic characteristics of questionnaire respondents were analysed. Thereafter by analysing the responses to Part B and Part C of the questionnaire, critical factors for the relationship between the main contractor and non-specialised contractor as well as the critical factors for the performance of the non-specialised subcontractor were identified. Then Part D of the questionnaire was analysed to understand the overall opinion of the questionnaire respondents regarding the approach suggested in this research study.

Thereafter findings from the semi-structured interviews were discussed in detail before summarising the contents of this chapter.

4.2. Demographics of Questionnaire Respondents

Respondent information was collected from Part A of the questionnaire.

The first question requested the CIDA grading (for buildings) of the company the respondent is currently affiliated to and as seen in Figure 4.1 below, 50% of the respondents represented CS2 companies, 45% C1 companies and 5% CS1 companies.

The second question asked the respondents of their experience in building construction. As seen in Figure 4.2, 59% of the respondents had more than 10 years of experience, 27% had 5 to 10 years of experience and 14% had less than 5 years of experience.

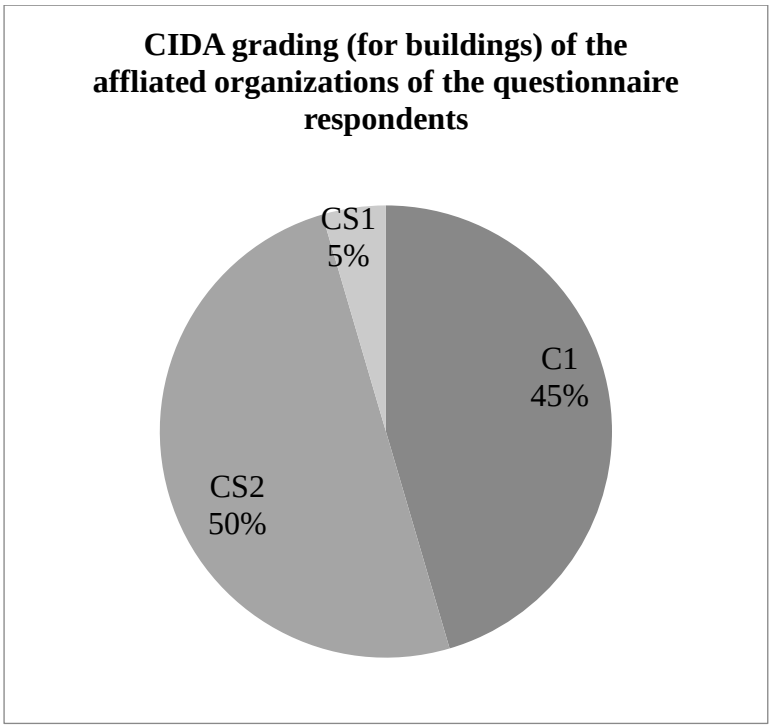

Figure 4.1: CIDA grading of the affiliated organisations of the questionnaire respondents

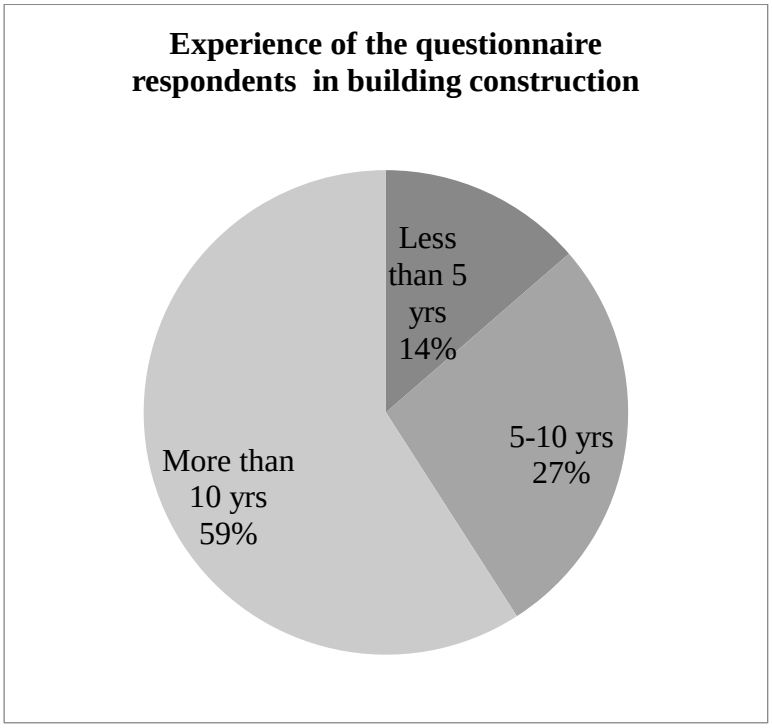

Figure 4.2: Experience of the questionnaire respondents in building construction

The third question inquired if the respondents were involved in any building projects as a subcontractor and as seen in Figure 4.3 given below, 59% responded yes whilst 41% responded no.

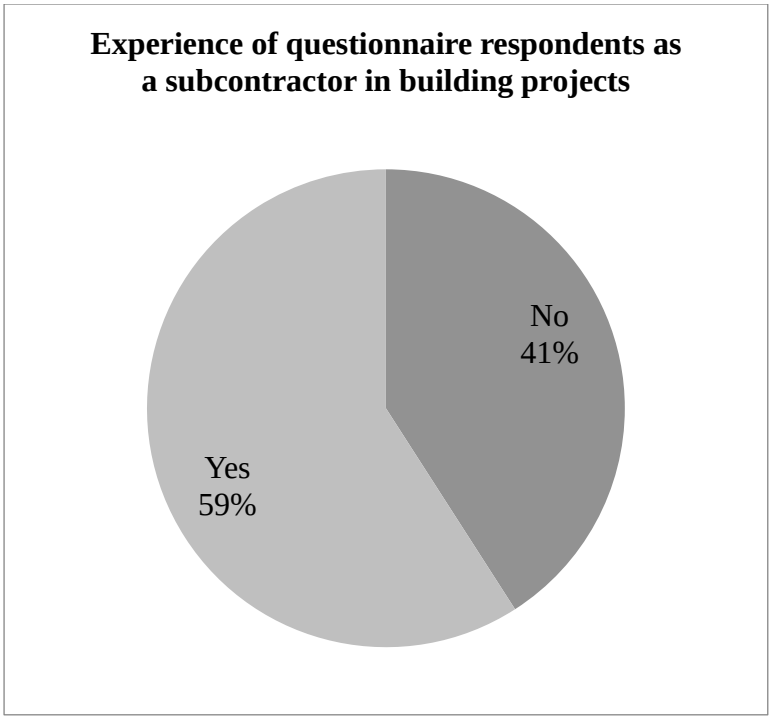

Figure 4.3: Subcontractor experience of questionnaire respondents

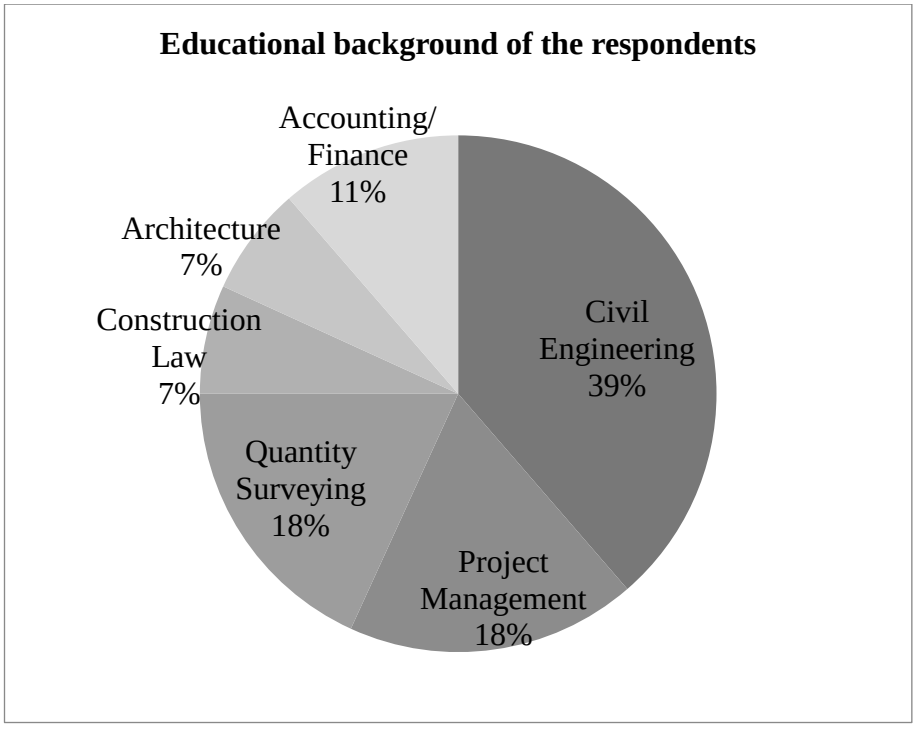

Figure 4.4: Educational background of the questionnaire respondents

As illustrated in Figure 4.4 shown above, when asked about the educational background respondents have answered that 39% have a civil engineering background, 18% have a project management background, another 18% have a quantity surveying background, 11% have an accounting & finance background, 7% have a construction law background and the remaining 7% have an architectural background.

In the final question of Part A, respondents were asked their current designation and as seen in figure 4.5 given below, 34% of the respondents answered as construction managers, 14% as general managers, another 14% as chief quantity surveyors, 13% as chairmen or managing directors, 10% as finance managers and 7% as design managers and the remaining 7% as contract mangers.

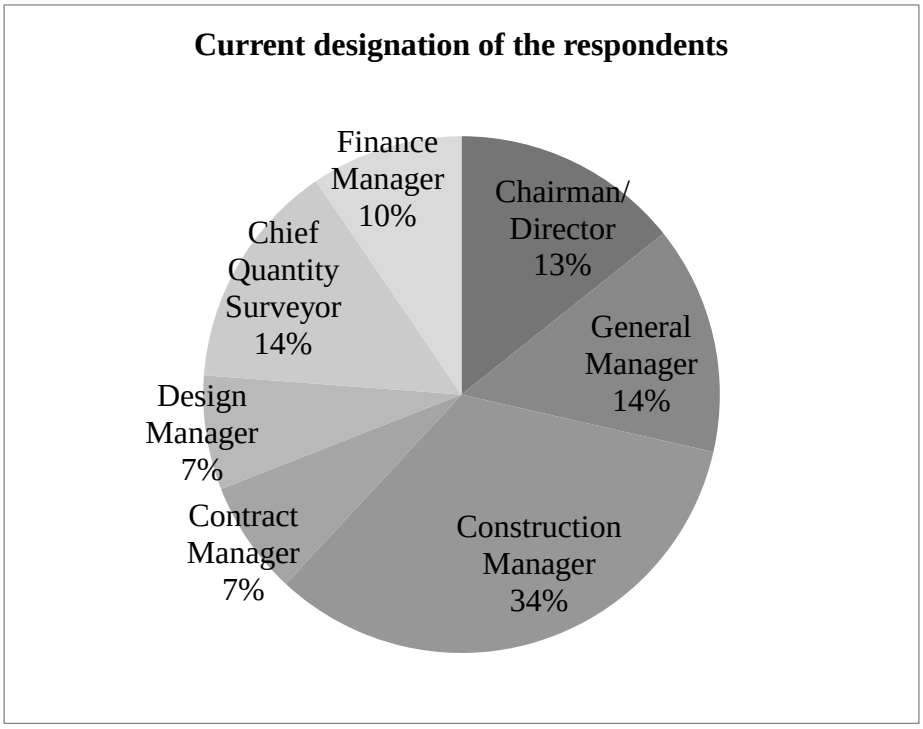

Figure 4.5: Current designation of the questionnaire respondents

4.3. Analysis of Responses to the Part B and C of Questionnaire

Part B and C of the questionnaire were given in Likert scale.

The response categories in Likert scales have a rank order, but the intervals between the responses cannot be presumed equal. Therefore, it is important to choose correct statistical analysis for such ordinal data. Although mean and standard deviation are inappropriate for data from Likert scale, mode and median can be used to interpret data. The range and interquartile range can also be used for statistical analysis. Since the data is not continuous, histograms cannot be used but bar chart or a frequency table can be used for data representation.

Accordingly, frequency tables were prepared for Part B and C by summarising the responses using 'COUNTIF' function of Microsoft Excel. Then weightings were assigned to different levels of criticality and thereafter following formula was used to calculate criticality of each factor as shown in the Table 4.1 below:

$$Criticality\ Score = 1X_1 + 2X_2 + 3X_3 + 4X_4 + 5X_5$$

.

Table 4.1: Example for calculation of criticality score of a factor

	Least Critical	Less Critical	Critical	More Critical	Most Critical
Number of responses for a factor	X_1 =2	X_2 =6	X_3 =24	X_4 =8	X_5 =4
Assigned Weight (points)	1	2	3	4	5
Calculation	$= (1 \times 2) + (2 \times 6) + (3 \times 24) + (4 \times 8) + (5 \times 4)$				
Criticality Score	=138				

Once calculations were completed for each of the factors of Part B and C (Appendix III), in order to categorise these factors into 5 sections as per their criticality score 'PERCENTILE' function was used similar to 'QUARTILE' function since quintile function is not available on Microsoft Excel. Thereafter bar charts were generated to understand the overall criticality of the factors.

4.3.1. Critical Factors Affecting the Subcontracting Relationship

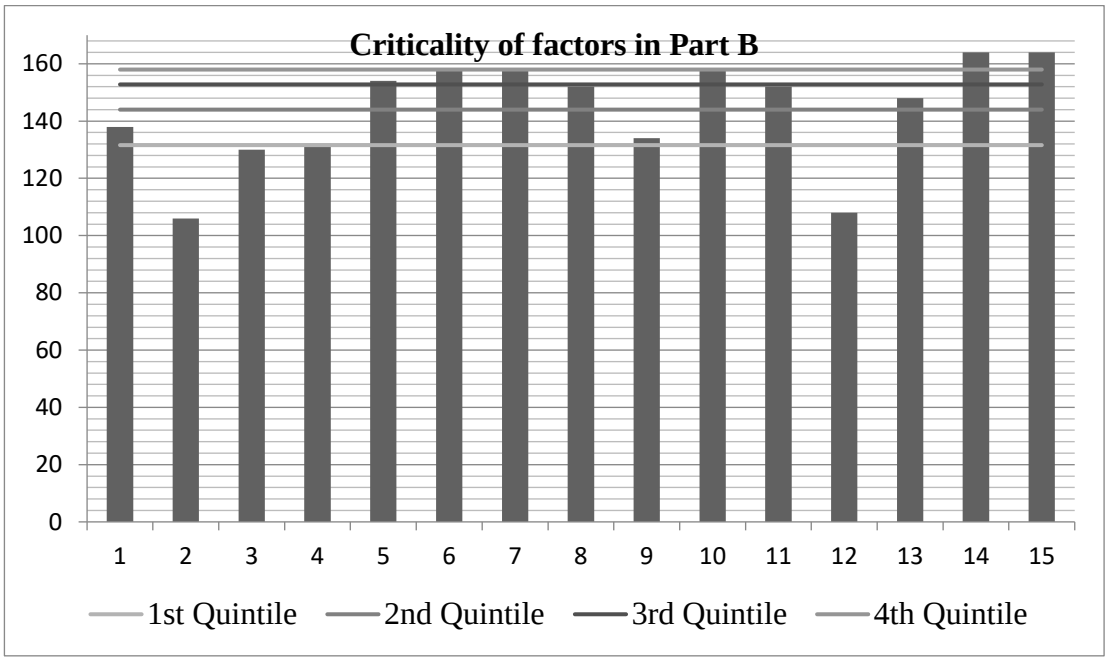

Figure 4.6: Criticality of factors in part B

Data analysis of Part B generated the bar chart as given above in Figure 4.6. Accordingly factors 2, 3, 12 falls within the first quintile, factors 1, 4, 9 in the second quintile, factors 8, 11, 13 in the third quintile, factor 5 in the fourth quintile and the remaining factors 6, 7, 10, 14, 15 in the fifth quintile. This quintile categorisation of the factors that affect the relationship between the main contractor and non-specialised subcontractor is also given in Table 4.4 at the end of this chapter.

One respondent has written for the second question of Part B that financial and physical capacity of the subcontractor is also a critical factor that affects the relationship between the main contractor and the subcontractor. However in the final questionnaire factors regarding aspects of financial capacity and physical capacity were included in Part C considering it to affect subcontractor performance more than the relationship.

4.3.2. Critical Factors Affecting the Performance of a Subcontractor

Data analysis of Part C generated the bar chart given below in Figure 4.7. It can be seen that factors 1, 7, 14 falls within the first quintile, factors 2, 6 in the second quintile, factors 5, 11, 15 in the third quintile, factors 3, 12, 13 in the fourth quintile and the remaining factors 4, 8, 9, 10 in the fifth quintile. This quintile categorisation of the factors affecting performance of non-specialised subcontractors is also given in Table 4.5 at the end of this chapter.

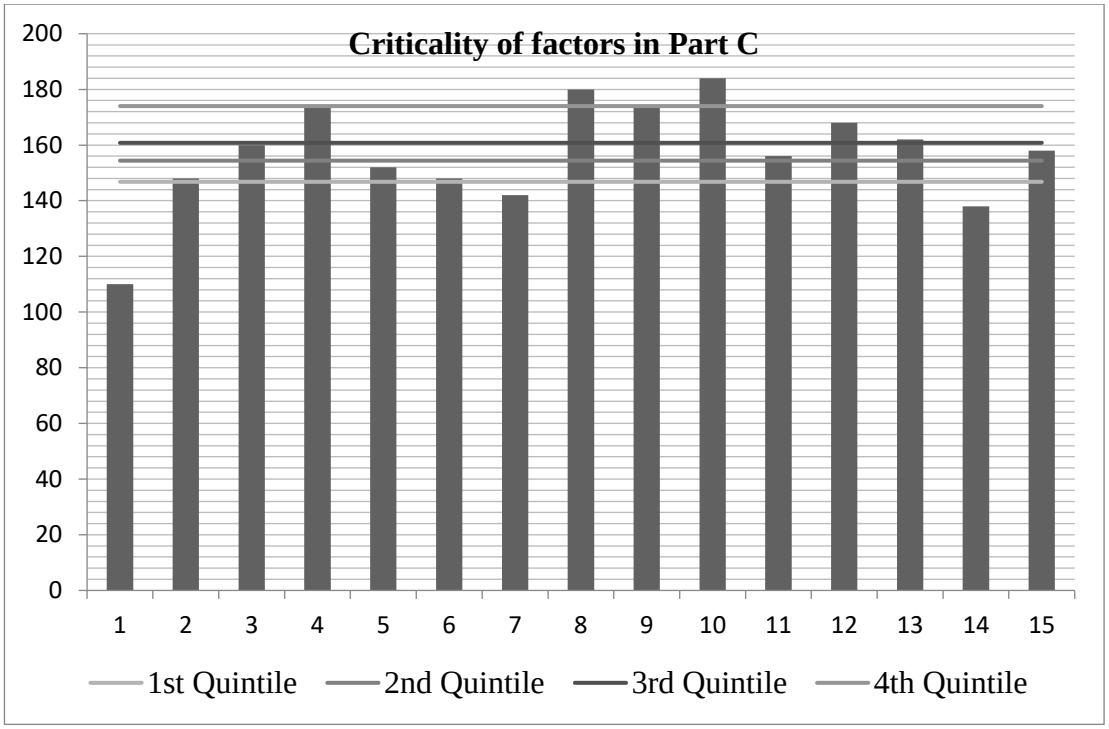

Figure 4.7: Criticality of factors in part C

4.4. Concluding Remarks of the Questionnaire Respondents

When respondents were asked in the first question of Part D if they agreed with the principle of this study (refer page 45) 100% of the respondents answered yes.

When asked to rank on a scale of 1 to 5 difficulty of implementation as seen in the Figure 4.8 below, 64% of the respondents chose 4, 18% chose 3, 9% chose 5 and the remaining 9% chose 2.

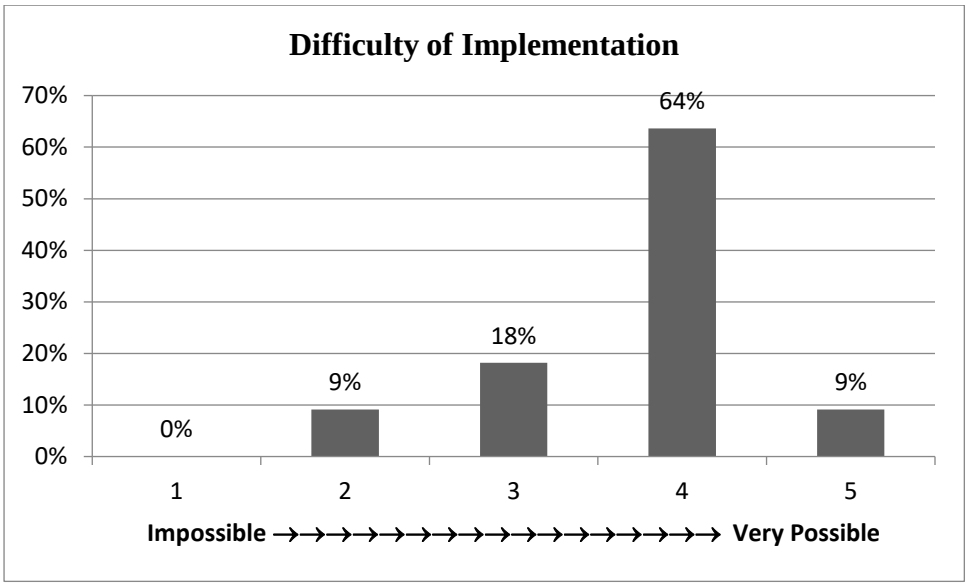

Figure 4.8: Difficulty of implementation

For the final question of the survey two respondents who marked 2 and 3 on the scale wrote the reason for their ranking as *'In Sri Lankan context parties are looking at a win situation rather than win-win. Therefore, it will be bit difficult to implement with that set of attitudes.'* and *'Due to less understanding of both parties.'*

4.5. Demographics of Interview Participants

The demographic characteristics of the project managers who were interviewed for this research study are summarised as given below in Table 4.2.

Table 4.2: Demographic characteristics of interview participants

	Grading for Buildings of the current affiliated company	**Total Experience (years)**	**Experience in Sri Lanka (years)**	**Experience as a subcontractor**	**Educational Background**
A	CS2	24	19	Yes	Civil Engineering
B	C1	5	5	Yes	Civil Engineering
C	CS2	19	19	Yes	Civil Engineering
D	CS2	35	35	Yes	Civil Engineering
E	C1	7	7	Yes	Civil Engineering

4.6. Discussion of the Interview Findings

As per the outline prepared for the semi-structured interview, project managers were shown categorisation of the factors of Part B and C by questionnaire respondents and asked of their opinion regarding each factor and its categorisation (Appendix IV).

4.6.1. Critical Factors Affecting the Subcontracting Relationship

This subchapter includes the discussion of the interview findings relating to factors (Table 3.3) affecting the relationship between the main contractor and non-specialised subcontractors.

- Fairness when main contractor is selecting the subcontractor (Part B, Factor 1)

Questionnaire respondents categorised this factor as less critical and majority of the project managers did not disagree with this categorisation.

According to the comments by the project managers when selecting a subcontractor, it is important to consider the financial and physical capacity, quality of work, past work experience and past work history apart from the rates for the selection to be fair. Furthermore, it is important to make note of the strengths and weaknesses of subcontractors and maintain a categorisation of subcontractors for future reference during selection. It can be understood that it is important to be fair by considering all the above-mentioned parameters when selecting a subcontractor for the very first time as it is the initial step in building a sustainable relationship. In addition one project manager stated that the existing relationship with a subcontractor will also come into play when selecting a subcontractor.

However, it is unlikely that a selected subcontractor will consider the selection to be unfair and if they are not selected a relationship is not present to be affected by this factor. Therefore, when considering critical factors for the relationship between main contractor and subcontractor this factor can be excluded altogether.

- Main contractor engaging in practice of Bid Shopping (Part B, Factor 2)

Questionnaire respondents categorised this factor as least critical, however one project manager commented that it is very critical because in bid shopping the main contractor is only focused on getting a lesser price disregarding all other parameters that should be considered when selecting a subcontractor.

Bid shopping according to the general opinion is a common practice in Sri Lanka that is difficult to avoid since it is used to cut down on the project cost. Some project managers felt it was not critical unless quality is compromised.

Another project manager stated that bid shopping is when the main contractor is misusing the relationship with the subcontractor. He added it is unfair when the main contractor engages in bid shopping since the relationship is used to negotiate a deal that is better for the main contractor.

It is apparent that because the main contractors in Sri Lanka have come to accept bid shopping as a common practice most of them have responded in the questionnaire that it is not critical. However in reality, as some project managers pointed out it is clearly detrimental to the relationship between the main contractor and subcontractors. Accordingly, when developing a 'win-win' approach to subcontracting this factor should be categorised as critical as bid shopping especially post award bid shopping is a practice that needs to be stopped in the industry.

- The type of subcontract (Measure & Pay, Lump sum etc.) & payment conditions (Part B, Factor 3)

Questionnaire respondents have categorised this factor as least critical, however one project manager commented that this factor can become critical if proper measures are not taken to control the issues that arise due to payment conditions.

According to project managers, payment conditions that are suitable for a project depends on the nature of the project. Therefore, it is best to agree from the beginning

on payment conditions and measurement methods appropriate for the project. One project manager said that problems can definitely arise if payment conditions between the client and the main contractor are different from the payment conditions between the main contractor and the subcontractor. However, if the main contractor has capable quantity surveyors to properly manage bill certification then problems can be minimised.

Few project managers added that it is extremely important to have a clearly defined scope for lump sum contracts. It must be noted that the subcontractor does not have the same know-how as the main contractor when pricing a bid. Therefore, when agreeing to payment conditions it is important to discuss in detail and share all available information with the subcontractor.

This factor was suggested for the survey by an evaluator of the preliminary questionnaire. It can be seen from the results of the questionnaire survey and findings of the interviews that although this factor is important it can be excluded from the categorisation since the industry seems to be in control of this factor by taking measures to manage it.

- Conditions regarding the retention in the subcontract (Part B, Factor 4)

Questionnaire respondents have categorised this factor as less critical.
Majority of the project managers stated that retention is very important to assure subcontractors acts responsibly. Therefore, they said conditions regarding retention must be discussed with the subcontractor and agreed at the beginning and then clearly included in the contract with the subcontractor. Accordingly, one project manager stated that he cannot agree with the categorisation of this factor as less critical.

However, one project manager stated that if a relationship has been built then the subcontractor will work to sustain the relationship and therefore retention will not be required.

It can be understood that although retention is important, an excessive retention can be detrimental when building a sustainable relationship with the subcontractor. This factor should be placed in the critical category when developing a 'win-win' approach to subcontracting.

- Timeliness of progress payments to the subcontractor (Part B, Factor 5)

Questionnaire respondents categorised this factor as more critical and all project managers agreed with the categorisation especially since timeliness of payments help build trust.

Since subcontractors do not have the same financial capacity as main contractors it is important to pay the subcontractors on time as agreed at the beginning. One project manager said it is important to develop micro finance schemes in Sri Lanka for subcontractors.

It is seen in the industry that main contractors use back-to-back payment conditions in the contract with the subcontractor for the convenience of the main contractor. This is when the main contractor agrees to pay the subcontractor when the client pays the main contractor. Most project managers said this practice is not fair and practical for subcontractors in Sri Lanka. According to one project manager, one of the reasons sometimes main contractors employ subcontractors is for some relief in situations when there are issues with the cash flow of the main contractor and payments are delayed. If the subcontractor agrees to back-to-back payment conditions and it is added to the contract then the subcontractor will have to tolerate even if it is disadvantageous to the subcontractor during execution. However the same project manager agreed that in certain situations the main contractor will have to step in and relieve the subcontractor if payments to the subcontractor are significantly delayed due to back-to-back payment conditions.

In conclusion the categorisation of this factor in more critical category seems to be appropriate due to the influence it has on maintaining a good relationship between the main contractor and the subcontractors.

- Fairness in profit sharing from variations and extra works (Part B, Factor 6)

Questionnaire respondents categorised this factor as most critical.

Project managers stated that conditions regarding variations and extra works should be agreed at the beginning and included in the contract itself to avoid any issues later on.

One project manager said ‘fair return' would be a better term than profit sharing and that the main contractor should reasonably reward the subcontractor if variations or extra works come up during the project. When preparing the bid for the client, the main contractor should consider the share of the subcontractor so that the profit of the main contractor is not decreased later in the project.

Another project manager stated that generally if the main contractor is making a profit the main contractor will share it with the subcontractor. However if the main contractor is not making an acceptable profit then the share that is given to the subcontractor can be small. On the other hand, if the subcontractor is not making much profit from main works, the subcontractor will try to get more profit from extra works and variations.

Although all project managers agreed this factor is critical it was clear from their comments that in the industry the impact of this factor on the relationship between the main contractor and subcontractors is managed using the contract. Therefore, this factor can be moved to the more critical category when developing a 'win-win' approach to subcontracting.

- Clear understanding of the work scope by the subcontractor (Part B, Factor 7)

Questionnaire respondents have categorised this factor as most critical and all project managers agreed. They said not understanding the scope often creates issues for the relationship with the subcontractor especially if the contract is complex. Thus, project

managers stated it is very important to clearly state the scope in the contract with all details including safety, quality and even site cleaning requirements.

One project manager said it is difficult for subcontractors to understand the work scope sometimes because they hear it from the main contractor and not directly from the client or consultant. Thus, he said it is very important to take time and explain the work scope from the very beginning to the subcontractor.

Accordingly, the categorisation of this factor as most critical is appropriate when developing a 'win-win' approach to subcontracting.

- Clear distribution of responsibilities during subcontracting (Part B, Factor 8)

Questionnaire respondents categorised this factor as critical and although project managers did not object to the categorisation they had many different opinions regarding this factor.

Some project managers stated that responsibilities should be clearly distributed in the contract with the subcontractor. However, some project managers stated that the inclusion in the contract itself is not effective.

One project manager said it is always better to clearly explain to the subcontractor their responsibilities and closely monitor them in the first few months until they understand their responsibilities.
Another project manager stated that it is only through daily meetings that the main contractor can make the subcontractor understand the real depth of their responsibility since subcontractors most often do not think of the master programme.

One project manager commented that most responsibilities at the end will remain with the main contractor whilst another project manager said subcontractors should be given the responsibility to execute with the required rights.

In conclusion it can be understood that it is important to clearly distribute the responsibilities in an effective manner to avoid issues later on in the project. Therefore, this factor is indeed critical as categorised by the questionnaire respondents.

- Adequate distribution of authority during subcontracting (Part B, Factor 9)

Questionnaire respondents have placed this factor in the less critical category and project managers had conflicting ideas regarding this factor.

One project manager stated that this too should be added to the contract with the subcontractor. But few were of the opinion that subcontractors should not be given any authority as it could create problems.

However, one project manager said if there is another tier of subcontractors then the main contractor can give the authority to subcontractors to manage their sub-subcontractors within their scope.

Another project manager stated that the subcontractors must be first carefully monitored to see how much authority the main contractor can vest upon the subcontractor. If they seem trustworthy the main contractor can distribute authority accordingly.

In conclusion in the industry the main contractor seems to be extremely cautious when distributing authority to the subcontractor. Depending on the relationship the main contractor seems to be comfortable in gradually distributing authority. Therefore, rather than this factor affecting the relationship it seems the relationship is affecting this factor. Hence this factor can be excluded from the critical factors affecting the relationship.

- Flexibility and cooperation of the main contractor during subcontracting (Part B, Factor 10)

Questionnaire respondents have categorised this factor as most critical and all project managers agreed with the categorisation.

According to the interview findings it is important that the main contractor is flexible by providing material, labour and/or equipment keeping in mind the success of the project when the subcontractor requires assistance to meet project targets.

One project manager stated similar to the QA/QC policy in projects there should be a management policy for the relationship with the subcontractors which can be used to improve cooperation with the subcontractors during the project.

Another project manager was of the opinion that the best solution to improving cooperation is to schedule regular progress review meetings to discuss ongoing issues and set targets for the future. In addition, it is important that the main contractor assigns a supervisor to closely cooperate with the subcontractor.

Therefore, the categorisation of this factor as most critical by the questionnaire respondents is validated by the project managers.

- Active participation of the main contractor during subcontracting (Part B, Factor 11)

Questionnaire respondents have categorised this factor as critical.

All project managers agreed that it was important for the main contractor to remember that the subcontractor was employed for the main contractor's project and therefore to stay involved and assist the subcontractor when necessary to execute the project successfully.

One project manager stated that preparing a weekly programme and monitoring it through daily meetings with all the subcontractors is the key to keep track of the project whilst another project manager said toolbox meetings are important. At these meetings observations regarding safety, performance etc. can be discussed and the main contractor can actively assist to improve weaknesses of the subcontractors.

However, one project manager commented that some main contractors subcontract majority of the work scope with the intention of minimal involvement in the project. He said even then it is important that the main contractor pays close attention to the project so that they can identify issues and help the subcontractor reach their targets.

Thus, it could be seen that this factor is closely associated with the 10th factor of part B (Flexibility and cooperation of the main contractor during subcontracting) discussed earlier. Accordingly, when developing a 'win-win' approach to subcontracting these two factors can be combined and placed in the most critical category.

- Differences in business management styles of the main contractor and the subcontractor (Part B, Factor 12)

This factor was categorised as least critical by the questionnaire respondents.

Majority of the project managers stated that generally in the industry main contractor adapts to the style of the client whilst the subcontractor adapts to the style of the main contractor. One project manager added that the differences in business management styles are mainly due to the fact that the main contractor is established whilst subcontractors are 'developing' and therefore subcontractors should study the main contractors and improve.

Another project manager disagreed with the categorisation and stated that this must be categorised as most critical. He said the highest priority should be given to overcome these differences since the attitude of the main contractor is critical, whether to treat the subcontractor as a partner or a slave, determines their relationship. He said the

main contractor should not adamantly expect only the subcontractor to change their ways.

It seems from the comments of the project managers that in the industry business management style of the subcontractor is completely disregarded on the basis of hierarchy. However, when developing a 'win-win' approach this attitude of the main contractor is extremely harmful since it is not in line with the principles of partnering. Therefore, this factor should be moved to the critical category as it is relevant and important for the relationship between the main contractor and subcontractor.

- Management capability of the main contractor (Part B, Factor 13)

Questionnaire respondents categorised this factor as critical and all project managers agreed this is very critical for the relationship of the main contractor and subcontractor. They commented that the main contractor should plan ahead than the subcontractors and always try to stay ahead of the programme.

One project manager said that the output of the subcontractor depends on the management capability of the main contractor as subcontractors expect guidance from the main contractors. Whilst the main contractor is expecting various qualities from the subcontractor it is important that the main contractor has a well-established management system to manage the subcontractors. Some project managers said the main contractor should train their staff on managing subcontractors. According to him, subcontractors are often victims of the management lapses of the main contractor.

It seems from these comments that this factor is very critical for the relationship between the main contractor and subcontractor, therefore, this should be moved to the more critical category.

- Good communication between the main contractor and the subcontractor (Part B, Factor 14)

This factor was categorised as most critical by the questionnaire respondents and all project managers unanimously agreed with the categorisation whilst giving their own opinion about this factor.

One project manager commented that communication is the most difficult aspect to manage in subcontracting and added toolbox meetings are helpful whilst another added regular briefing for the subcontractor face to face is the most effective method of communication.

Another project manager commented that it is extremely important to encourage the subcontractor to speak to the main contractor from the very beginning. He stated otherwise towards the end of the project issues will come up because the subcontractor does not speak to the main contractor openly regarding issues. Sometimes even if the main contractor cannot help, it is important to support by listening.

One project manager noted that the main contractor must be very careful when communicating technical information to the subcontractor since the subcontractors are not as knowledgeable as the main contractor.

Furthermore, one project manager was of the opinion that the communication between the client and the subcontractor should be avoided as this can cause problems in the project.

As communication is clearly important in improving mutual understanding the categorisation of this factor as most critical is appropriate when developing a 'win-win' approach to subcontracting.

- Mutual Trust between the main contractor and the subcontractor (Part B, Factor 15)

Questionnaire respondents have categorised this factor as most critical.

Majority of the project managers stated that timeliness of payments initially causes growth of trust. One project manager added sometimes the main contractor has to act humanely especially regarding financial issues as this will result in an automatic growth of mutual trust. Another project manager said sometimes the main contractor will have to take a leap of faith, such as releasing an on account payment to the subcontractor exceeding the work done.

One project manager was of the opinion that in the first few months the main contractor must observe the subcontractor carefully to see if the subcontractor is delivering as agreed. He added that if the subcontractor is delivering then the main contractor can focus on building a relationship.

Another project manager stated that the subcontractor will definitely note if the main contractor is genuine and will respond similarly. He said therefore the main contractor should initiate building trust and that subcontractors also have a responsibility not to take advantage of the good faith shown by main contractors.

Accordingly, it is appropriate to categorise this factor as most critical since mutual trust is clearly extremely important in improving the relationship between the main contractor and the subcontractors.

4.6.2. Critical Factors Affecting the Performance of a Subcontractor

This subchapter includes the discussion of the interview findings of factors (Table 3.4) affecting the performance of non-specialised subcontractors.

- Political support for the main contractor and the project (Part C, Factor 1)

This factor was categorised as least critical by the questionnaire respondents.

Majority of the project managers were of the opinion that this factor is not generally critical for the performance of subcontractors unless it causes delay in payments.

One project manager said positive or negative political influence on the project would mean either acceleration or deceleration of the project. He said if such a scenario occurs the main contractor can take the measures usually taken to assist the subcontractor in similar acceleration or deceleration situations.

However, when identifying critical factors to be managed for a 'win-win' approach this factor can be excluded since it is often beyond the control of the main contractor or subcontractor.

- Legislation and policy changes in Sri Lanka (Part C, Factor 2)

Questionnaire respondents have categorised this factor as less critical.

Whilst some project managers considered this factor as not critical for the performance of the subcontractor other project managers disagreed with the categorisation.

One project manager said anything that affects the cash flow such as river sand transportation policy changes etc. cannot be considered less critical.

Therefore, it can be seen that this factor is sometimes critical for the performance of the subcontractor. However, since legislation and policy changes are beyond the control of the main contractor or subcontractor it must be excluded when developing a 'win-win' approach.

- Fluctuation of inflation rate when material is supplied by the subcontractor (Part C, Factor 3)

This factor was categorised by the questionnaire respondents as more critical and all project managers stated that the subcontractor should be given fair compensation in case inflation causes price increase of materials considering the successful completion of the project.

Thus, project managers have agreed with the categorisation of this factor as more critical similar to the questionnaire respondents.

- Price increase of materials when material is supplied by the subcontractor (Part C, Factor 4)

Questionnaire respondents have placed this factor in the most critical category.

All project managers agreed that the main contractor should compensate and take measures to minimise any losses to the subcontractor due to price increase as the failure of a subcontractor is a failure of the project.

One project manager said it is always beneficial to discuss how to manage price increase of materials at the beginning with the subcontractor. If compensation is received from the client as per the price adjustment clause, it must be given to the subcontractor as this is an equitable approach. When preparing the bid, if price adjustment is not in the contract, the main contractor should consider and make an allowance so that the subcontractor can be compensated if a problem arises during the project. If any unforeseen circumstances occur, the main contractor should help the subcontractor as much as possible.

According to the project managers, there are many measures that can be taken to manage this factor and since this factor is closely associated with the 3rd factor of Part C (Fluctuation of inflation rate when material is supplied by the subcontractor) this can be combined and placed in the more critical category.

- Adequate bid preparation time given to the subcontractor (Part C, Factor 5)

Questionnaire respondents placed this factor in the critical category and project managers had different opinions regarding this factor.

One project manager said that the criticality of this factor depends on the complexity of the work scope. Often problems occur because adequate time is not given for bid preparation. Another project manager said that this factor is not very critical since the main contractors quite often gives the possible rates to the subcontractor and negotiates those.

Yet another project manager stated that bid preparation should be a joint effort. He said it is important to sit with the subcontractor, share information and derive the rates together so that both the main contractor and subcontractor are satisfied.

Another project manager said giving subcontractors the required information to prepare a good bid is more important than giving time. At the time of bid preparation all available information with the main contractor must be shared with the subcontractor.

Accordingly, from the above comments of the project managers it can be understood that this factor is critical for the performance of the subcontractor when revised as 'Adequate bid preparation time and pre-bid information given to the subcontractor'.

- Unforeseen weather conditions (Part C, Factor 6)

This factor was categorised by the questionnaire respondents in the less critical category and the project managers had varying opinions regarding this factor.

One project manager said the main contractor must provide advice and prepare the subcontractor in advance as much as possible for unforeseen weather conditions since this can cause idling.

Some project managers stated the main contractor must request for an Extension of time (EOT) from the client and try to get compensation for the subcontractor. However, clients often do not compensate the main contractor for inclement weather. Nonetheless the subcontractor must definitely be compensated for any damage caused by major events like floods.

In case of idling, the main contractor must give immediate relief to the subcontractor by assigning alternate indoor work. Some project managers said the main contractors can keep an allowance to compensate for idling at the time of preparing rates which could be included in the contract.

It can be understood by discussing with the project managers that the reason questionnaire respondents have categorised this factor as less critical is because often influence of inclement weather on performance is taken as unavoidable in the construction industry since it is beyond the control of project stakeholders. Accordingly, it would be more appropriate to exclude this factor when developing a 'win-win' approach to subcontracting.

- Unforeseen Geotechnical conditions (Part C, Factor 7)

Questionnaire respondents have categorised this factor as least critical, the project managers had differing opinions regarding this factor.

One project manager was of the opinion that this factor was not critical for the performance of the subcontractor.

Another project manager was of the opinion that if the main contractor can claim, then compensation should be given to the subcontractor in situations like when there is a sudden need for shoring during excavation.

Another project manager stated that compensation should be given respecting the relationship maintained with the subcontractor since reasons like these are beyond the

control of anyone but causes idling and/or extra costs for the subcontractor. He said subcontractors are often hesitant to increase the work force because of idling possibilities.

It can be understood that questionnaire respondents have categorised this factor as least critical similar to unforeseen weather conditions because this is also beyond the control of the project stakeholders. Accordingly, this factor should also be excluded although it is important to compensate the subcontractor for idling in any unforeseen situation that is beyond the control of project stakeholders.

- Availability of finance/working capital for main contractor and subcontractor (Part C, Factor 8)

This factor was categorised by questionnaire respondents as most critical and all project managers unanimously agreed with the categorisation.

One project manager said that in order to build a sustainable relationship it is important that both parties have the basic capability or capacity required of them and that financial capacity is a fundamental requirement. Therefore, it is important to arrange sources of funding for the subcontractor similar to the main contractor. Another project manager added that the subcontractor should have the financial capacity to tolerate delayed payments by at least a week or so. One project manager emphasised that the financial capacity of client is also important.

Accordingly, when developing a 'win-win' approach to subcontracting it is evident that this factor should be placed in the most critical category.

- Design errors, Late design changes, Specialised design etc. in the project (Part C, Factor 9)

Questionnaire respondents had categorised this factor as most critical and all project managers agreed. They commented that this factor can cause idling and if so the subcontractor must be compensated.

One project manager said that the main contractor can claim for time and cost from the client citing this factor. However if the main contractor does not claim cost from client in fear of damaging the relationship with the client then the main contractor must compensate the subcontractor for idling from the profit of the main contractor.

One project manager said that since idling often affects the subcontractor more than the main contractor a minimum standing fee should be included in the contract as compensation. Another project manager said the main contractor should manage the situation in such a way that the subcontractor is not idling by providing alternative work.

Thus, the categorisation of this factor as most critical by questionnaire respondents was validated by the project managers.

- Time and cost management capability of the subcontractor (Part C, Factor 10)

This factor was categorised as most critical by the questionnaire respondents.

All project managers stated it is important to monitor both financial and physical progress at regular progress review meetings. The main contractor should step in if the subcontractor is not meeting the targets and give instructions. Most of the time the main contractor will have to financially help if the subcontractor is not managing time and cost well as reasons are usually tied to financial issues. One project manager said that the main contractor can also arrange for training to improve technical aspects that can then assist in time and cost management of the subcontractor.

According to one project manager subcontractors are usually far superior in micro management and labour management which is also a reason for employing subcontractors. However, if the main contractor noted the subcontractor is failing at meeting targets then the reasons should be investigated. The main reasons are usually incompetency of labour force, ambiguous work scope or payment delays.

Incompetency of labour force is often tied to low rates. Thereafter the main contractor can advise the subcontractor accordingly.

Thus, project managers also agree that this factor should be categorised as most critical for the performance of a subcontractor when developing a 'win-win' approach to subcontracting.

- Document management capability of the subcontractor (Part C, Factor 11)

Questionnaire respondents had categorised this factor as critical and all project managers agreed with the categorisation adding that it is beneficial for both parties to encourage subcontractors to maintain proper records.

Main contractors were of the opinion that importance of document management must be first explained to the subcontractors. Then simple formats for daily records etc. that are suitable and relevant to their level must be introduced to the subcontractor staff to keep records. Someone who is capable of record keeping must be selected from the subcontractor staff for the main contractor to train and guide. In addition, some project managers said it will also encourage the subcontractor to manage documents if office space and stationery is given at the site.

Another project manager added that main contractors mostly take responsibility of documentation because the main contractor must have all documentation to continue work in a situation where the subcontractor stops work.

Thus, it can be understood that it is important to pay attention and improve this factor categorised as critical when developing a 'win-win' approach to subcontracting.

- Expertise of the subcontractor staff (Part C, Factor 12)

Questionnaire respondents categorised this factor as more critical and the project manager agreed with the categorisation since the main contractor cannot always closely supervise the work of a subcontractor.

One project manager said if the subcontractor does not have at least one expert then it will affect the progress of the project as subpar work can cause redoing. Thus, this factor is tied with efficiency.

Another project manager added leadership is as important as expertise while another project manager commented that regardless of the expertise of the subcontractor staff it is important that the main contractor closely supervises the subcontractor.

Therefore, it is appropriate to categorise this factor as more critical according to the questionnaire respondents and the interview participants.

- Use of new technology/methods by the subcontractor (Part C, Factor 13)

This factor was categorised by the questionnaire respondents as more critical.

Some project managers stated that it is the responsibility of main contractor to introduce new technology to subcontractors. One project manager added that although only some subcontractors listen and benefit, it is important to share new methods that save time with subcontractors. According to one project manager encouraging costly new methods will not be helpful.

According to another project manager, subcontractors tend to leave after learning new technology which is discouraging the main contractors from taking time to train. The main contractors fear dependency on one subcontractor so one project manager said few subcontractors should be trained to always have an alternative.

Considering the comments of the project managers and the impact of this factor on the performance of the subcontractor it is appropriate to categorise this factor as critical.

- Adequate claim and arbitration provisions in the subcontract (Part C, Factor 14)

Questionnaire respondents have categorised this factor as least critical however project managers were divided regarding this factor. While some said it is better to include claim and arbitration clauses in the contract with the subcontractor others felt such clauses are excessive in subcontracting.

One project manager said if the work scope is extensive and these conditions seem necessary then it should be included in the contract in detail. Another project manager said the possibility of arbitration increases the cost structure and discourages the subcontractor from getting into a formal contract.

Accordingly, when considering the criticality of this factor on the performance of the subcontractor it is appropriate to exclude this factor from the categorisation since project managers have not spoken of any impact from this factor on performance.

- Safety management capability of the subcontractor (Part C, Factor 15)

This factor was categorised by questionnaire respondents as critical.

Some project managers commented that it is better to inform at the beginning what is expected from the subcontractor with regards to safety and also include a safety allowance in the rates especially since subcontractors think money spent on safety is an additional cost.

If subcontractors do not adhere to safety measures even after a safety allowance is included in their rates then the main contractor can certify less in their payments as a punitive measure because according to a few project managers penalties seem effective in enforcing safety than motivation methods like zero accident bonus etc. in Sri Lanka. However, some project managers felt rather than enforcing penalties it is better to reward for safety as well as cleanliness and good behaviour during the project by giving incentives to exemplary labourers every month. Few project managers

added that the toolbox meeting every morning is important and that the main contractor should try to convey the importance of safety to the subcontractor regularly by providing training etc.

Although project managers agreed that it is important for main contractors to closely monitor safety at site they also agreed that the safety management capability of the subcontractor is critical for the performance of the subcontractor. Accordingly, in developing countries like Sri Lanka it would be appropriate to categorise this factor as more critical when developing a 'win-win' approach to subcontracting.

4.7. Discussion of Concluding Remarks of Interview Participants

The following discussion is based on the overall concluding remarks of the project managers (Appendix V) about the implementation of a ‘win-win’ approach to subcontracting in building construction projects of Sri Lanka as suggested in this research study.

Project Manager A emphasised the importance and criticality of timeliness of payments when building/ maintaining a sustainable relationship with the subcontractor in the concluding remarks. He said subcontractors will only stay with main contractors who look after them and also consider timeliness of the payments in the past when deciding to work again.

When asked about the possibility of implementing a 'win-win' approach to subcontracting in Sri Lanka according to his experience in the industry he stated it is possible since the attitude of the main contractors are slowly changing. He added that there is a huge demand for subcontractors today and therefore main contractors can no longer treat subcontractors as dispensable. The main contractors must try to retain the subcontractors and change if they wish to continue working with reliable/capable subcontractors. Project manager A concluded by stating that the construction industry in Sri Lanka will soon come to treat subcontractors as equal.

Project manager B stressed the criticality of selecting a subcontractor since it is the first step in building a sustainable relationship. Then he commented on the criticality of motivating the subcontractors by making payments as agreed.

Project manager B also stated there is a growing demand for subcontractors. He added therefore subcontractors today are not bound to one main contractor. According to him one way to retain subcontractors is to give an increment to the rates of the subcontractor every 6 months if they continue to stay with the main contractor. He said it is important that main contractors have enough continuous work according to the capacities of the subcontractors to retain them. He was also of the opinion that it is important to build the relationship by getting involved in the issues of the subcontractors on a personal level.

Project manager B also said that it is possible to slowly change the subcontracting environment in Sri Lanka by implementing a 'win-win' approach. However before concluding he added that sometimes subcontractors also have issues like inability to increase labour at site. He said subcontractors must also keep to their word and maintain the trust bestowed upon them. According to him both parties should look after each other when building a lasting relationship.

Project manager C was of the opinion that it is important to improve the subcontracting environment in Sri Lanka with the cooperation of all relevant government institutions, relevant departments in universities and construction associations. He said it is important to provide free legal consultations to subcontractors when drawing up contracts and also to arrange a source of finance for subcontractors through banks or micro loan schemes. He said a system where the main contractor can provide a guarantee to the bank considering the existing relationship with the subcontractor would be beneficial for both parties as it will ease the financial burden of the main contractor by increasing the tolerance of the subcontractor if payments are delayed.

He was also of the opinion that implementing a 'win-win' approach is possible. However, added that rather than individual implementation in companies it is only if

the whole industry comes together that this attitude change can be accelerated and gave an example: when engineers are trained at universities they must be educated to treat subcontractors with humanity. Project manager C concluded by stating that today the main contractors and subcontractors are equal partners carrying out different work scopes of the same project.

Project manager D emphasised that the main contractor should never assume that the subcontractors know everything that the main contractors know. He said main contractors must clearly explain to the subcontractor what is expected of them since the two parties often have different practices. He also added that the main contractor must not expect the subcontractor to absorb extra costs as it can be a detrimental burden on their financial capacity.

He was of the opinion that it may not be possible to successfully implement a 'win-win' approach to subcontracting in Sri Lanka since subcontractors are not going to continue to be subcontractors. He said subcontractors are in the process of learning, developing and gradually reaching the level of main contractor. The main contractors cannot expect the subcontractors to remain the same. He also commented that when the current subcontractors change and leave, new subcontractors will take their place. However, project manager D also added that the only way to build a long-term relationship is by treating the subcontractor as a main contractor and a partner. Accordingly, it can be understood that the implementation process can be quite difficult in the industry due to the pre-existing perceptions regarding subcontractors.

Project manager E also agreed that the mindset of the main contractors in the industry must change today to accommodate the 'win-win' approach suggested in this research. He concluded by saying it is possible to reach there with small steps.

Accordingly, it can be seen from this final section of the interview that project managers similar to the questionnaire respondents agree that it is possible to implement a 'win-win' approach to subcontracting in building construction of Sri Lanka by managing the identified critical factors affecting the relationship and performance.

4.8. Summary

The following observations were evident from analysis of data collected from Part A of the questionnaire regarding the respondents of the questionnaire:

- All the companies represented by the respondents are well- established main contractors in the industry with high CIDA grading for building construction.
- Respondents have experience in building construction with majority having more than 10 years of experience in the industry.
- Only 59% of the respondents have experience as a subcontractor in building construction during their career.
- Respondents have varying educational backgrounds such as civil engineering, quantity surveying, project management, accounting/finance, architecture and construction law.
- All respondents are decision makers in their respective organisations such as Chairman/Director, Chief Quantity Surveyor, General Manager, Construction Manager, Finance Manager, Contract Manger and Design Manager.

The respondents of the questionnaire categorised the criticality of the 15 factors included in Part B for the relationship between the main contractor and the subcontractor as seen in Table 4.3 and the criticality of the 15 factors included in Part C for the performance of a non-specialised subcontractor as seen in Table 4.4.

All questionnaire respondents have unanimously agreed that management of factors affecting the relationship between the main contractor and non-specialised subcontractor as well as the performance of the non-specialised subcontractor would result in a 'win-win' outcome which is the basis of this research study.

Secondly in the concluding remarks questionnaire respondents have stated that according to their experience it is possible to implement this approach in the building construction industry of Sri Lanka. However, two respondents have noted that implementation is difficult because of the prevalent attitude in the industry as well as poor understanding amongst the main contractors and subcontractors.

Table 4.3: Quintile categorisation of criticality of factors in part B

Least Critical	**Less Critical**	**Critical**	**More Critical**	**Most Critical**
Main contractor engaging in practice of Bid Shopping.	Conditions regarding the retention in the subcontract.	Management capability of the main contractor.	Timeliness of progress payments to the subcontractor.	Fairness in profit sharing from variations and extra works.
Differences in business management styles of the main contractor and the subcontractor.	Adequate distribution of authority during subcontracting.	Clear distribution of responsibilities during subcontracting.		Clear understanding of the work scope by the subcontractor.
The type of subcontract (Measure & Pay, Lump sum etc) & payment conditions.	Fairness when the main contractor is selecting the subcontractor.	Active participation of the main contractor during subcontracting.		Flexibility and cooperation of the main contractor during subcontracting.
				Good communication between the main contractor and the subcontractor.
				Mutual Trust between the main contractor and the subcontractor.

Table 4.4: Quintile categorisation of criticality of factors in part C

Least Critical	**Less Critical**	**Critical**	**More Critical**	**Most Critical**
Political support for the main contractor and the project.	Legislation and policy changes in Sri Lanka.	Adequate bid preparation time given to the subcontractor.	Fluctuation of inflation rate when material is supplied by the subcontractor.	Price increase of materials when material is supplied by the subcontractor.
Adequate claim and arbitration provisions in the subcontract.	Unforeseen weather conditions.	Document management capability of subcontractor.	Use of new technology/methods by the subcontractor.	Design errors, Late design changes, Specialised design etc in the project.
Unforeseen Geotechnical Conditions.		Safety management capability of the subcontractor.	Expertise of subcontractor staff.	Availability of finance/working capital for main contractor and subcontractor.
				Time & cost management capability of the subcontractor.

In the next phase of the study during semi-structured interviews Table 4.3 and 4.4 were discussed in length with focus on implementation at site.

The project managers who were interviewed represented organisations with CS2 and C1 CIDA grading for buildings. They all had a civil engineering educational background and were well experienced as the main contractor in building projects.

These project managers have also worked as a subcontractor at some point of their career in the industry.

According to the comments made by the project managers regarding the criticality of the factors affecting the relationship between the main contractor and the subcontractor the categorisation of the factors was revised as given below in Table 4.5. Some factors deemed to be irrelevant were excluded whilst factors closely associated were combined after the discussion of the interview findings.

Table 4.5: Revised categorisation of criticality of factors affecting the relationship

Critical	**More Critical**	**Most Critical**
Main contractor engaging in practice of Bid Shopping.	Management capability of the main contractor.	Clear understanding of the work scope by the subcontractor.
Differences in business management styles of the main contractor and the subcontractor.	Timeliness of progress payments to the subcontractor.	Flexibility, cooperation and active participation of the main contractor during subcontracting.
Conditions regarding the retention in the subcontract.	Fairness in profit sharing from variations and extra works.	Good communication between the main contractor and the subcontractor.
Clear distribution of responsibilities during subcontracting.		Mutual Trust between the main contractor and the subcontractor.

Similarly, categorisation of factors of Part C were also revised considering the opinion of project managers regarding the criticality of the factors for the performance of a non-specialised subcontractor as seen in the Table 4.6 given below.

Table 4.6: Revised categorisation of criticality of factors affecting the performance

Critical	**More Critical**	**Most Critical**
Adequate bid preparation time and pre-bid information given to the subcontractor.	Safety management capability of the subcontractor.	Design errors, Late design changes, Specialised design etc in the project.
Document management capability of subcontractor.	Fluctuation of inflation rate and price increase of materials when material is supplied by the subcontractor.	Availability of finance/working capital for main contractor and subcontractor.
Use of new technology/methods by the subcontractor.	Expertise of subcontractor staff.	Time & cost management capability of subcontractor.

Furthermore, project managers during the interviews provided effective methods to manage critical factors according to their experience in the industry as summarised in the discussion of this chapter.

In the final section of the interview, project managers emphasised the importance of selection of subcontractors, timeliness of payments, providing motivation for the subcontractor and also mentioned few ways to retain the subcontractors according to their experience in the industry. They also suggested measures that can be taken to not only improve the subcontracting relationship but also to improve the overall subcontracting environment in Sri Lanka by getting all relevant parties such as government institutions, universities and construction associations involved.

Furthermore, similar to questionnaire respondents, project managers also agreed that it is possible to implement a 'win-win' approach to subcontracting in building construction projects in Sri Lanka with some challenges to be overcome. They stated that the way main contractors are treating the subcontractors in the industry are changing especially due to the high demand for the subcontractors. Therefore, main

contractors are trying to retain the subcontractors by building sustainable relationships. They also noted it is important that the subcontractor reciprocate and also try to maintain the relationship with the main contractor. Thus, the approach attempted to be developed in this research study can be implemented step by step in the industry.

CHAPTER 5 CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

In recent years as the construction industry has come to rely heavily on subcontractors many research studies have been conducted to explore mitigation methods for the issues prevalent among main contractors and subcontractors. However most of these recommendations were unilateral and therefore did not appeal to both the main contractor and subcontractor. After identifying the need for an approach that is favourable for both parties from prior literature, as explained in the first chapter, this research study was conducted to achieve three objectives:

- To identify critical factors affecting the relationship between the main contractor and non-specialised subcontractor
- To identify critical factors affecting the performance of the non-specialised subcontractor
- To develop the findings as a win-win approach to subcontracting in building construction projects of Sri Lanka

Accordingly, the proposed 'win-win' approach encompasses the management of critical factors that were identified from the questionnaire survey distributed to the decision makers and from the semi-structured interviews conducted with the project managers representing the main contractors. Thus, use of mixed method research design enabled developing a more practical approach to subcontracting based on relationship management and performance management.

The identified critical factors for the relationship between the main contractor and non-specialised subcontractor as well as identified critical factors for the performance of a non-specialised subcontractor are first summarised in this final chapter before the conclusion. Thereafter contributions of this research study, limitations, directions for future research and recommendations are also given at the end of the chapter.

5.2. Summary of Findings

As per the first objective of the study, according to the data analysis of the questionnaire and discussion of interview findings, 11 factors were identified as critical for the relationship between the main contractors and the non-specialised subcontractors. As seen in the Figure 5.1 given below, these 11 factors were placed in three categories according to the criticality.

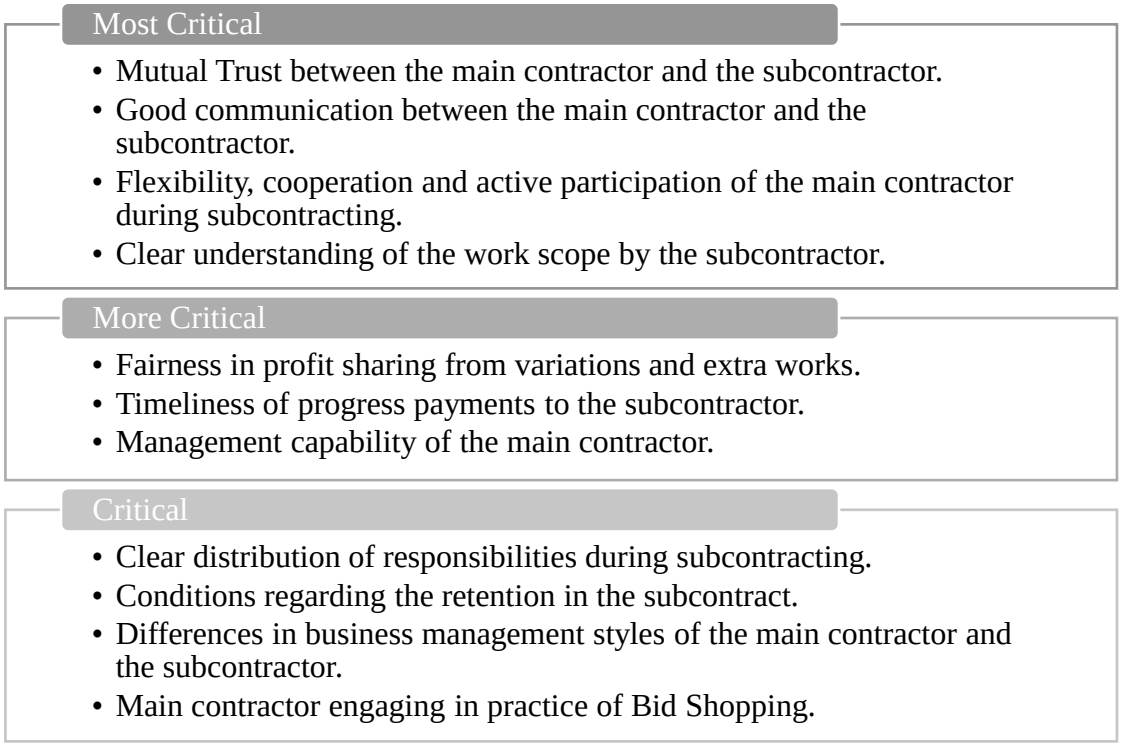

Figure 5.1: Critical Factors for the subcontracting relationship

Similarly as per the second objective of the study, 9 factors were identified as critical for the performance of a non-specialised subcontractor. These factors were also placed in three categories as given below in Figure 5.2.

It was evident from this research study that paying close attention to manage these identified critical factors would produce both successful subcontracting relationships as well as effective subcontractor performance in building construction projects of Sri Lanka.

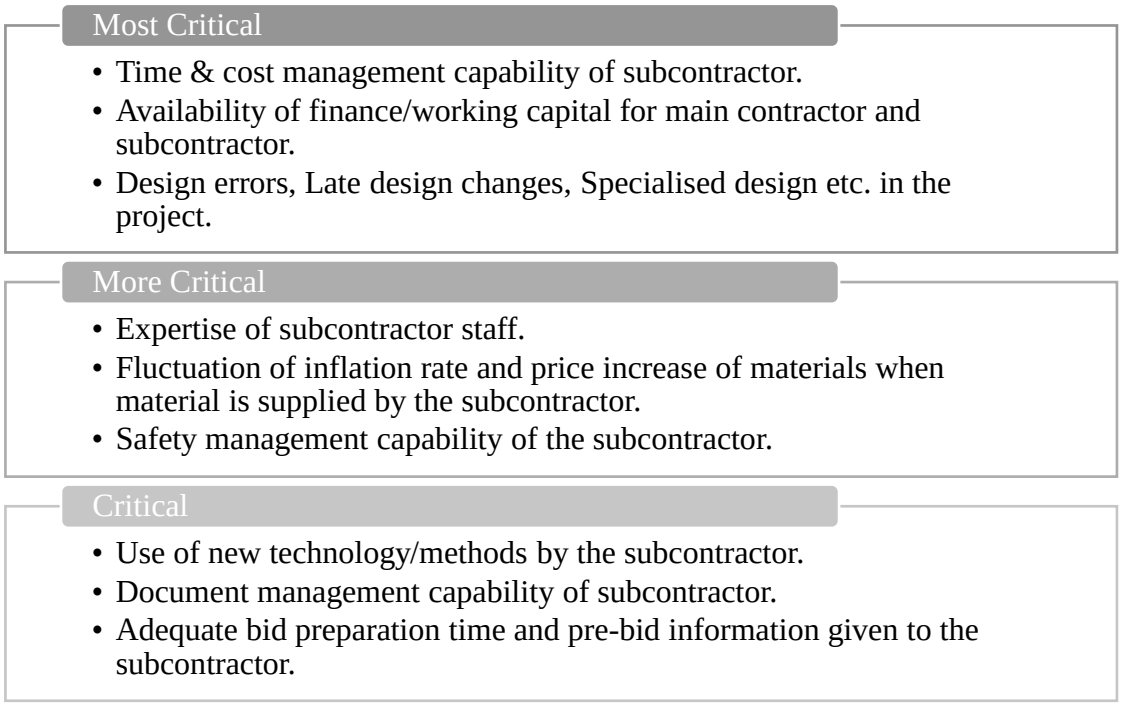

Figure 5.2: Critical Factors for the performance of subcontractor

5.3. Conclusion

According to the findings of this research study it can be concluded that a 'win-win' approach to subcontracting in building construction projects of Sri Lanka must comprise of; good management of the identified critical factors for the relationship between the main contractor and subcontractor, good management of the identified critical factors for the performance of the subcontractor as given in Figure 5.3.

This conclusion is in line with the findings of Lee et al. (2017). Therefore as per the third objective of the study, the 'win-win' matrix proposed by Lee et al. (2017) was further developed to be applicable in the building construction industry of Sri Lanka as given in Figure 5.4. As it can be understood from this figure it is vital to equally strive for a better relationship and better performance to reach a 'win-win' outcome in subcontracting where contentment of both the main contractor and subcontractor is ensured. As explained in the second chapter the other three scenarios are neither sustainable nor beneficial for the project and both parties; main contractor and subcontractor.

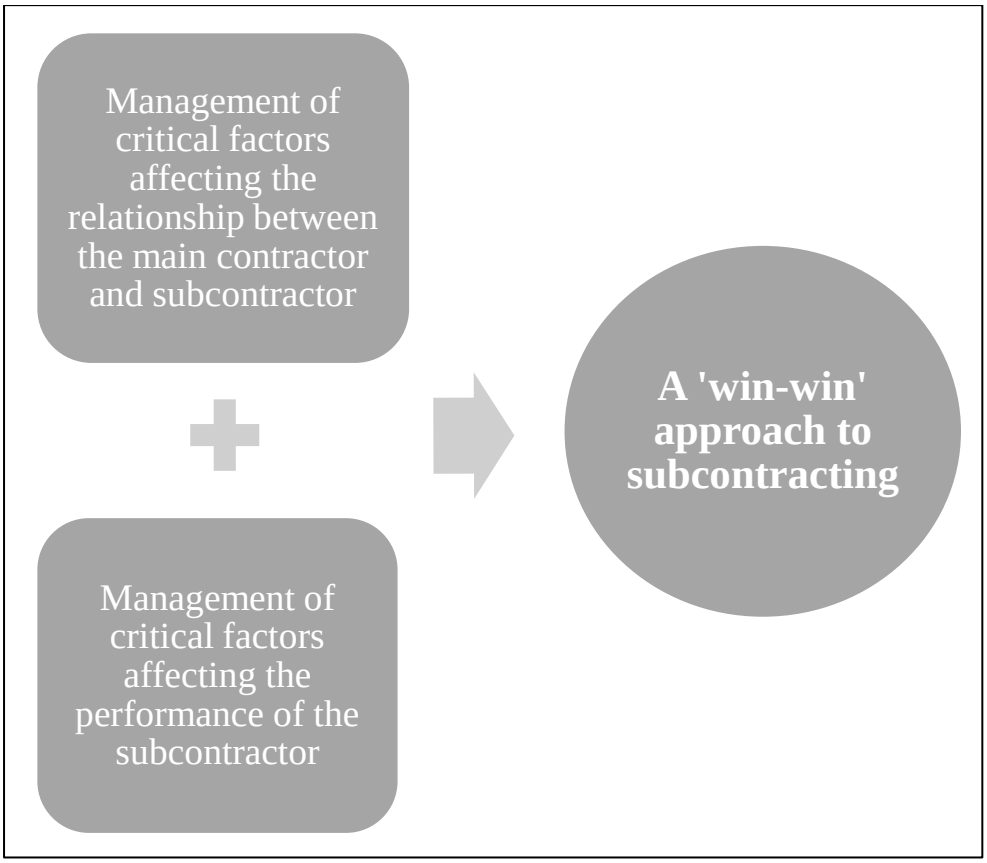

Figure 5.3: A 'win-win' approach to subcontracting

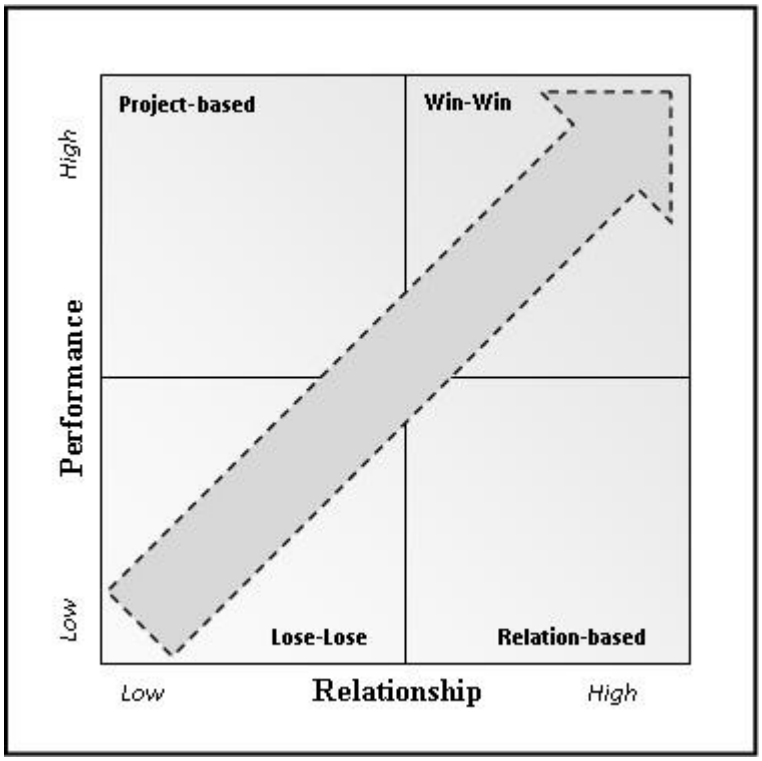

Figure 5.4: Key concept of 'win-win' approach to subcontracting

A 'win-win' approach in essence is an approach that can bring equal satisfaction to both the main contractor and the subcontractor when applied in subcontracting. Therefore, by implementing this approach both the main contractor and subcontractor can reap benefits from a sustainable smooth functioning relationship with minimum issues arising during project execution. The time and resources that were originally spent on mitigating subcontracting issues during the project can be utilized to improve productivity and efficiency. According to this approach, since both parties are expected to conduct themselves as partners with one end goal, project success is assured. Furthermore, by focusing on managing the critical factors both parties can also improve their individual performance. It is important for the main contractor to remember that continuous development of the subcontractor is beneficial for both parties in a sustainable relationship. This approach cannot only be used as a framework for planning but also as an assessment tool for subcontracting. It can also be further developed as a policy to be adapted for subcontracting by an organisation or as a guidance for the relevant authorities to formalise subcontracting in Sri Lanka.

Although the recommendations of this research study are primarily directed at main contractors the findings cannot be implemented without the wholehearted support of the subcontractor. In this 'win-win' approach, the main contractor chooses to trust the subcontractor as a partner. The subcontractor also has a responsibility to uphold that trust by genuinely working in the interest of both parties. When taking any measure to manage any factor that affects the relationship or the performance in subcontracting both the main contractor and the subcontractor must consider the satisfaction of the other party. This is the principle of the proposed 'win-win' approach to subcontracting in building construction of Sri Lanka.

5.4. Recommendations

The proposed 'win-win' approach in this study is based equally on managing the critical factors for relationship and performance management. The following Tables 5.1 and 5.2 present the recommendations discovered from the semi-structured interviews with the project mangers representing main contractors to manage each critical factor identified in this research study.

Table 5.1: Recommendations for managing critical factors affecting the relationship

	Factor	Recommendations
Most Critical	Mutual Trust between the main contractor and the subcontractor.	▪ Paying the subcontractor on time as agreed. ▪ Taking a humane approach regarding financial issues of the subcontractor. ▪ Initiating building a sustainable relationship with subcontractor.
	Good communication between the main contractor and the subcontractor.	▪ Scheduling regular face-to-face briefing for the subcontractor. ▪ Encouraging the subcontractors to communicate any concern they have. ▪ Being cautious when communicating technical information. ▪ Intercepting direct communication between the client and the subcontractor.
	Flexibility, cooperation and active participation of the main contractor during subcontracting.	▪ Scheduling regular progress review meetings to discuss ongoing issues and to set targets. ▪ Monitoring a weekly programme through daily meetings. ▪ Assigning one supervisor to closely monitor and aid the subcontractor. ▪ Providing material, labour or equipment in a flexible manner if the subcontractor is struggling to meet the targets. ▪ Implementing a site policy to manage the subcontracting relationship similar to a QA/QC policy.

Most Critical	Clear understanding of the work scope by the subcontractor.	▪ Clearly defining the scope including safety, quality, site cleaning etc. requirements. ▪ Including the scope clearly in the contract especially when the scope is complex. ▪ Explaining the scope verbally in detail to the subcontractor from the beginning.
More Critical	Fairness in profit sharing from variations and extra works.	▪ Discussing conditions regarding variations and extra works at the beginning. ▪ Including the agreed conditions in the contract. ▪ Considering the cost related to the subcontractor when the main contractor is submitting rates to the client. ▪ Assuring a fair return from variations and extra works for the subcontractor. ▪ Both parties being reasonable about the profit from variations and extra works.
	Timeliness of progress payments to the subcontractor.	▪ Refraining from using back-to-back payment conditions to delay payments to the subcontractor. ▪ Taking all possible measures such as providing material etc. to relieve the subcontractor if payments to the subcontractor is delayed.
	Management capability of the main contractor.	▪ Planning for the whole project and giving directions to subcontractors to stay ahead of the programme. ▪ Establishing a system to manage the subcontractors. ▪ Training the staff of the main contractor

		on managing subcontractors.
Critical	Clear distribution of responsibilities during subcontracting.	▪ Explaining the responsibilities verbally at the beginning. ▪ Including clear distribution of responsibilities in the contract. ▪ Using daily meetings to closely monitor until they fully understand their responsibilities. ▪ Giving the subcontractor required rights to execute the responsibilities.
	Conditions regarding the retention in the subcontract.	▪ Discussing conditions regarding retention before the contract. ▪ Including the agreed conditions in the contract. ▪ Considering the existing relationship and avoiding excessive conditions regarding retention.
	Differences in business management styles of the main contractor and the subcontractor.	▪ Being considerate of the difference in business management styles of the subcontractor in line with the principles of partnering.
	Main contractor engaging in practice of Bid Shopping.	▪ Refraining from misusing the existing relationship for bid shopping. ▪ Considering other selection parameters such as work experience, quality of work, financial and physical capacity etc. apart from lower price.

Table 5.2: Recommendations for managing critical factors affecting the performance

	Factor	Recommendations
Most Critical	Time & cost management capability of subcontractor.	▪ Monitoring financial and physical progresses through regular progress review meetings. ▪ Stepping in with instructions if the subcontractor is not meeting the targets. ▪ Assisting financially if the reasons of lapses of subcontractor are tied to financial issues. ▪ Arranging training for subcontractors to improve technical aspects that are helpful for time and cost management.
	Availability of finance/working capital for main contractor and subcontractor.	▪ Establishing a system with the cooperation of relevant authorities to provide a source of finance for subcontractors through banks or micro loan schemes.
	Design errors, Late design changes, Specialised design etc in the project.	▪ Compensating the subcontractor for idling due to design issues by including a minimum standing fee in the contract. ▪ Assigning alternative work at idling times. ▪ Claiming for time and cost from the client and giving a fair share of compensation to the subcontractor.
More Critical	Expertise of subcontractor staff.	▪ Focusing on improving leadership of the subcontractor in addition to expertise. ▪ Closely supervising subcontractor staff initially to improve their expertise.
	Fluctuation of inflation rate and price increase of materials when	▪ Giving the subcontractor compensation received by the client through price

	material is supplied by the subcontractor.	adjustment. ▪ If price adjustment is not included in the main contract keeping an allowance when submitting rates to the client to compensate the subcontractor in case of a price increase. ▪ Reasonably compensating the subcontractor in the event of an unforeseen increase of price.
	Safety management capability of the subcontractor.	▪ Explain safety requirements to the subcontractor at the beginning. ▪ Including a safety allowance in the subcontractor rates. ▪ Regularly conveying the importance of safety at tool box meetings. ▪ Arranging for monthly safety training. ▪ Implementing motivation methods like zero accident bonus, reward system for exemplary labourers etc. ▪ Encouraging good housekeeping, cleanliness, good behaviour etc. ▪ Enforcing penalties if motivation methods are not effective.
Critical	Use of new technology/methods by the subcontractor.	▪ Introducing new technology to subcontractors, especially time saving methodologies. ▪ Being cautious of the cost aspect of the new methods introduced. ▪ Paying attention to knowledge transfer.
	Document management capability of subcontractor.	▪ Explaining the importance of document management to the subcontractors. ▪ Introducing simple formats for daily records etc. that are suitable and

		relevant to the level of the subcontractor. ▪ Assigning one capable supervisor from the subcontractor staff for record keeping. ▪ Training and guiding the assigned supervisor to manage documents. ▪ Providing the subcontractor an office space and stationery at the site.
	Adequate bid preparation time and pre-bid information given to the subcontractor.	▪ Giving adequate time to the subcontractor to prepare the bid considering the complexity of the scope. ▪ Sharing all available information with the subcontractor at the time of bid preparation. ▪ Preparing the bid jointly by discussing and deriving the rates together considering the satisfaction of both parties.

Apart from the aforementioned critical factors it was revealed from the discussion with project managers that there are few other aspects to pay attention to when considering subcontracting in building construction projects of Sri Lanka.

The importance of selection of the subcontractor cannot be overstressed as it is the first step in building a good relationship between the main contractor and the subcontractor.

Once the relationship is initiated the criticality of timeliness of payments in sustaining the subcontracting relationship must be emphasised. Top priority should be given to financial aspects when building a sustainable relationship as it is a motivating factor for the subcontractors.

Accordingly, it is extremely important that the subcontractor is reasonably compensated for idling within reason. Although most of the time reasons such as inclement weather are beyond the control of the project stakeholders, subcontractors are the victims of their effects. It was seen in this research study that subcontractors preferred to build lasting relationships with main contractors who were considerate of their issues. Main contractors must not expect the subcontractor to absorb many extra costs as it can be a burden on their limited financial capacity.

Often in the industry although the main contractor is quick to request for an extension of time from the client, they are hesitant to claim cost in fear of damaging the relationship with the client. However, it is seen that subcontractors are again victims of this practice as they are not compensated when the main contractor is not compensated. But in a 'win-win' approach the main contractor has to be understanding of the financial constraints of the subcontractor and remember not to jeopardize the relationship with the subcontractor in lieu of the relationship with the client. The main contractor must understand that both relationships are equally important as the client is paying for the work and the subcontractor is executing the work the client is paying for. Even if the main contractor chooses not to claim for cost from the client, the subcontractor must be reasonably compensated.

In addition, it was recommended to give an increment every six months to the rates of the subcontractor if they continue to stay with the main contractor as an effective way to retain the subcontractors.

It is also extremely important to never assume that subcontractors are knowledgeable as the main contractors or that they have the same practices as the main contractor. Many issues can be avoided throughout the project by clearly explaining what is expected from the subcontractor.

In Sri Lanka due attention must also be given to the contract between the main contractor and subcontractor. It can be observed that many subcontractors are not working under a formal contract in Sri Lanka although having a detailed contract is

helpful to both parties. It may encourage the subcontractor to formalise the subcontracting relationship, if a system is established by the relevant government institutions, relevant departments in universities and construction associations to provide free legal consultations for the subcontractor when drawing up contracts.

Implementation of the proposed 'win-win' approach in the industry can also be more effective if the relevant parties came together. As discovered in this research study, a 'win-win' approach most importantly requires a mindset that is considerate of the other party. Such an attitude change does not happen overnight. However if the approach is supported by many parties, implementation can be accelerated. Therefore, government authorities, universities, contractors and relevant associations should all assist in changing the attitude of the main contractors and subcontractors. The recommendations of the project managers emphasised it is only possible to build a sustainable relationship today if the main contractor treats the subcontractor also as a main contractor or a partner.

5.5. Future Research

As per the scope and limitations given in the first chapter this study focused on building projects in Sri Lanka. Therefore further studies are required to test the applicability of this approach in other sectors of construction. It is also important to conduct additional surveys to gather opinions of the subcontractors in Sri Lanka regarding this approach. Moreover according to the scope of this research study only non-specialised subcontractors were considered when developing this approach therefore it would be beneficial for future studies to also investigate other types of subcontractors. Furthermore, it was observed that even in one specific building trade there is a distinct difference in the level of organisation in subcontractors in the industry hence it would be beneficial to consider these different levels of subcontractors in future research to obtain more specific findings. Addressing these limitations in future studies can generate more relevant findings to improve the 'win-win' approach proposed in this research study.

In addition it would also be extremely helpful to conduct in-depth research on how to manage each identified critical factor in accordance with the proposed 'win-win' approach as well as to follow up with case studies that implement the recommendations given in this research study. Such studies would greatly benefit in further developing the practicality of the ‘win-win’ approach proposed in this research study.

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APPENDIX I - Questionnaire

A Win-Win Approach to Subcontracting in Building Construction of Sri Lanka

Dear Respondent,

I am a postgraduate student of the Civil Engineering Department of University of Moratuwa. The purpose of my research is to develop a win-win approach to subcontracting in building construction of Sri Lanka.

Accordingly I invite you to participate in this survey by answering the following questions referring to your experience in BUILDING construction.

The questionnaire will require approximately 20 mins to complete and responses will remain strictly confidential.

Participation is voluntary. Completion and submission of the questionnaire will indicate your willingness to participate in this survey.

Please note Subcontractors in this questionnaire refers to NON-specialised subcontractors (civil subcontractors such as masonry, formwork, concrete subcontractors etc).

Thank you for taking the time to assist me in my educational endeavours.

Sincerely,

Eng (Ms) I. R. Pasqual
irpasqual@gmail.com

Part A- Respondent Information

1. Please choose the CIDA grading of your organization for Buildings?

- ◯ CS2
- ◯ CS1
- ◯ C1

2. Please state your experience in building construction.

- ◯ Less than 5 years
- ◯ 5-10 years
- ◯ More than 10 years

3. Were you involved in any building project in the capacity of the subcontractor?

- ◯ Yes
- ◯ No

4. Please choose your educational background.

- ◯ Civil Engineering
- ◯ Quantity Surveying
- ◯ Project Management
- ◯ Accounting/ Finance
- ◯ Law
- ◯ Procurement/ Purchasing
- ◯ Other: ……

5. Please choose your current designation.

- ◯ Chairman/Director
- ◯ Contract Manager
- ◯ Construction Manager
- ◯ Finance Manager
- ◯ Chief Quantity Surveyor
- ◯ Other:…….....

Part B- Critical Factors for Subcontracting Relationship

The objective of this section is to identify factors that are critical for the RELATIONSHIP between the main contractor and a non-specialised subcontractor.

1. According to your observations please mark how critical following factors are for the subcontracting relationship.

	Least Critical	Less Critical	Critical	More Critical	Most Critical
1. Fairness when main contractor is selecting the subcontractor.					
2. Main contractor engaging in practice of Bid Shopping. *(Sharing a bid price provided by a subcontractor to its competitors in an attempt to obtain a lower bid)*					
3. The type of subcontract (Measure & Pay, Lump sum etc) & payment conditions.					
4. Conditions regarding the retention in the subcontract.					
5. Timeliness of progress payments to the subcontractor.					
6. Fairness in profit sharing from variations and extra works.					
7. Clear understanding of the work scope by the subcontractor.					
8. Clear distribution of responsibilities during subcontracting.					
9. Adequate distribution of authority during subcontracting.					
10. Flexibility and cooperation of the main contractor during subcontracting.					
11. Active participation of the main contractor during subcontracting.					
12. Differences in business management styles of the main contractor and the subcontractor.					
13. Management capability of the main contractor.					
14. Good communication between the main contractor and the subcontractor.					
15. Mutual Trust between the main contractor and the subcontractor.					

2. Are there any other factors not mentioned above that are critical for the relationship between the main contractor and a non-specialised subcontractor?

.....

Part C- Critical Factors for Subcontractor Performance

The objective of this section is to identify factors that are critical for the PERFORMANCE of a non-specialised subcontractor in a building project.

1. According to your observations please mark how critical following factors are for the performance of a non-specialised subcontractor.

	Least Critical	Less Critical	Critical	More Critical	Most Critical
1. Political support for the main contractor and the project.					
2. Legislation and policy changes in Sri Lanka.					
3. Fluctuation of inflation rate when material is supplied by the subcontractor.					
4. Price increase of materials when material is supplied by the subcontractor.					
5. Adequate bid preparation time given to the subcontractor.					
6. Unforeseen weather conditions.					
7. Unforeseen Geotechnical Conditions.					
8. Availability of finance/working capital for main contractor and subcontractor.					
9. Design errors, Late design changes, Specialised design etc in the project.					
10. Time & cost management capability of subcontractor.					
11. Document management capability of subcontractor.					
12. Expertise of subcontractor staff.					
13. Use of new technology/methods by the subcontractor.					

14. Adequate claim and arbitration provisions in the subcontract.					
15.Safety management capability of the subcontractor.					

2. Are there any other factors not mentioned above that are critical for the performance of a non-specialised subcontractor?

……

Part D- Concluding Opinion

1. Do you agree with the statement given below suggested by prior research?

(A win-win outcome in subcontracting is when BOTH the main contractor and the subcontractor benefit from a project.)

Management of critical factors for
- The relationship between the main contractor and the subcontractor
  AND
- Performance of the subcontractor

will result in a '**WIN-WIN'** outcome.

◯ Yes

◯ No

2. If you answered 'no' for the above question, please state why.

……

3. As per your previous experience in the Sri Lankan construction industry, how difficult will it be to implement an approach to subcontracting that benefits both parties (win-win approach) in building projects?

	1	2	3	4	5	
Impossible	◯	◯	◯	◯	◯	Very Possible

4. If you marked 1-3 for the above question, please state your reasons.
……

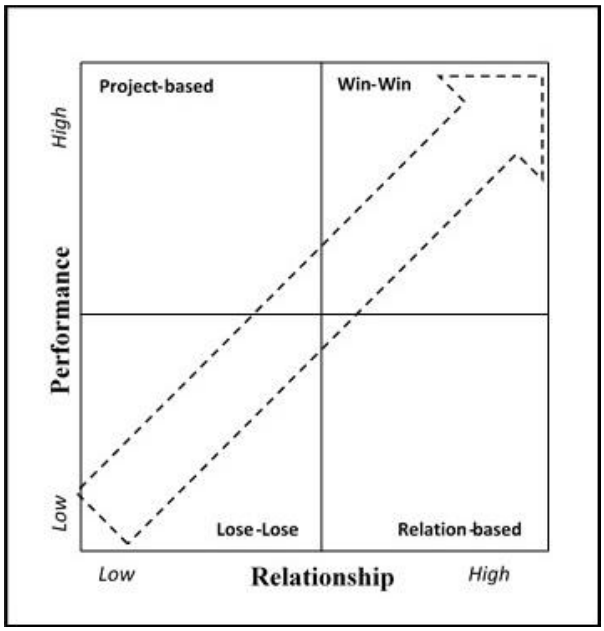
APPENDIX II - Outline for semi-structured interview

A Win-Win Approach to Subcontracting in Building Construction of Sri Lanka

1. Introduction

My name is Imasha Pasqual and I am following a Masters in Construction Project Management in the Department of Civil Engineering at University of Moratuwa. And for the thesis which is the final requirement of the masters I have chosen to explore subcontracting in Sri Lankan building construction.

As given in the title of my study, the 'win-win' approach is an approach that has been explored in similar studies abroad. As you may know 'win-win' in a business negotiation is when both parties are satisfied with what they receive. It is learnt from previous studies that a win-win outcome for subcontracting is when:



Management of critical factors for

1. The relationship between the main contractor and the subcontractor &
2. The performance of the subcontractor

will result in a **'win-win'** outcome.

Accordingly in the first phase of this study a questionnaire survey was carried out to rank the criticality of factors that affect the relationship and the performance of the subcontractor. The purpose of this interview is to further explore the findings of the questionnaire survey with reference to your experience in the industry.

Please kindly note this interview will be recorded for convenience. All contents of this interview will be summarised for the thesis while ensuring your anonymity.

The scope of my study is to investigate this 'win-win' approach from the point of view of the main contractor.

Accordingly I am interviewing you as a project manager of the main contractor for building projects.

Furthermore in this interview subcontractor refer to civil subcontractors who carry out NON-specialised work such as masonry, formwork, concrete etc. in the building projects.

This is a semi-structured interview where there is a basic outline. But you can interrupt and remark on anything that you may wish to bring up during our interview.

2. Demographic characteristics

Let me first confirm the following about you

CIDA grading of your company for buildings-
Your experience in building construction- years
Were you involved in any building project in the capacity of the subcontractor during your career? Yes or No (If yes please let me remind you again that I require you to answer my questions from your current perspective as the main contractor)
Your educational background- Civil Engineering, Quantity Surveying, Project Management
Your current designation- Project Manager

3. Part B

Respondents of the questionnaire were asked to rate the criticality of 15 factors for the relationship between the main contractor and the subcontractor.

So I would like to briefly discuss with you how to manage each of these factors and your thoughts on the categorisation of the factors by the questionnaire respondents.

Least Critical	Less Critical	Critical	More Critical	Most Critical
Main contractor engaging in practice of Bid Shopping.	Fairness when main contractor is selecting the subcontractor.	Clear distribution of responsibilities during subcontracting.	Timeliness of progress payments to the subcontractor.	Fairness in profit sharing from variations and extra works.
The type of subcontract (Measure & Pay, Lump sum etc) & payment conditions.	Conditions regarding the retention in the subcontract.	Active participation of the main contractor during subcontracting.		Clear understanding of the work scope by the subcontractor.
Differences in business management styles of the main contractor and the subcontractor.	Adequate distribution of authority during subcontracting.	Management capability of the main contractor.		Flexibility and cooperation of the main contractor during subcontracting.
				Good communication between the main contractor and the subcontractor.
				Mutual Trust between the main contractor and the subcontractor.

4. Part C

Then respondents of the questionnaire were asked to rate the criticality of 15 factors for the performance of the subcontractor.

Similar to Part B as per your experience in the industry I wish to briefly discuss each factor of Part C regarding your opinion on the categorisation and ways to manage them.

Least Critical	**Less Critical**	**Critical**	**More Critical**	**Most Critical**
Political support for the main contractor and the project.	Legislation and policy changes in Sri Lanka.	Adequate bid preparation time given to the subcontractor.	Fluctuation of inflation rate when material is supplied by the subcontractor.	Price increase of materials when material is supplied by the subcontractor.
Unforeseen Geotechnical Conditions.	Unforeseen weather conditions.	Document management capability of subcontractor.	Expertise of subcontractor staff.	Availability of finance/ working capital for main contractor and subcontractor.
Adequate claim and arbitration provisions in the subcontract.		Safety management capability of the subcontractor.	Use of new technology/ methods by the subcontractor.	Design errors, Late design changes, Specialised design etc in the project.
				Time & cost management capability of subcontractor.

5. Concluding remarks

Are there any other critical factors relevant to subcontracting that was not discussed in this study?

Some of the respondents of the questionnaire survey has stated that implementing a ‘win-win’ approach would require attitude change and better understanding. I do agree this is true.

What I like to suggest is taking small steps to manage the identified critical factors. This will eventually lead us to where we want to go. Do you agree?

As per your experience in the industry how difficult do you think it will be to implement this approach in Sri Lankan building construction? How can we improve the implementation process and also the overall subcontracting environment in Sri Lanka?

APPENDIX III - Data Analysis of Part B and C of Questionnaire

	Factor	No of responses (×Assigned weight)					Criticality Score (Catergory)
Part B - Relationship		**Least Critical (×1)**	**Less Critical (×2)**	**Critical (×3)**	**More Critical (×4)**	**Most Critical (×5)**	
1	Fairness when main contractor is selecting the subcontractor.	2 (2)	6 (12)	24 (72)	8 (32)	4 (20)	138 (Less Critical)
2	Main contractor engaging in practice of Bid Shopping.	7 (7)	21 (42)	8 (24)	8 (32)	0 (0)	105 (Least Critical)
3	The type of subcontract & payment conditions.	5 (5)	16 (32)	11 (33)	2 (8)	10 (50)	128 (Least Critical)
4	Conditions regarding the retention in the subcontract.	2 (2)	12 (24)	18 (54)	8 (32)	4 (20)	132 (Less Critical)
5	Timeliness of progress payments to the subcontractor.	0 (0)	10 (20)	12 (36)	12 (48)	10 (50)	154 (More Critical)
6	Fairness in profit sharing from variations and extra works.	0 (0)	8 (16)	13 (39)	11 (44)	12 (60)	159 (Most Critical)
7	Clear understanding of the work scope by the subcontractor.	0 (0)	14 (28)	6 (18)	8 (32)	16 (80)	158 (Most Critical)
8	Clear distribution of responsibilities during subcontracting.	2 (2)	8 (16)	14 (42)	8 (32)	12 (60)	152 (Critical)
9	Adequate distribution of authority during subcontracting.	2 (2)	12 (24)	16 (48)	10 (40)	4 (20)	134 (Less Critical)
10	Flexibility and cooperation of the main contractor during subcontracting.	0 (0)	8 (16)	14 (42)	10 (40)	12 (60)	158 (Most Critical)
11	Active participation of the main contractor during subcontracting.	3 (3)	10 (20)	7 (21)	12 (48)	12 (60)	152 (Critical)

12	Differences in business management styles of the main contractor and the subcontractor.	4 (4)	22 (44)	14 (42)	2 (8)	2 (10)	108 (Least Critical)
13	Management capability of the main contractor.	2 (2)	8 (16)	16 (48)	8 (32)	10 (50)	148 (Critical)
14	Good communication between the main contractor and the subcontractor.	0 (0)	6 (12)	14 (42)	10 (40)	14 (70)	164 (Most Critical)
15	Mutual Trust between the main contractor and the subcontractor.	0 (0)	6 (12)	15 (45)	7 (28)	16 (80)	165 (Most Critical)
1st Quintile-131, 2nd Quintile-144, 3rd Quintile-153, 4th Quintile-158							
Part C - Performance							
1	Political support for the main contractor and the project.	6 (6)	20 (40)	10 (30)	6 (24)	2 (10)	110 (Least Critical)
2	Legislation and policy changes in Sri Lanka.	0 (0)	10 (20)	16 (48)	10 (40)	8 (40)	148 (Less Critical)
3	Fluctuation of inflation rate when material is supplied by the subcontractor.	0 (0)	8 (16)	11 (33)	13 (52)	12 (60)	161 (More Critical)
4	Price increase of materials when material is supplied by the subcontractor.	0 (0)	0 (0)	14 (42)	18 (72)	12 (60)	174(Most Critical)
5	Adequate bid preparation time given to the subcontractor.	0 (0)	8 (16)	15 (45)	10 (40)	11 (55)	156 (Critical)
6	Unforeseen weather conditions.	3 (3)	4 (8)	21 (63)	8 (32)	8 (40)	146 (Less Critical)
7	Unforeseen Geotechnical conditions	0 (0)	10 (20)	20 (60)	8 (32)	6 (30)	142 (Least Critical)
8	Availability of finance/working capital for main contractor and subcontractor.	0 (0)	1 (2)	10 (30)	15 (60)	18 (90)	182 (Most Critical)

9	Design errors, Late design changes, Specialised design etc in the project.	0 (0)	2 (4)	14 (42)	12 (48)	16 (80)	174 (Most Critical)
10	Time and cost management capability of the subcontractor.	0 (0)	0 (0)	8 (24)	20 (80)	16 (80)	184 (Most Critical)
11	Document management capability of the subcontractor.	0 (0)	6 (12)	16 (48)	14 (56)	8 (40)	156 (Critical)
12	Expertise of the subcontractor staff.	0 (0)	2 (4)	14 (42)	18 (72)	10 (50)	168 (More Critical)
13	Use of new technology/methods by the subcontractor.	0 (0)	0 (0)	22 (66)	14 (56)	8 (40)	162 (More Critical)
14	Adequate claim and arbitration provisions in the subcontract.	2 (2)	8 (16)	20 (60)	10 (40)	4 (20)	138 (Least Critical)
15	Safety management capability of the subcontractor.	0 (0)	4 (8)	18 (54)	14 (56)	8 (40)	158 (Critical)
1st Quintile-145, 2nd Quintile-156, 3rd Quintile-161, 4th Quintile-174							

APPENDIX IV- Interview Transcripts of Part B and C

Part B- Relationship

	Factor	Opinion of Each Project Manager
1	Fairness when main contractor is selecting the subcontractor.	A-The most important factor to consider when selecting a subcontractor is financial and physical capacity of the subcontractor. Considering these factors generate fairness in selection. It is important to make note of strengths & weaknesses of subcontractors and maintain a categorisation of subcontractors for future reference during selection. B- Selection process will be fair if the subcontractors' past experience is considered. C- This factor should be categorised as critical not less critical. Existing relationship dictates the 'fairness'. So as per the theory of this study relationship will come into play when selecting a subcontractor. D- If the main contractor only considers the price to select a subcontractor it will not be fair. It is important to also consider financial capacity, physical capacity and previous work experience. E- It is extremely important to check the past work history of the subcontractor. Visiting one of their ongoing sites will give a true idea of their level.
2	Main contractor engaging in practice of Bid Shopping (Definition explained).	A-This is a common practice in the industry that is difficult to avoid. B-This is a common practice used to cut down on cost and is not a problem unless quality is compromised.

		C- This is when the main contractor is misusing the relationship. This behaviour is unfair since the relationship is used to negotiate a deal that is better for the main contractor. D- This is not least critical. This is very critical because in bid shopping main contractor is only focused on getting a lesser price. Both parties should understand that it is not the only parameter to be considered when selecting a subcontractor. E- A common practice in Sri Lanka that is not critical.
3	The type of subcontract (Measure & Pay, Lump sum etc) & payment conditions.	A-Payment conditions that are suitable for a project depends on the nature of project. So it is important to choose the payment conditions matching to the project. Problems can definitely arise if payment conditions between the client and the main contractor are different from the payment conditions between the main contractor and the subcontractor. However if main contractor has capable staff to properly manage bill certification then problems can be minimised. B- Definitely critical unless measures are taken to control the issues. Some subcontractors do not have the same knowledge as the main contractor regarding bill preparation. So sometimes they do not agree with the measurements taken by the main contractor. Therefore it is best to discuss and agree from the beginning on payment conditions and measurement methods. It is the responsibility of the quantity surveyor of the main contractor to manage any issues that can arise when there is a difference in the payment conditions between the main contractor & the client and the payment conditions of the main contractor &

		the subcontractor. C- In a lump sum contract if the main contractor can see subcontractor has made a mistake when rating the main contractor should be fair and give a chance to the subcontractor to correct the mistake. Subcontractor does not have the same know-how as the main contractor when rating a bid. D- Lump sum contracts can be especially problematic if the subcontractor was not aware of the scope at the time of bidding. Therefore when agreeing to payment conditions it is important to discuss in detail and share all available information with the subcontractor. E- If the scope is straightforward lump sum contact is suitable.
4	Conditions regarding the retention in the subcontract.	A-Must be clearly included in the contract with the subcontractor as agreed at the beginning. B-This must be discussed and included in the contract with the subcontractor. C- If a relationship has been built then that alone serves the purpose of retention as the subcontractor will work to sustain the relationship. Then retention will not be required since it adds undue stress on the subcontractor. D- Cannot agree with this 'less critical' categorisation as retention is very important to make sure subcontractor acts with responsibility. E- Very important to keep a retention. Important to have a contract that has clauses like these so that the subcontractors are held responsible for rectification or

		follow up work.
5	Timeliness of progress payments to the subcontractor.	A-Main contractors try to transfer this risk by including back to back payment conditions in the contract with the subcontractor. But in certain situations main contractor will have to step in and relieve the subcontractor if payments to subcontractor are significantly delayed due to back to back conditions. If such a condition is added to the contract and subcontractor agrees initially then subcontractor will have to tolerate even if it is disadvantageous to the subcontractor later. One of the reasons sometimes main contractors employ subcontractors is for some relief in situations when there are issues with the cash flow of the main contractor and payments are delayed. B- Subcontractors do not have the same bank facilities as the main contractor. So it is important to pay on time as agreed at the beginning or give him best possible relief if payments are delayed. C- Very critical because the subcontractor's access to finance is different from the main contractor. In Sri Lanka it is extremely important to develop micro finance schemes for subcontractors. Back to back payment conditions are not practical and fair for Sri Lankan subcontractors. It is used as an easy way out by the main contractors. D- Very critical as it helps to build trust. E- This is very critical and back to back payment conditions are not a good practice.
6	Fairness in profit sharing from variations	A-Issues that arise due to this factor can altogether be avoided if there are clear conditions regarding

	and extra works.	variations and extra works in the initial contract with the subcontractor. B- The way to avoid issues is to agree at the very beginning on how to share the profit and then exactly follow that ratio throughout the contract. C- Fair return would be a better term than profit sharing. It is better to include the terms in the contract from the beginning. Main contractor should reasonably reward the subcontractor and when preparing the bid for the client main contractor should take this into account so that the profit of main contractor is not decreased due to this reason later in the project. D- Generally if the main contractor is making a profit main contractor will share it with the subcontractor. But if the main contractor is not making much profit then the share that is given to the subcontractor can be small. The subcontractor will try to get more profit from extra works and variations if the profit from main works is unsatisfactory. So this is critical. It is good to agree from the very beginning on a percentage. E- It is good to negotiate and agree at a rate from the beginning.
7	Clear understanding of the work scope by the subcontractor.	A-This should also be added in the initial contract with the subcontractor. B- This should be included in the agreement in detail. Very important to document and have a thorough agreement with the subcontractor with a clearly defined scope including site cleaning. C- This should be clearly spelt in a formal contract

		especially if the contract is complex as it can cause confusion during the project. D- It is difficult for subcontractors to understand the scope sometimes because they hear it from the main contractor and not directly from the client or consultant. It is very important to take time and explain the scope from the very beginning to the subcontractor. E- This has caused many issues while working in projects since subcontractors are not aware of quality control and safety aspects expected in the scope.
8	Clear distribution of responsibilities during subcontracting.	A-This should also be added in the initial contract with the subcontractor. B- This should be included in the agreement in detail. Often most responsibilities lie with the main contractor even if a subcontractor is employed. C- Subcontractors should be given the responsibility to execute together with the rights. E.g.-Right to speak to the project manager. D- Including conditions in documents is not effective in the industry. It is always better to clearly explain to the subcontractor their responsibilities and closely monitor if they adhere to them in the first few months. They should be prompted in the right direction until they understand their responsibilities. E- Most of the time subcontractor does not care about the master programme. It is only through daily meetings that main contractor can make the subcontractor understand the real depth of their responsibility. Including conditions in the contract

		itself is not adequate.
9	Adequate distribution of authority during subcontracting.	A-This should also be added in the initial contract with the subcontractor. B- This should be included in the agreement. However not critical since usually authority is not given to subcontractors. C- Subcontractors should not be given authority but only responsibility as it can get in the way of the main contract and cause more problems. However if there is another tier of subcontractors then main contractors can give the authority to subcontractors to manage the sub-subcontractors within their scope. D- First the subcontractor must be carefully monitored to see how much authority the main contractor can trust with the subcontractor. If they seem trustworthy main contractor can distribute authority accordingly. E- Authority cannot be given to subcontractors as it will make it difficult to control them.
10	Flexibility and cooperation of the main contractor during subcontracting.	A-The best solution is to schedule a regular progress review meeting to discuss ongoing issues and set targets for the coming days. It is important that the main contractor assign a supervisor to closely cooperate with the subcontractor. B- It is important that main contractor is flexible during the project for the project to be successful. E.g.- If the subcontractor's equipment suddenly breaks down and if the main contractor has the equipment then the main contractor can rent the equipment at a lesser rate than the market price to meet the targets of the project even if it is not in the agreement.

		C- Similar to QA/QC policy in projects there should be a policy for the relationship with the subcontractors which can be used to improve cooperation with the subcontractors during the project. D- Similar to factor 11 it is important that main contractor is involved in the project, cooperates well with the subcontractor and is flexible when needed. E- It is important to be flexible and cooperate with the subcontractor to meet the targets by providing assistance since at the end of the day their lapses will affect the project. E.g.- Supplying material or labour as required.
11	Active participation of the main contractor during subcontracting.	A-Main contractor must step in actively in situations such as when request for extension of time (EOT) needs to be prepared and submitted. B- Toolbox meetings are important. At these meetings observations regarding safety, performance etc. can be discussed and main contractor can actively assist to improve weaknesses of the subcontractors. C- Main contractor should remember that the subcontractor was employed for the main contractor's project and therefore stay involved and assist the subcontractor when necessary for a successful project. D- Some main contractors subcontract majority of the scope of work with the intention of not getting involved in the project much. However it is important that main contractor keeps close attention on the project so that they can identify issues and help the subcontractor reach the targets.

		E- Monitoring a weekly programme through daily meetings with all the subcontractors is the key to keep track of the project.
12	Differences in business management styles of the main contractor and the subcontractor.	A-Generally what happens in the industry is that main contractor adapts to the style of the client while subcontractor adapts to the style of the main contractor. B- This is not critical because usually in the industry subcontractor will adapt to the ways of the main contractor. C- Most critical. Project managers should give the highest priority in overcoming these differences. The attitude main contractor has for this factor whether to treat the subcontractor as a partner or a slave determines the relationship. Main contractor should not adamantly expect only the subcontractor to change their ways. D- There are always differences because main contractors are established and subcontractors are 'developing'. So subcontractors should study main contractors and learn. E- Generally subcontractor changes to match the style of the main contractor.
13	Management capability of the main contractor.	A-This is very important. The main contractor should see far ahead than the subcontractor and manage for even future requirements like maintaining supporting documents for EOT. It must be remembered that failure of the project is a failure for also the main contractor and not only for the subcontractor.

		B- This is critical for subcontractors since output of the subcontractor depend on this factor. Subcontractors expect guidance from the main contractors. C- It is important for the main contractor to train the staff of the main contractor on managing the subcontractors. Otherwise subcontractors are often victims of the management lapses of the main contractor. D- Very critical for the entire project so whilst main contractor is expecting various qualities from the subcontractor it is important that the main contractor has a well established management system to manage the subcontractors. E- Very critical. The main contractor should plan far ahead than the subcontractors and always try to stay ahead of the programme.
14	Good communication between the main contractor and the subcontractor.	A-Maintaining a proper line of communication and a system is important. In the system client should not communicate with the subcontractor or vice versa as this can cause problems. B- Similar to factor 11 toolbox meetings are helpful to maintain good communication. C- Regular briefing for the subcontractor face to face is the most effective method of communication. D- It is extremely important to encourage the subcontractor to speak to the main contractor from the very beginning. Otherwise towards the end of project issues will come up because the subcontractor does not

		speak to the main contractor openly of issues. Sometimes even if the main contractor cannot help it is important to support by listening. Communication is important for improving mutual understanding. Main contractor must be very careful when communicating technical information to the subcontractor since they are not knowledgeable as much as the main contractor. E- This is the most difficult aspect to manage. At least one contact person from the subcontractor should have sound technical knowledge for communication to be effective.
15	Mutual Trust between the main contractor and the subcontractor.	A-Initially trust will grow if subcontractor is paid on time. Therefore it is best to focus on that. B- Main contractor has to pay the subcontractor on time. If payments are delayed main contractor should speak to the subcontractor and find them a relief in alternate ways. Sometimes main contractor have to act humanely especially regarding financial issues as this will result in automatic growth of mutual trust. C- Subcontractor will definitely note if the main contractor is genuine and will respond similarly. Therefore main contractor should initiate building trust. Subcontractors also have a responsibility not to take advantage of good faith of main contractors. D- In the first few months main contractor must observe the subcontractor carefully to see if the subcontractor is delivering as agreed. If the subcontractor is delivering then the main contractor can focus on building the relationship. Timeliness of payments will always help to build trust.

		E- Timeliness of payments is extremely important to initially build trust. Sometimes the main contractor will have to take a leap of faith such as giving the subcontractor an on account payment for more than the work done.

Part C- Performance

	Factor	**Opinion of each Project Manager**
1	Political support for the main contractor and the project.	A-This factor can be relevant sometimes for a subcontractor. E.g.- When a project comes to a halt due to government change. B- Not critical for subcontractor level unless it causes payment delay for subcontractors. C- Positive or negative political influence on the project would mean either acceleration or deceleration of the project. Accordingly main contractor should take the measures usually taken in similar situations to sustain the relationship. D- Political force is an external force and it can sometimes be critical for the subcontractor as well. E- Not critical for the performance of subcontractor.
2	Legislation and policy changes in Sri Lanka.	A-This can be relevant sometimes for a subcontractor. B- Generally not critical for subcontractor level. C- Very critical even for subcontractor. E.g.- government takes into account safety and introduces a national policy to screen eye sight of construction

		workers. D- Anything that affects the cash flow is critical and cannot be considered less critical. E.g.- River sand transportation policy changes. E- Not critical for the performance of the subcontractor as such changes come very rarely.
3	Fluctuation of inflation rate when material is supplied by the subcontractor.	A-This is similar to factor 4 as it can cause price increase of materials which is disadvantageous. B- Similar to factor 4 if material price increase due to this then subcontractor should be compensated. C- Similar to factor 4 compensation should be provided. D- Similar to factor 4 main contractor should help the subcontractor rate at the beginning considering price increase of materials so that no problems occur later in the project. E- Similar to factor 4 the main contractor should agree with the subcontractor from the beginning on how to handle price increase and provide fair compensation.
4	Price increase of materials when material is supplied by the subcontractor.	A-If price adjustment is received from the client it must be given to the subcontractor. Price adjustments are especially important in lump sum projects. Main contractor should consider and make an allowance when rating if price adjustment is not in the contract. The subcontractor can also be compensated if a problem arises during the project if an allowance is made by the main contractor at the time of rating.

		B- Should definitely give the subcontractor any compensation received from price adjustment from the client as this will improve mutual understanding. Even if the main contractor does not receive an adjustment from the client, main contractor has to be flexible and fair by giving a share from the profit of the main contractor to cover for some of the loss of the subcontractor. C- If the subcontractor fails then the project will fail. Therefore the main contractor should compensate and take measures to minimise any losses to the subcontractor due to price increase. D- It is important that this is discussed at the very beginning. The main contractor should let the subcontractor decide how to consider price increase when preparing the rates at the beginning given the contract period. It is always important to discuss this in detail and if any unforeseen increase occurs main contractor should help the subcontractor as much as possible. E- The main contractor should agree with the subcontractor from the beginning on how to handle price increase and provide fair compensation.
5	Adequate bid preparation time given to the subcontractor.	A-Sometimes the given time is not enough. But most times main contractors give possible rates to the subcontractor and negotiate those. B- Depending on the work scope this factor can be important. Usually there are established rates for basic tasks such as formwork etc. and therefore these basic contracts do not require much time. But

		otherwise main contractor has to give subcontractors time to visit the site so that they can submit a well prepared bid. C- Bid preparation should be a joint effort. It is important to sit with the subcontractor, share information and derive the rates together so that both the main contractor and subcontractor are satisfied. D- It is important to give adequate information to the subcontractor than time. During bid preparation all the available information with the main contractor must be shared with the subcontractor. E- It is extremely important to give sufficient time or it will cause problems during the project.
6	Unforeseen weather conditions.	A-Main contractor must submit an Extension of time and try to get compensation for the subcontractor. Often bad weather is considered a normal occurrence in construction and nothing much can be done. B- Bad weather can cause idling and if so main contractor has to give immediate relief to the subcontractor. E.g.- Assign them other work inside. C- Similar to factor 9 a minimum standing fee should be included in the contract. Subcontractors should be given work inside and if that is also not possible compensate accordingly. D- Main contractor must provide advice and prepare the subcontractor in advance as much as possible for unforeseen weather conditions. Main contractor can also claim for time from the client and help the

		subcontractor. Unfortunately main contractor cannot help with the cost aspect of it. E- There is not much to do if the client is not compensating the main contractor. If there is damage because of a big event like floods then compensation can be given. Unless the main contractor has kept an allowance to compensate for idling there is nothing that can be done. Inclement weather is part of construction that has to be tolerated.
7	Unforeseen Geotechnical conditions	A-Main contractor must submit an Extension of time and try to get compensation for the subcontractor. B- Generally not critical for subcontractor level. C- Respecting the relationship, compensation should be given to the subcontractor for reasons like these that are beyond the control of anyone but causes idling for the subcontractor. Subcontractors are often hesitant to increase the work force because of idling possibilities. D- Similar to factor 6 main contractor must help the subcontractor as much as possible. E- If the main contractor can claim then compensation should be given to the subcontractor. E.g.- In case there is a sudden need for shoring during excavation. Otherwise there is nothing to do because as similar to the main contractor subcontractor should also consider possibilities when agreeing to a rate.
8	Availability of	A-Very critical. So it is important to arrange sources

	finance/working capital for main contractor and subcontractor.	of funding for the subcontractor similar to the main contractor B- Definitely Critical. C- In order to build a sustainable relationship it is important that both parties have the basic capability or capacity required of them. Financial capacity is one of them. D- Very critical as it affects all stakeholders of the project. Financial capacity of client is also important. E- Very critical. The subcontractor should have the financial capacity to tolerate the delay of payments by at least a week or so.
9	Design errors, Late design changes, Specialised design etc in the project.	A- Usually the subcontractors are the victims of the effects of this factor as this can sometimes cause idling etc. Main contractors usually claim for time but do not claim for cost as it can damage the relationship with the client. But main contractor must try to compensate cost also for the subcontractor. B- Main contractor can claim for time and cost from the client and compensate the subcontractor if it causes issues like idling. But if the main contractor does not claim cost from client then main contractor will have to compensate the subcontractor from the profit of the main contractor. This factor is critical for the motivation and performance of the subcontractor especially if it causes redoing. C- Idling will affect the subcontractor more than the main contractor. A minimum standing fee should be

		included in the contract as compensation. D- A system should be in place to deal with these issues. If the client does not compensate the main contractor and therefore main contractor does not compensate the subcontractor then at the end it will be a burden on the financial capacity of the subcontractor. E- Main contractor should manage the situation in such a way that the subcontractor is not idling by providing alternative work.
10	Time and cost management capability of the subcontractor.	A-Regular progress review meetings are important where financial and physical progresses are both monitored. Main contractor should step in if the subcontractor is not meeting the targets and give instructions. Main contractor can also arrange to provide material etc. as a relief to the subcontractor. B- Main contractor can arrange for training to improve technical aspects that can then assist in time and cost management. C- Subcontractors are usually far superior in micro management and labour management which is also a reason for employing subcontractors. However if the main contractor see the subcontractor failing at meeting targets then it should be investigated why. The main reasons are usually incompetency of labour force, non-clarity of scope or payment delays. Incompetency of labour force is often tied to low rates. Main contractor can then advise the subcontractor. It must be remembered that subcontractors will never increase the labour force unless the subcontractor is confident about not

		making a loss. D- The main contractor has to pay attention to the progress of the subcontractor and warn the subcontractors in advance if they are failing in managing cost and time. Most of the time main contractor will have to financially help if subcontractor is not managing time and cost well as reasons are usually tied to financial issues. E- If it is observed that the subcontractor is running into trouble main contractor should step in with advice to manage time and cost.
11	Document management capability of the subcontractor.	A-Importance of documentation must be explained to the subcontractors. Main contractors mostly take responsibility of documentation. Main contractor must have all documentation to continue work in a situation subcontractor stops work. B-Simple document formats must be introduced to the subcontractor staff to keep records. These formats must be suited for their level and relevant to them. It will encourage the subcontractor to keep records if an office space is given at the site and also training on documentation is given. C- Main contractor should introduce a culture that encourages the subcontractor to be methodical in record keeping and provide stationery as well as facilities like an office table with lockers since at the end of the day it will benefit both parties. D- A supervisor who is capable of record keeping must be selected from the subcontractor staff and main contractor can guide this supervisor to manage

		documentation. E- Main contractor should guide and get a daily report from the subcontractor.
12	Expertise of the subcontractor staff.	A- Regardless of the expertise of the subcontractor it is critical that the main contractor closely supervise subcontractor staff. B- Very important because main contractor cannot always be present close by. This is critical for the efficiency of the main contractor. C- Leadership is as important as expertise. Usually subcontractors have one or at most two experts and if they leave there is usually no quick replacement. Therefore this is critical in Sri Lanka. D- This is very important. But if staff of main contractor is well experienced and extra helpful then this can be less critical. E- If the subcontractor does not have at least one expert then it will affect the progress of the project as subpar work can cause redoing. The main contractor will have to closely supervise throughout if the subcontractor staff is not competent.
13	Use of new technology/methods by the subcontractor.	A-Main contractors sometimes instruct subcontractors to use new technology. But only some subcontractors cooperate and benefit from it. B- Since use of technology is important to reach targets main contractor must introduce new technology and give basic advice to improve. But main contractors usually do not have much time to train subcontractors.

		C- It is the main contractor's responsibility to introduce new technology to subcontractors. Main contractors fear dependency on one subcontractor so few subcontractors should be trained to always have an alternative. D- It cannot be expected that subcontractors know all what main contractors know. But it is important to always encourage subcontractors to use new methods. However encouraging costly new methods will not be helpful. E- It is important to share new methods that save time with the subcontractors. But subcontractors tend to leave after learning new technology which is discouraging main contractors from taking time to train.
14	Adequate claim and arbitration provisions in the subcontract.	A-Agree with questionnaire respondents that this is not critical for subcontracting. B- Depending on the scope of the subcontract if the scope is big and these conditions seem necessary it should be included in the contract in detail. C- Possibility of arbitration increases the cost structure and discourages from getting into a formal contract. Therefore including these clauses in subcontracting is excessive. D- Subcontractors are not aware of these clauses but it is beneficial to include them in the contract in case any problems occur during the project. E- These provisions are excessive for subcontracting.

15	Safety management capability of the subcontractor.	A-Must be closely monitored at sites. Usually a safety allowance is included in the rates given to the subcontractor. If subcontractors do not adhere to safety measures even after a safety allowance is included in their rates then main contractor can certify less in their payments as a punishment. B- Subcontractors think money spent on safety is a waste of profit. Therefore main contractors have to definitely include this cost in rates. It is also helpful to give training and safety helmets etc. as well. In Sri Lanka penalties seem to work to enforce safety than motivation methods like zero accident bonus etc. C- Main contractor should make an attempt to convey the importance of safety to the subcontractor regularly. Rather than enforcing penalties it is better to reward for safety as well as cleanliness and good behaviour during the project as an accident is a black mark for the whole project. D- Main contractor must closely monitor and provide guidance if the subcontractors are failing in managing safety by providing training etc. E- It is better to inform safety requirements expected from the subcontractor at the beginning and also include a safety allowance in the rates. The toolbox meeting every morning is important. Also prizes can be given to exemplary labourers every month to encourage adherence to safety. Main contractor must closely monitor safety as injuries will affect the whole project.

APPENDIX V - Interview Transcript of Concluding Remarks

Project Manager	Concluding Remarks
A	Subcontractors will only continue to work with main contractors who look after them and will also consider timeliness of the payments in the past when deciding to work again. In the Middle East where project manager A has worked main contractor takes responsibility even if the payments from the client is delayed and always pays the subcontractors on time. Today there is a huge demand for subcontractors. So the attitude of main contractors is also slowly changing. Main contractors can no longer treat subcontractors badly and must work to retain the subcontractors. Main contractors have to change if they want to continue working with capable subcontractors. So an environment where subcontractors are treated as equal will come soon in the industry.
B	Subcontractor selection is extremely critical. It is very important to see if subcontractors are capable by requesting recommendations from past main contractors etc. Similar to main contractors, prequalification of subcontractors should also be checked. Timeliness of the payments is critical for motivation. In the industry sometimes subcontractors stay with main contractors if they are paid on time even if the rates are low. It is very important to motivate subcontractors to improve their performance. Sometimes subcontractors also have issues like inability to increase labour at site. Subcontractors must also keep their word and maintain the trust placed on them. Both parties should look after each other. There is a big demand for subcontractors. Therefore subcontractors today are not bound to one main contractor. One way to build the relationship is to give an increment to the rates of the subcontractor every 6 months if they continue to stay with the main contractor. It is important to build the relationship by getting involved in the issues of

	the subcontractor on a personal level. Sometimes because of the retention subcontractors are compelled to stay. To retain subcontractors it is important that main contractors have enough continuous work according to the capacities of the subcontractors.
C	To improve contracts between main contractors and subcontractors in Sri Lanka government should take the initiative with universities and construction associations to provide free legal consultations to subcontractors when drawing up contracts. Furthermore construction associations and the government should arrange a source of finance for the subcontractors such as banking facilities, micro finance schemes as it will in turn ease the financial burden of the main contractor. E.g.- The main contractor can provide a guarantee to the bank that the subcontractor will be paid. This will only work if there is an existing relationship as the main contractor will not vouch for a new subcontractor. It is important to consider many factors when selecting a new subcontractor. Both parties should evaluate each other at the first stage of the project before building a sustainable relationship. Thereafter working together on few projects will serve as an indirect interview as this experience will then become a significant factor in selection. Implementing a 'win-win' approach is very possible, however construction associations, construction ministry, relevant departments in the universities will have to take the lead. Rather than individual implementation it is only if the whole industry comes together that this attitude change can be accelerated. E.g.- when the engineers are trained at universities they must be educated to treat subcontractors with humanity. Today subcontractors are equal partners carrying out different work scopes of the same project.
D	Main contractor should never assume that the subcontractors know everything that the main contractors know since the two parties will have different practices. So the main contractor must clearly explain to the subcontractor what is expected from them. Main contractor must not expect the subcontractor to absorb lot of extra costs as it can be a burden

	on their financial capacity. It may not be possible to implement a 'win-win' approach for subcontracting in Sri Lanka since subcontractors are not always going to be subcontractors. They are learning, developing and gradually reaching the level of a main contractor. So the main contractors cannot expect the subcontractors to remain the same as they will change and leave. Then new subcontractors will take their place. The only way to build a long term relationship is by treating the subcontractor as a main contractor and a partner.
E	The mindset of the main contractors in the industry must change today to accommodate the approach suggested in this research. It is possible to reach there with small steps.