

**SKILLS AND COMPETENCY REQUIREMENTS
OF CONSTRUCTION PROFESSIONALS
FOR EFFECTIVE DISPUTE MANAGEMENT
IN CONSTRUCTION INDUSTRY**

Rajapakshe Wasala Panditharathna Mudiyansele
Imashi Sasidya Rajapakshe

(159167J)

Degree of Master of Science in Construction Law and Dispute Resolution

Department of Building Economics

University of Moratuwa

Sri Lanka

September 2019

**SKILLS AND COMPETENCY REQUIREMENTS
OF CONSTRUCTION PROFESSIONALS
FOR EFFECTIVE DISPUTE MANAGEMENT
IN CONSTRUCTION INDUSTRY**

Rajapakshe Wasala Panditharathna Mudiyansele
Imashi Sasidya Rajapakshe

(159167J)

Dissertation submitted in partial fulfilment of the requirements for the
degree of Master of Science in Construction Law and Dispute Resolution

Department of Building Economics

University of Moratuwa

Sri Lanka

September 2019

DECLARATION

Declaration, copyright statement and the statement of the supervisor

I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Also, I hereby grant to the University of Moratuwa the non-exclusive right to reproduce and distribute my dissertation, in whole or in part in print, electronic or other medium. I retain the right to use this content in whole or part in future works (such as articles or books).

Signature:

Date:

The above candidate has carried out research for the Masters under my supervision.

Name of the supervisor:

Signature of the supervisor:

Date:

Abstract

Frequent disputes in construction projects are detrimental to the project performance which in turn demands effective dispute management efforts. Although construction professionals' involvement is highly envisaged in dispute management due to technicality and complexity involved and due to their contribution to generate disputes, such involvement is barred by essential competency and skill deficits of construction professionals. In view of that, this research is aimed at exploring the skills and competencies that are required to be acquired by Construction Professionals (CPs) in order to effectively manage disputes in the construction industry.

Accordingly, 'survey' was selected as the research strategy which is under the quantitative research approach. Questionnaires designed based on the knowledge gained through literature was distributed to construction professionals holding corporate memberships in the related Sri Lankan professional institutes. Data analysis was done through statistical t-tests and finally, a comparison was conducted using the questionnaire survey results and literature findings to accomplish the research aim.

With related to dispute avoidance (DA), which is one compartment of Dispute Management (DM), questionnaire findings identified twenty significant sources of disputes which are supported by construction professionals. Further, in order to avoid disputes in the construction industry, questionnaire findings identified significantly important thirteen Competencies and ten Skills. The comparison of above questionnaire findings and literature findings on availability of skills and competencies with CPs, revealed that the CPs are equipped with all necessary Dispute Avoidance Competencies while 'Team working skills', 'Ability to be flexible', 'Ability to acknowledge other's needs and interests' and 'Skill in recognising and responding to cultural differences' were identified as deficient Dispute Avoidance Skills for effective involvement in DA.

Questionnaire findings on Dispute Resolution (DR), which is the other compartment of DM, identified seven competencies and fifteen skills commonly important for all DR methods with high influence on all or particular DR method (s), one competency and nine skills commonly important for all DR methods but less influential and two competencies and three skills important for only certain types of DR methods. Comparison of such questionnaire findings with literature findings on availability of skills and competencies with CPs, unveiled the competency and skill areas which are deficient with each CP. Consequently, the research findings provide clear guidance on improving the Competency and Skill areas of each CP for strengthening their involvement in desired DR method (s) to a predetermined extent.

Thus, this research provides inputs to the professional institutes in Sri Lanka and to the construction professionals on improving competency and skill areas of CPs in order to achieve effective dispute management in Sri Lankan construction industry.

Key Words: Dispute Management, Dispute Avoidance, Dispute Resolution, Competency, Skill, Construction Professionals

ACKNOWLEDGEMENT

I would like to express my gratitude to my dissertation supervisor, Dr. (Ms.) Thanuja Ramachandra, for all the guidance, assistance and continuous encouragement provided to me.

I wish to deliver my gratefulness towards the head of the Department of Building Economics and the Programme Director of MSc / PG Diploma in Construction Law and Dispute Resolution, Dr. (Ms.) Yasangika Sandanayake, for the valuable guidance, encouragement and assistance provided.

I should deliver my gratefulness to all the lecturers for their guidance and assistance. Their direction throughout the process and clear knowledge on the subject are very much appreciated.

I extend my special appreciation to all respondents of my research. Without their assistance, this endeavor would not be a success.

I should express my appreciation to programme assistance and other non-academic staff members in the Department of Building Economics for their support.

It is also my duty to acknowledge to my seniors, batch mates and especially for my family members, for all their support and encouragement.

TABLE OF CONTENT

1.0 INTRODUCTION.....	1
1.1 Background	1
1.2 Problem statement	4
1.3 Aim and objectives	4
1.4 Methodology	5
1.5 Scope and limitation	6
1.6 Chapter breakdown.....	6
2.0 LITERATURE REVIEW:	8
2.1 Introduction	8
2.2 Nature of construction disputes	8
2.3 Effects of disputes	10
2.4 Dispute Management (DM).....	11
2.4.1 Dispute Avoidance (DA)	12
2.4.1.1 Sources of disputes.....	14
2.4.2 Dispute Resolution (DR)	17
2.5 Construction professionals' involvement in DM	19
2.5.1 Construction professionals' involvement in DA	20
2.5.2 Construction professionals' involvement in DR.....	21
2.6 Skills and competencies	22
2.7 Skills and competencies necessary for DM.....	23
2.7.1 Skills and competencies for DA	24
2.7.2 Skills and competencies for DR.....	26
2.7.2.1 Skills and competency requirements for Negotiation	27
2.7.2.2 Skills and competency requirements for Mediation / Conciliation.....	28
2.7.2.3 Skills and competency requirements for Adjudication / DAB	30
2.8 Skills and competencies of construction professionals	35
2.9 Summary	38
3.0 RESEARCH METHODOLOGY	40
3.1 Introduction	40
3.2 Research Process	40

3.3 Research design	41
3.3.1 Research approach and research strategy	41
3.3.1.1 Reasoning behind the selection of survey approach	41
3.3.2 Research technique- data collection	42
3.3.2.1 Pilot survey	42
3.3.2.2 Questionnaire survey.....	43
3.3.3 Research technique- data analysis	45
3.3.3.1 Descriptive analysis	45
3.3.3.2 Single sample t-test	45
3.3.3.3 Comparison	47
3.4 Summary	48
4.0 DATA ANALYSIS AND FINDINGS	49
4.1 Introduction	49
4.2 Respondents' information	49
4.2.1 Response rate	49
4.2.2 Composition of respondents according to current organisation	50
4.2.3. Composition of respondents according to qualified profession.....	50
4.2.4 Experience in the construction industry.....	51
4.2.5 Knowledge and experience in DR	51
4.2.6 Professionals involved in DR	52
4.3 Sources of disputes and construction professionals responsible for them	52
4.3.1 Sources of disputes	52
4.3.2 Construction professionals' involvement to dispute generation.....	55
4.4 Dispute management skills and competencies	57
4.4.1 Dispute Avoidance Competencies (DACs)	57
4.4.2 Dispute Avoidance Skills (DASs)	58
4.4.3 Dispute Resolution Competencies (DRCs)	60
4.4.4 Dispute Resolution Skills (DRSs)	62
4.5 Summary	65
5.0 DISCUSSION	66
5.1 Introduction	66

5.2 Discussion of survey findings with corresponding literature findings.....	66
5.2.1 Sources of disputes and construction professionals’ responsibility	66
5.2.2 Competencies and skills important for DM.....	67
5.3 Comparison of literature findings and questionnaire findings to identify skills and competency requirements for DM.....	70
5.3.1 Dispute Avoidance.....	70
5. 3.2 Dispute Resolution.....	79
5.4 Summary	83
6.0 CONCLUSIONS AND RECOMMENDATIONS.....	84
6.1 Introduction	84
6.2 Conclusions	84
6.3 Recommendations	87
6.4 Limitations of the research	88
6.5 Further research.....	89
REFERENCES.....	90
APPENDIX A: SKILLS AND COMPETENCIES EXPECTED FROM CONSTRUCTION PROFESSIONALS.....	104
APPENDIX B: QUESTIONNAIRE.....	111

LIST OF FIGURES

	Page
Figure 2.1: Basic relationship between conflicts, claims and disputes	9
Figure 2.2: Step by step process of dealing with disputes	12
Figure 2.3: Skills and competencies required throughout negotiation process.....	28
Figure 2.4: Competencies expected from construction professionals in Sri Lankan construction industry	36
Figure 2.5: Skills expected from construction professionals in Sri Lankan construction industry	37
Figure 3.1: Research process	40
Figure 4.1: Overall response rate	49
Figure 4.2: Type of current organisation.....	50
Figure 4.3: Distribution of respondent's profession	50
Figure 4.4: Distribution of experience of respondents.....	51
Figure 4.5: Experience in DR methods	51
Figure 4.6: Professional involvement in DR.....	52
Figure 4.7: Professional involvement in dispute generation.....	55
Figure 5.1: Rationale behind identifying DACs / DASs to be improved with CPs...	77

LIST OF TABLES

	Page
Table 2.1: Sources of disputes	15
Table 2.2: skills and competency requirements for DA.....	25
Table 2.3: Skills and Competency requirements for each DR method	32
Table 2.4: Summary of Skills and Competencies required for DR.....	34
Table 4.1: Significance of sources of disputes.....	53
Table 4.2: Construction professionals' responsibility for significant sources of disputes.....	56
Table 4.3: Competencies for dispute avoidance	58
Table 4.4: Skills for dispute avoidance	59
Table 4.5: Competencies for dispute resolution.....	61
Table 4.6: Skills for dispute resolution	63
Table 5.1: Comparison between DACs and competencies of CPs	71
Table 5.2: Comparison between DASs and competencies of CPs.....	73
Table 5.3: Comparison between causes of disputes and availability of DACs with CPs	75
Table 5.4: Comparison between causes of disputes and availability of DASs with CPs	76
Table 5.5: Comparison between DRCs and competencies of CPs.....	79

LIST OF ABBREVIATIONS

Abbreviation	Description
A	Architect
ADR	Alternative Dispute Resolution
C	Conciliation
CP	Construction Professional
DA	Dispute Avoidance
DAB	Dispute Adjudication Board
DAC	Dispute Avoidance Competencies
DAS	Dispute Avoidance Skills
DM	Dispute Management
DR	Dispute Resolution
DRC	Dispute Resolution Competencies
DRS	Dispute Resolution Skills
E	Engineer
M	Mediation
N	Negotiation
QS	Quantity Surveyor
SL	Sri Lanka

LIST OF APPENDICES

Appendix	Description	Page
Appendix-A	Skills and competencies expected from construction professionals	104
Appendix-B	Questionnaire	111

1.0 INTRODUCTION

1.1 Background

The construction industry is one of the key components in any country's economy (Enshassi & Mossa, 2008; Mashwama, Aigbovboa & Thwala, 2016) and it satisfies a wide range of physical, economic and social needs of human (Khan, 2008). Nevertheless, majority of the construction projects worldwide falls behind the desired project objectives for various reasons (Harmon, 2003) and among which 'Dispute' is a major contributing factor (Cheung, Suen & Lam, 2002; E. Cakmak & Cakmak, 2013; Sinha & Wayal, 2007). Disputes in construction projects result in a range of negative impacts on the projects including project delays, increased project costs, poor quality and weak business relationships between the parties (Abenayake, 2015; Cheung & Suen, 2002, 2004; Jha & Iyer, 2006). Making the situation worse, disputes are inevitable in any construction project (Jannadia, Assaf, Bubshait & Naji, 2000) due to ever-growing complexity, uncertainty, risks and multi-party involvement (Harmon, 2003; Yiu & Cheung, 2007). Therefore, proper management of these disputes is critical (Gebken & Gibson, 2006), with the establishment of dispute avoidance and resolution techniques (Pena-More, Sosa & Mc-Cone, 2003).

Litigation and arbitration are the traditional dispute resolution mechanisms which are associated with high cost, delay and adversarial relationships (Fenn & Gameson, 1997). According to Harmon (2003), litigation is inappropriate to resolve disputes in the construction industry owing to the complexity of technical and financial matters involved. Consequently, Alternative Dispute Resolution (ADR) methods such as negotiation, mediation, conciliation, expert determination, adjudication are being encouraged in the construction industry to overcome the shortcomings of formalized methods (Cheung, 1999; Cheung et al., 2002). Meanwhile, dispute avoidance (DA) has gained recognition as a proactive measure to prevent generating disputes rather than reactive measures which struggle to resolve disputes once arise (Gerber, 2010; Harmon, 2003; Mashwama et al., 2016).

Dispute avoidance can be achieved through good management techniques regarding people, policy and communications (Jahren & Dammeier, 1990), which in turn assigns an array of responsibilities on construction professionals (Acharya, Lee & Im, 2006; Royal Institution of Chartered Surveyors [RICS], 2012). Resolving disputes in construction projects too is within the scope of construction professionals especially of the project manager, ranging from selecting the appropriate dispute resolution process to the actual participation (Cheung, 2006). On the other hand, due to complicated technical matters involved, judges who do not have knowledge on construction are confronted with many difficulties in resolving construction disputes (Betancourt & Crook, 2014) and also the disputes are not resolved to the satisfaction of the parties where such judges take the control of their matters in a win-lose system (Harmon, 2003). Conversely, technical conciliator or mediator is capable of understanding the issue confronted and resolving the construction dispute quickly and economically (Betancourt & Crook, 2014). Further, several authors perceive that involvement of technical persons in resolving disputes is a key feature that uplifts the value of ADR methods over litigation (e.g. Betancourt & Crook, 2014; Cheung, 1999; Hughes, 2003). All this emphasis in combination denotes that construction professionals are key drivers in dispute management in the construction industry.

Therefore, it is vital for any construction professional to possess skills and competencies with regard to dispute management (Cheung & Suen, 2002; Cheung et al., 2002). According to Cheung and Yiu (2006), construction professionals need to possess skills to exercise proactive dispute management i.e. skills to avoid disputes and where dispute materializes, to resolve them at the lowest possible level. As viewed by Daicoff (2012), interpersonal skills including communication skills, understanding human behavior, empathy, listening and influencing skills and intrapersonal skills including honesty, reliability, passion, motivation, self-confidence, tolerance, patience, independence, adaptability and stress management and problem solving and conflict handling skills, strategic planning are among the highly expected skills from a dispute resolving professional. Skills and competencies required for dispute avoidance include effective teamwork and team leadership,

ability to understand and acknowledge other's needs, communication skills and management competencies (Bagshaw, 1998; RICS, 2012; Suter et al., 2009).

Although construction professionals are required to be equipped with these soft skills for active participation in dispute management, they are more concerned on technical (hard) skills, giving a lesser priority to such soft skills (Mohan, Merle, Jackson, Lannin & Nair, 2010; Toor & Ofori, 2008). Further, according to Jambro and Siddiqi (2008), conflict resolution and negotiation skills are lacking among the majority of project managers in the construction industry. Moreover, Bowes (2008) concluded that the lack of suitably skilled dispute board members as one of the barriers to the establishment of a dispute board in the construction industry. As revealed by Jeyavernee and Abenayake (2016), lack of awareness and skills is a major contributing factor for the failure of mediation in Sri Lankan construction industry. Besides, only few construction industry professionals are practicing as adjudicators in Sri Lanka which limits the choice of Dispute Adjudication Board (DAB) members and in turn negatively affects the performance of DAB (Abenayake, 2015). Therefore, in-depth insights into the skills and competencies required to be cultivated and/or improved by construction professionals for effectively managing disputes will essentially contribute to uplift the performance level of the construction industry.

Several researches worldwide have addressed the skills and competencies of different construction professionals and among which dispute management skills are remarked (e.g. Edum-Fotway & McCaffer, 2000; Mohan et al., 2010; Odusami, 2002). Further, literature is replete with emphasis on skills and competencies expected for dispute management and its different techniques (e.g. Daicoff, 2012; Kharbanda & Stallworthy, 1991; Pedler, 1978; Tang, 1986). However, within this literature, the linkage between skills and competencies available with construction professionals and skill and competency requirements for dispute management in the industry is not established. Therefore, this study attempts to assess the level of skills and competency requirements on the part of construction professionals for effective management of disputes in the construction industry.

1.2 Problem statement

Construction Industry, despite being a major contributor to the country's economy (Enshassi & Mossa, 2008), tend to fall behind in terms of performance due to disputes which are frequent in construction projects (E.Cakmak & Cakmak, 2013; Sinha & Wayal, 2007). Therefore, various dispute management efforts are being practiced in the industry (e.g. Cheung, Suen & Lam, 2002; Fenn & Gameson, 1997). However, their effectiveness is questionable mainly due to the technical and complex characteristics of the construction disputes (Harmon, 2003). Therefore, construction professional involvement in construction dispute resolution is highly envisaged (Betancourt & Crook 2014; Fenn and Gameson, 1997). At the same time, construction professionals are the main contributors to the generation of disputes hence, they hold a prime responsibility towards dispute avoidance (RICS, 2012; Sinha & Wayal, 2007).

Nevertheless, many researchers (e.g. Mohan, Merle, Jackson, Lannin & Nair, 2010; Toor & Ofori, 2008) are of the view that construction professionals are lacking essential skills required for effective participation in construction dispute management. Proving this outlook, investigations have revealed that almost all ADR techniques in the construction industry indicate performance deficits for related skills and competency inadequacies on the part of construction professionals (e.g. Bowes, 2008; Jeyavernee & Abenayake, 2016). This deprives construction professionals from making the contribution expected of them towards eliminating disputes and their effects from the construction industry. Therefore, getting equipped with such skills is vital for any construction professional (Cheung, Suen & Lam, 2002; Cheung & Suen, 2002). With respect to this situation, the research is aimed at exploring the skills and competency requirements of construction professionals in order to effectively manage disputes in the construction industry.

1.3 Aim and objectives

The aim of this research study is to explore the skills and competencies that are required to be acquired by construction professionals in order to effectively manage

disputes in the construction industry. In order to achieve the aim, the following objectives were addressed;

1. Identify the significant sources of disputes in the construction industry and to identify the responsible construction professionals.
2. Identify the skills and competencies required for construction Dispute Management (DM) process
3. Identify skills and competencies possessed by construction professionals (CPs)
4. Compare the outcome of objective 01, 02 and 03 and identify the skills and competency areas that need to be improved in construction professionals for effective DM in the construction industry

1.4 Methodology

A comprehensive literature review has been carried out by referring to published and unpublished literature on construction professionals and dispute management process in construction background. It was basically carried out in order to establish the current knowledge base with respect to sources of disputes in the construction industry, construction professionals involved in DM, skills and competencies possessed by such construction professionals and skills and competencies required for construction DM.

This was followed by a questionnaire survey, aiming at two main purposes. One was to identify the significant sources of disputes in the Sri Lankan construction industry and the responsible construction professionals. The second purpose was to assess the level at which the skills and competencies of DM as identified through literature is important for each DM process. Before distributing the questionnaire, a pilot survey was conducted to ensure that the data to be collected would enable the achievement of the research aim. Forty-six questionnaires were distributed to Engineers, Quantity Surveyors and Architects who hold corporate membership in the related Sri Lankan institutes and thirty-five of them were returned. The data collected through questionnaire survey was analysed by one-sample t-tests. Finally, a comparison of

the questionnaire findings and literature findings was done to derive the conclusions of the study.

1.5 Scope and limitations

The research is to be conducted within the boundaries of Sri Lanka. The construction professionals considered in this research are Engineers, Quantity Surveyors and Architects who were identified in the literature as the construction professionals involved in the DM process. Further, the dispute resolution techniques used for the research confine to negotiation, mediation/conciliation and adjudication/dispute adjudication board.

1.6 Chapter breakdown

Chapter one: Introduction

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

Chapter two: Literature review

This chapter reviews the related existing literature in seven sections. The first section and second section respectively explains the nature of disputes and their effects on the construction industry. The third section reviews literature on the DM process together with the identification of sources of disputes which is bonded with DA. The fourth identifies the CPs involved in DM and seventh sections recognises the skills and competencies possessed by such CPs. The sixth section explores the skills and competency requirements for DA and each method of DR and subsequently comes up with four lists of DACs, DASs, DRCs and DRSs in order to proceed with data collection stage.

Chapter three: Research methodology

This chapter describes the methodology followed including research approach, data collection and analysis techniques in detail together with justifications for following the particular methods.

Chapter four: Data analysis and findings

This chapter analyses the data collected through the questionnaire survey in three main sections. The first section is for the analysis of respondent information. The second section analyses 'Section B' of the questionnaire, to identify significantly effective sources of disputes in the construction industry and to identify Construction Professionals' involvement to dispute generation through such significant sources. The last section includes the analysis of 'Section C' of the questionnaire, to identify significant DACs, DASs, DRCs and DRSs.

Chapter five: Discussion

This chapter comprises two subsections. The first section discusses the findings of data analysis on sources of disputes, DACs, DASs, DRCs and DRSs with the corresponding literature findings while the second section compares the above survey findings with literature findings on skills and competencies possessed by CPs in order to reach the research aim.

Chapter six: Conclusions and recommendations

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

2.0 LITERATURE REVIEW:

Disputes, Sources, Dispute Management (DM), DM Skills and Competencies and Construction Professionals' Skills and Competencies.

2.1 Introduction

This chapter appraises the existing literature on the subject area addressing the research objectives in a way to provide a sound basis for data collection.

The first two sections explain the nature of disputes and their effects on the construction industry. The third section describes the process of dispute management while the fourth section presents the expected involvement of construction professionals in the DM process. The next section is aimed at summarising the skills and competencies required for construction DM with emphasis on dispute avoidance and each DM technique where construction professional involvement is sought. The subsequent section provides insights into the skills and competencies possessed by the construction professionals in order to perform the tasks that they are assigned. In the end, the chapter content is summarised in order to demonstrate the research problem and to provide the basis for further execution of the study.

2.2 Nature of construction disputes

A dispute is defined as “any contract question or controversy that must be settled beyond the job site management” (Diekmann & Girad, 1995, p.355). It arises once an action or argument is presented between the conflicting parties on a certain controversy (Jaffar, Tharim & Shuib, 2011). According to Kumaraswamy (1997), the generation of construction disputes have two flows; ‘directly from conflicts’ and ‘through claims’ as illustrated in figure 2.1. As stated by the Institute of Civil Engineers (ICE, 2012, p.2) “a dispute shall be deemed to arise when a claim or assertion made by one party is rejected by the other party and either that rejection is

not accepted or no response thereto is received”. Halki principle which is used to determine the existence of a dispute for the purpose of adjudication and arbitration, too explained that disputes exist when one party submits a claim and the other party refuses or does not admit to pay or denies the fact that the first party owes such sum (Reid & Ellis, 2007).

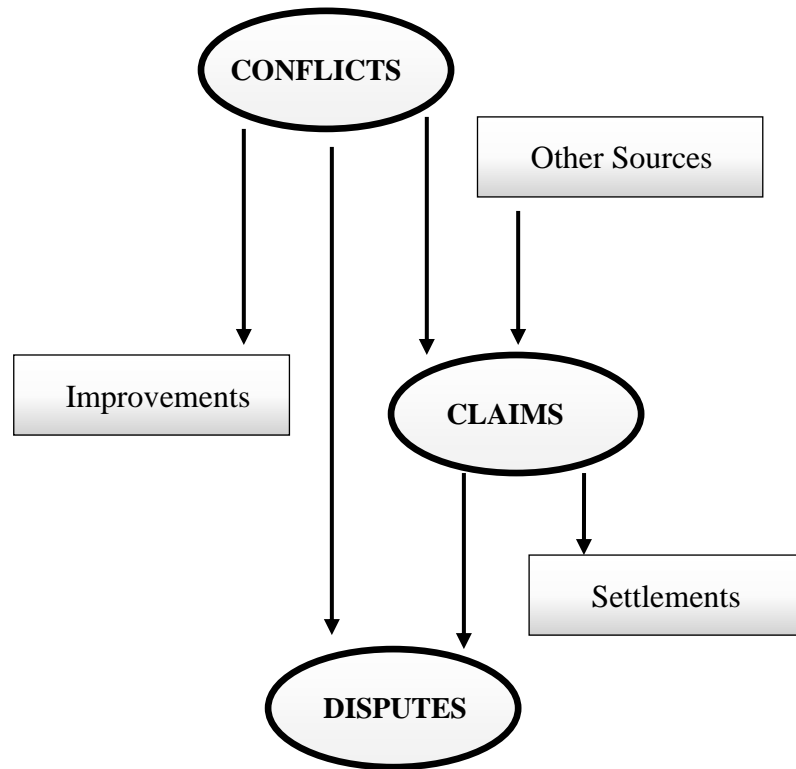


Figure 2.1: Basic relationship between conflicts, claims and disputes
Source: (Kumarasswamy, 1997)

As per the definition by Canadian Law Dictionary, a ‘Claim’ is an “assertion of the right to remedy, relief or property” or “failure to fulfill obligations under the contract” (Semple, Hartman & Gergeas, 1994). In construction contracts, claims should not be always looked upon as destructive, instead in some instances claim is an unavoidable contractual requisite in order to accommodate essential changes in client’s requirements and unforeseen changes in the project environment (Kumarasswamy, 1997). ‘Conflict’ which is the other notion pertaining to dispute is inescapable in any human interaction where the parties possess incompatible values and the position of either party regarding their objectives and interests are threatened by the other (Fenn and Gameson, 1997; Yie & Cheung, 2007). For the same reason,

conflicts are inevitable in any construction project which essentially involves complex human interactions among multiple parties (Yie & Cheung, 2007).

Therefore, 'Dispute' can be identified as the manifestation of mismatches among the parties, freely supported by the very nature of the construction industry itself.

2.3 Effects of disputes

The effects of disputes in construction are detrimental (Cheung & Suen, 2002, 2004). If the disputes are not properly managed, they result in poor performance by the stakeholders (Ekhtor, 2016a), project delays (Abenayake, 2015; Cheung & Suen, 2002, 2004), damaged team spirit (Cheung & Suen, 2002, 2004), increased tension (Abenayake, 2015), added project costs (Abenayake, 2015; Cheung & Suen, 2002, 2004; Harmon, 2003), poor quality (Jha & Iyer, 2006) and loss of productivity (Jaffar, et al., 2011; Mashwama et al., 2016) with regard to the project. When it comes to company's point of view, disputes create weak business relationships and communication (Harmon, 2003; Cheung and Suen, 2002, 2004), loss of profit (Jaffar et al, 2011; Mashwama et al., 2016), additional managerial and administrative expenses and loss of professional and company reputation and business viability (Mashwama et al., 2016). Further according to Corporative Research Center for Construction Innovation (CRCCI, 2009) and Mashwama et al. (2016), disputes, in the long run, contribute to inflation of future construction projects through higher tender price level discouraging delivery of real value for client's money.

Considering all these damages in monetary terms, McGeorge (2007) and Mashwama et al. (2016) categorises the cost of disputes as follows;

- a) Direct Cost – Fees to lawyers and other dispute resolving experts and related expenses
- b) Indirect costs - Salaries and associated overheads for in-house lawyers and company managers, cost arising from reduced onsite productivity and company managers and other employees who are engaged in the process of assembling the facts, serving as witnesses

- c) Hidden costs - Inefficiencies, delays, loss of quality occurred to the construction process and the cost of weakened business relations between the contracting parties

Further as revealed by Mashwama et al. (2016), hidden costs are the most serious cost category followed by indirect costs and lastly the direct costs. Whatever the category, not only the project participants but also the community is paying these costs, for instance, through additional taxation payable to receive essential services (CRCCI, 2009).

These emphases establish that effective management of these disputes is critical for the success of any construction project (Spittler & Jentzen, 1992) and also for the wellbeing of the community.

2.4 Dispute Management (DM)

Literature emphasises that frequent involvement of disputes in construction projects together with their adverse effects, urge the construction professionals to exercise proactive dispute management (Cheung & Yiu, 2006; Gebken & Gibson, 2006). Such dispute management systems should be focused on resolving conflict at the lowest levels possible (Gebken & Gibson, 2006). According to Harmon (2003), the parties to the contract must recognize the occurrence of differences between themselves and once differences occur, they should be addressed contemporaneously. Further according to author, dispute prevention mechanisms such as partnering and Dispute Review Boards help to overcome such differences by encouraging frank and open communication and in the event of propagating the differences to the level of disputes, methods such as mediation are to be adopted prior to more time-consuming and expensive methods, for instance, arbitration and litigation are followed. To the viewpoint of Hunter (2000), dispute management firstly and essentially means ‘dispute avoidance’ and once failing to avoid, secondly it means ‘structured direct negotiation’ minimising third-party intervention to the best possible level.

The step by step process of dealing with disputes in the construction industry is illustrated in figure 2.2. The hierarchy starts with dispute prevention and each rising step indicates the escalation in the level of hostility and cost involvement.

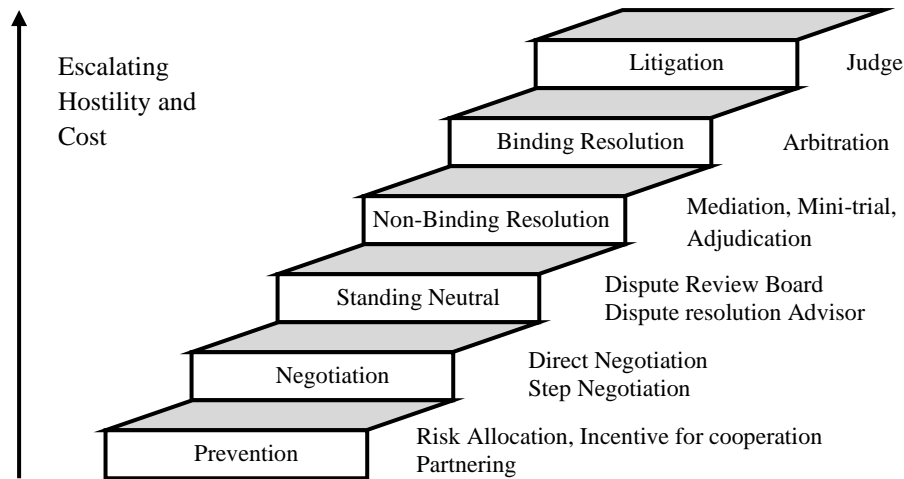


Figure 2.2 : Step by step process of dealing with disputes
Source: (Cheung,1999)

Thus, it can be identified that dispute avoidance and dispute resolution are the two key elements of dispute management with more weight on dispute avoidance and flexible methods of dispute resolution.

2.4.1 Dispute Avoidance (DA)

Dispute avoidance embraces the principle of ‘prevention is better than curing’ which is meant for preventing conflicts and differences between parties from escalating into disputes (McGeorge, 2007; RICS, 2012).

Dispute avoidance in construction fundamentally falls within the broader area of changing work processes, policies and procedures of the industry and behaviours of its participants (Love, Davis, London & Jasper, 2008). As said by Jahren and Dammeier (1990), construction disputes can be avoided by using good management techniques regarding people, policy and communications. According to RICS (2012, p.2), conflict avoidance is not more than ‘carefully and properly planning, with clarity, the strategy for executing a project’. Thus, managing disputes should become

a part of normal project management during project operation because disputes in construction projects are very common and prevention and resolution need to occur immediately on the project site (Shin as cited in Jaffar et al., 2011). However, such efforts on avoiding disputes through project management require thorough concerns in a vast area including minimization of scope changes, proactive management of risk, joint problem solving, careful selection of procurement strategy, contractors and consultants, sharing of knowledge (Ekhator, 2016a; Sinha & Wayal, 2007).

In addition to the concerns on avoiding disputes through project management aspects, literature presents some organised systems which assist or even predominantly aimed at dispute avoidance. For instance, Fenn and Gameson (1997) introduce dispute review boards (DRBs), dispute review advisors (DRA), total quality management, quality assurance, coordinated project information and correct procurement system as such non-binding systems for dispute avoidance. According to Harmon (2003), partnering and DRBs are effective dispute prevention mechanisms in the construction industry. As per McGeorge (2007), dispute avoidance or prevention include strategies such as partnering, relational contracting, stakeholder management, alignment, alliancing, lean construction and supply chain management.

Partnering is based on three pillars of mutual objectives, agreed problem resolution procedure and active search for continuous measurable improvements (Bennett & Jayes, 1995). Partnering injects a range of relational contracting qualities such as trust, open communication, teamwork, integration and cooperative and collaborative management effort into process with view to eliminate fragmentation, formal contractual and adversarial characters (Harmon, 2003; RICS, 2012). The concept of alliancing is also very closer to partnering however is characterized by both contractual elements i.e. formal contract and gain share/pain share arrangement as well as so-called relational elements (Yeung, A.P.C. Chan & Chan, 2007). These changes induced through partnering, alliancing and other relational contracting systems to the attitudes and contracting procedures, especially the collaborative relationships and agreed problem resolution procedures lead to resolution of the

conflicts, reduction of the number of claims and thus prevention of the disputes (A.P.C. Chan, Chan & Ho, 2003; RICS, 2012).

Standing neutrals includes Dispute Resolution Adviser (DRA), Dispute Review Boards (DRBs) and Dispute Adjudication Boards (DABs) (Ex: Gerber, 2010; Harmon, 2003; RICS, 2012). According to RICS (2012), dispute boards are placed somewhere between dispute avoidance and dispute resolution however, to the viewpoint of Harmon (2003), DRB is principally inclined towards dispute avoidance.

DRBs are constituted with three members at the commencement of a project so that the parties can refer their issues to DRB for non-binding recommendation throughout project duration (RICS, 2012) and also the DRB members can influence the attitudes and behaviour of the project participants in a way to minimize the disputes (Gerber, 2010).

Further, a noticeable fact in literature related to Dispute Avoidance is that DA endeavor is pertaining to avoidance or minimization of causes that emerge such disputes (CRCCI, 2009; Gerber, 2010; Sinha & Wayal, 2007). Therefore, insight into such sources of disputes is vital under the caption of DA.

2.4.1.1 Sources of disputes

It is the construction projects' characteristics that generate claims and conflicts and subsequent disputes (Mashwama et al., 2016). Complex disputes arise as a result of the increasingly complex nature of the construction projects which deal with complex contract documents and complex construction (Harmon, 2003). Describing the Williamson's framework of Market Failures, Mitropoulos & Howell (2001), explained that long-term transactions with high uncertainty, complexity and impossibility to foresee every contingency and detail at the outset (bounded rationality) give rise to situations that are not clearly addressed by the contract resulting contractual problems. Once the project starts, introducing even essential changes to the contract becomes distressing because parties are tightly bonded together irreversibly in a way that one party's opportunistic behavior will lead to take undue advantage of such situations. Uniqueness associated with each and every

construction project is the next dimension contributing to disputes through the presence of new challenges in each project (Corporative Research Center for Construction Innovation [CRCCI], 2009; Younis, Wood & Malak, 2008). Moreover, construction projects are handled by newly formed team comprising multiple parties from different disciplines and organisations with dissimilar level of knowledge and skills, interests and objectives encouraging the potential of conflicts and disputes (CRCCI, 2009). Besides, the involvement of long time period makes the projects more vulnerable to changing economic and environmental conditions which in turn lead to disputes (Younis et al., 2008).

Several authors have taken efforts to characterize this dispute emerging industry environment in different perceptions. A summary of common sources of disputes is presented in Table 2.1.

Table 2.1: Sources of Disputes

	Source of Dispute	Ekhator (2016b)	E. Cakmak & Cakmak (2013)	Jaffar, Tharim & Shuib (2011)	Love et al. (2011)	(Younis et al. (2008)	Sinha & Wayal (2007)	Yie & Cheung (2007)	E.H.W.Chan & Suen, (2005)	Harman (2003)	Kululanga et al. (2001)	Kumaraswamy (1997)
Frequency level 1: mentioned in eight (8) out of eleven (11) references												
S01	Ambiguities in contract documents	X	X		X	X	X		X	X	X	
Frequency level 2: mentioned in seven (7) out of eleven (11) references												
S02	Variations	X	X		X	X	X		X		X	
Frequency level 3: mentioned in six (6) out of eleven (11) references												
S03	Inadequate / incomplete specifications, information and instructions	X	X	X		X			X		X	
Frequency level 4: mentioned in five (5) out of eleven (11) references												
S04	Unrealistic pricing /errors in tender		X	X					X		X	X
S31	External Factors (Weather, Legal, Economic, Public interruption)		X			X			X	X	X	

	Source of Dispute	Ekhator (2016b)	E. Cakmak & Cakmak (2013)	Jaffar, Tharim & Shuib (2011)	Love et al. (2011)	(Younis et al. (2008)	Sinha & Wayal (2007)	Yie & Cheung (2007)	E.H.W.Chan & Suen, (2005)	Harman (2003)	Kululanga et al. (2001)	Kumaraswamy (1997)
Frequency level 5: mentioned in four (4) out of eleven (11) references												
S05	Payment delays		X	X		X			X			
S06	Slow client's responses	X		X		X						X
S07	Design errors	X	X			X					X	
S08	Poor quality /defective works by Contractor		X	X		X			X			
S09	Poor communication		X	X					X	X		
S12	Unfair and unclear risk allocation		X		X				X			X
Frequency level 6: mentioned in three (3) out of eleven (11) references												
S10	Late giving of possession		X			X	X					
S11	Unrealistic expectations/targets of Employer		X						X			X
S13	Adversarial / controversial culture		X		X				X			
S14	Unforeseen Site conditions		X			X	X					
S15	Extension of time for completion		X	X					X			
S16	Poor project administration and management by consultants				X				X			X
S17	Acceleration		X			X		X				
S18	Delays in work progress by Contractor		X			X			X			
Frequency level 7: mentioned in two (2) out of eleven (11) references												
S19	Poor project administration and management by contractor				X				X			
S20	Inappropriate procurement strategy/Contract type				X							X
S21	Lack of team spirit		X						X			

	Source of Dispute	Ekhtator (2016b)	E. Cakmak & Cakmak (2013)	Jaffar, Tharim & Shuib (2011)	Love et al. (2011)	(Younis et al. (2008)	Sinha & Wayal (2007)	Yie & Cheung (2007)	E.H.W.Chan & Suen, (2005)	Harman (2003)	Kululanga et al. (2001)	Kumaraswamy (1997)
S30	Financial incapacity of the Contractor		X						X			
Frequency level 8: mentioned in one (1) out of eleven (11) references												
S22	Disruption					X						
S23	Lack of professionalism of Employer, consultants and Contractor											X
S24	Over/under measurement of work progress by consultants	X										
S25	Technical inadequacy of the Contractor		X									
S26	Suspension of Work					X						
S27	Contradictory goals and needs							X				
S28	Litigious mindset of project participants								X			
S29	Poor project planning and scheduling									X		

2.4.2 Dispute Resolution (DR)

Litigation and arbitration are the traditional dispute resolution mechanisms in the construction industry (Harmon, 2003). Arbitration is the process wherein parties submit their dispute to one or more neutral third parties for final and binding determination which is enforceable both domestically and internationally (Harmon, 2003; Jones, 2006). The way that the hearings are conducted in arbitration and the authority of the arbitration panel are similar to the court proceedings while, arbitration is conducted in a private setting unlike court proceedings (Harmon, 2003).

Other than these traditional binding dispute resolution procedures, there is a range of dispute resolution mechanisms called Alternative Dispute Resolution (ADR) (Cheung, 2009; RICS, 2012). ADR methods lead the parties to reach a solution to their dispute either by themselves or with the involvement of a neutral third party (Jones, 2006). There are two groups of construction ADR techniques: formal, binding methodologies and informal, nonbinding methodologies (Harmon, 2003). ADR methods are not merely for dispute resolution rather they lead to manage conflicts and disputes (Lie, Yie & Cheung, 2016) and they are associated with flexibility in varying degrees (Cheung, 1999). Such ADR methods used in the construction industry involve negotiation, mediation, conciliation, adjudication and expert determination (Jones, 2006).

Negotiation is the unassisted discussion between the parties to get resolved the dispute or the issue by themselves where power to resolve the dispute also rests with themselves (RICS, 2012). Conciliation and mediation engage an independent intervener and are comparable in terms of nature and process, however, the degree of participation of the neutral third party is the deviating factor (Cheung, 1999). Walls (1993, P123) defines conciliation as the 'intervention of a neutral third party for the purposes of bringing the parties closer together', and mediation as 'the appointment of a technical person who, if he cannot reach settlement with the parties, provides his or her written reasoned opinion'. According to Riches and Dancaster (2008), adjudication in the construction industry is the process that the disputes under the contract are referred to a third person called adjudicator, who acts impartially and gives a binding decision which may subsequently determine in arbitration or through legal proceedings. Dispute Adjudication Board (DAB) is a standing body composed of one or three members typically established upon the signature or commencement of mid or long-term contract and issue decisions that must be complied with by the parties immediately (International Chamber of Commerce [ICC], 2016). In expert determination, the parties by a contract agree to be binding on the decision made by a third party (RICS, 2012). Further to the author, in most cases this decision is final and no possibility to appeal.

2.5 Construction professionals' involvement in DM

Construction disputes are commonly associated with both technical and legal matters (Cheung, 2006). It is unlikely that judges and juries have knowledge and expertise in technical matters and also it is unrealistic to expect them to learn all the facts and understand complex concepts within the trial period (American Arbitration Association [AAA], 2010). Therefore, court proceeding becomes an inappropriate approach to settle construction disputes (Cheung, 2006).

Instead, literature emphasizes that dealing with disputes i.e. prevention and resolution is an essential part of the daily activities of construction professionals (AAA, 2010; Cheung & Yiu, 2006). It is the responsibility of all project participants to carry out their part of work to the best possible level in order to prevent and settle disputes (Newly, 1992). Engineers and managers are expected to solve disputes developing during the project execution phase (Cheung & Yiu, 2006). According to RICS (2012), following are the responsibilities vested on quantity surveyors in avoiding and resolving construction disputes;

- Searching for clarity in contractual documentation
- Identifying, within the surveyor's area of expertise, risks that should be brought to the client's attention, and assist the client in the management of these risks
- Managing professionally, objectively and consensually the day-to-day or regular conflicts, disagreements and causes of dispute that arise in respect of property and construction matters
- Identifying the escalation of disputes and keeping the client informed
- Understanding the range of available dispute resolution techniques
- Acquiring knowledge and understanding of the applicable dispute resolution techniques and recognizing when more specialist assistance is required and advising the client accordingly.

Further according to Cheung & Yiu (2006), the inevitability of disputes in complex construction projects adds more weight to this requirement of professional involvement in handling construction disputes (Cheung & Yiu, 2006).

2.5.1 Construction professionals' involvement in DA

In avoiding occurrences of construction disputes, the prime concern is on treating the causes that create disputes (Gerber, 2010). Meanwhile, literature on causes of disputes reveals that almost all the sources of disputes are related to or at the control of construction professionals. It suggests that the prime responsibility to avoid disputes in projects rests with construction professionals.

According to Navigant Construction Forum (NCF, 2013), it is entirely possible to complete projects without any formal dispute through proper prior planning, good design, selection of good contractors and good project management by all parties. Employers should decide what they want while the designers, contractors, sub-contractors and suppliers should ensure that they understand what is expected of them, perform duties under careful supervision with good faith without intention to get undue advantages (Newly, 1992). Consultants have an obligation and a responsibility to produce documentation that can be used effectively to construct the facility that is required by the client and to undertake design verifications, reviews and audits (Sinha & Wayal, 2007). Alternative to these initiatives to be taken on the part of employer and the consultant, the construction professionals attached to the contractor is supposed in bidding stage to recognize the patent ambiguities in the contract documentation and to bring them to the employer's attention so as to correct them and to prevent later disputes (Jayalath, 2013). Further, project managers working under the contractor is responsible to establish better project management strategies supportive towards dispute avoidance (Jahren & Dammeier, 1990; RICS, 2012). Especially, early and informal resolution of administrative issues during the construction phase is of paramount importance to avoid turning the issues into dispute (Jones, 2006). According to the author, the responsibility to identify and resolve these administrative issues is vested in the contract administrator who may be an architect, engineer or manager.

Thus, it is clear that construction professionals play a key role in avoiding disputes in construction projects.

2.5.2 Construction professionals' involvement in DR

Traditional dispute resolution mechanisms i.e. arbitration and litigation follow strict procedural rules and require the involvement of legal professionals whereas ADR methods do not require the involvement of legal professionals (Cheung, 1999). As viewed by brooker (1997), the reduced role for lawyers is the main advantage of using ADR which brings significant cost reductions in construction dispute resolution. According to Jeyavernee and Abenayake (2016), increasing the practice of technically qualified construction professionals as conciliators, mediators, adjudicators and arbitrators is one of the best ways to promote usage of ADR in Sri Lankan construction industry. The importance of construction professionals in dispute resolution is highly demonstrated through the viewpoint of Brooker and Laver (1997) that the industry can enjoy the very real benefits expected through ADR only if the danger of legal domination in ADR which he has introduced as 'the fate of arbitration' is avoided.

Negotiation for being the most cost-effective method in resolving construction disputes, skills in negotiation are essential to all construction professionals, especially those who hold managerial positions for direct participation in the negotiation process (Cheung, 2014).

As perceived by Betancourt and Crook (2014), technical **conciliator/mediator** in resolving construction disputes, is able to understand the complex issues and to build up a rapport that helps the parties to resolve the dispute quickly and economically. According to AAA (2010), technical mediation in which engineers, architects or other technical experts act as the mediator can be used to resolve associated scientific and technical issues prior to resolve legal issues in classic mediation which centers on the role of lawyers.

Similarly, in **adjudication**, the involvement of a project architect or an engineer who is responsible for drafting drawings and specifications as adjudicator, leads to quick and informed determinations regarding controversies and disputes arisen (Stipanowich, 1996). According to the Chartered Institute of Arbitrators (2016), there

is an opportunity for any person who has legal, architectural, engineering or surveying background to become a construction adjudicator.

In **arbitration** too, the parties to the dispute are free to select the arbitrator so that they can select a person who has knowledge and expertise in construction, for instance, an engineer, architect or other construction professional (AAA, 2010). The author further noted that such professional involvement enables quick focus on the disputed issue. According to Betancourt and Crook (2014), in most scenarios related to the construction industry, construction professionals in the area of subject matter of dispute is the best choice of arbitrator. However, in the construction industry, legal professionals are the predominant players in arbitration (Brooker & Laver, 1997)

Litigation essentially involves judges and other legal professionals, however in resolving construction disputes, they face difficulties in deciding on technical matters especially related to engineering and architectural aspects. Hence, there may be a requirement of construction professionals to involve in litigation by producing evidence as experts to inform the judge of the matter in issue or by determining the technical issues and reporting back to the court for them to determine other factual and legal issues (Betancourt & Crook, 2014).

All these emphasises the need for construction professionals to actively participate in managing disputes in the construction industry.

2.6 Skills and competencies

Skill can be defined as “an ability that can be developed which is manifested in performance” or “an ability to translate knowledge into action” (Odusami, 2002, P61). Skills can be taught (Kharbanda & Stallworthy, 1991) and can be acquired through training (Gibbs, Brigden & Hellenberg, 2004), through practice and experience (Kharbanda & Stallworthy, 1991; Pedler, 1978. Briscoe, Dainty and Millett (2001), classified ‘Skills’ as hard skills which are mainly vocational in nature and as soft skills which are generic and to be acquired through on-the-job experience.

The oxford dictionary defines competency as ‘the ability to do something successfully or efficiently’ while defining skills as “the ability to do something well;

expertise”. These two definitions seem alike, however, the literature identifies deviations in these two terms. As viewed by Edum-Fotway & McCaffer (2000), professional competency denotes a combination of knowledge, skills and application of the acquired knowledge. According to Dainty, Cheng and Moore (2004), competency relates to underlying personal traits and behavioral characteristics that lead to effective performance. Further, E.H.W. Chan, Chan, Scott and Chan (2002) broadly classify professional competence into two as cognitive and normative. Cognitive competence refers to the possession and application of a body of knowledge and related skills whereas normative competence relates more to the trustworthiness and social assumptions of professionals.

Thus, it signifies that ‘competency’ comprises ‘skills’, however, beyond skills it further integrate several other aspects like knowledge, abilities and behaviours (Sturgess,2012).

2.7 Skills and competencies necessary for DM

Dispute management requires developing an array of skills and competencies to avoid creating disputes and where disputes occur, to resolve them at the lowest possible level (Cheung & Yiu, 2006). When it comes to the construction industry, disputes involve advanced and complicated technical and financial matters (Betancourt & Crook, 2014). This suggests managing construction disputes need sound technical understanding and skills. Further according to Cheung & Yiu (2006), disputes in essence are complex than usually manageable technical problems due to the involvement of legal essence and personalities. The scenario gets worst in a multicultural environment where social, psychological and cross-cultural skills become requisites to avoid and resolve disputes (Lampel, 2001). All these emphasis denotes that the range of skill and competency requirements for construction dispute management is widespread in a diverse area.

2.7.1 Skills and competencies for DA

Dispute avoidance entails all the project participants carrying out their part of the work to the best possible level (Newly, 1992), which in turn requires a higher level of technical skills and competencies in the relevant discipline. For instance according to Sinha and Wayal (2007), errors and ambiguities in contract documentation which is a major contributor to construction disputes occur due to poor knowledge resulted from insufficient education, training and experience, carelessness, negligence incorrect reading of drawings/specifications (Sinha & Wayal, 2007). In addition to technical competencies, dispute avoidance embraces project participant's ability to institute certain aspects of project management including time management, cost management, proactive management of risk (RICS, 2012), scope change management (Sinha & Wayal, 2007), quality management and quality assurance, and information management (Fenn & Gameson, 1997).

In addition, there are certain personal and interpersonal skills and competencies highlighted in literature as requisites for dispute avoidance. Effective teamwork, team leadership and ability to acknowledge other's needs (Bagshaw, 1998), ability to motivate the other party (Hunter, 2000), understanding and appreciating professional roles, ability to work with professionals from other disciplines and communicating effectively (Suter et al., 2009) have been introduced in literature as such core competencies and skills. Dispute avoidance in the international arena necessitates a better understanding of cultural factors and the ability to recognise and respond appropriately to the cultural differences (Hunter, 2000). As viewed by Briscoe, et al. (2001), whilst both hard and soft skills are needed to establish partnering and other relational contracting approaches that embrace dispute avoidance, soft skills are the most critical contributor to the effectiveness of such systems. Trust, commitment, cooperativeness, open and effective communication, mutual goals, continuous performance improvement, equity, integrated team building, flexibility, mutual respect, ethical conduct and discipline are among the related key components of relational contracting approaches (Rahman & Kumaraswamy, 2002; Palaneeswaran, Kumaraswamy, Rahman & Ng, 2003; Rahman, Kumaraswamy & Ling, 2007;

Mclennan; 2000). Further according to Briscoe et al. (2001), following are the skills required to establish partnering arrangement in the construction context:

1. Oral and written communication skills (Writing letters and reports, reading technical documents, understanding contracts)
2. Numerical and financial skills and Information Technology skills (Basic calculations, IT and computing, Financial management)
3. Client and contractor relationships (Verbal presentations, Marketing, strong negotiating skills)
4. Teamwork - leadership and motivation of the workforce are often critical skills
5. Planning skills including IT proficiency

Accordingly, competencies and skills required for dispute avoidance in construction projects are categorised in Table 2.2.

Table 2.2: skills and competency requirements for DA

SKILLS AND COMPETENCIES		REFERENCE
COMPETENCIES		
DAC 1	Competency in subject matter	(Sinha & Wayal, 2007)
DAC 1a	Knowledge, understanding and application of construction technology	
DAC 1b	Producing designs to satisfy overall requirement	
DAC 1c	Cost estimation, management and reporting	
DAC 1d	Procurement and tendering	
DAC 1e	Contract administration	
DAC 2	Financial Management	(Briscoe et al, 2001)
DAC 3	Ethical conduct and discipline	(Rahman & Kumaraswamy, 2002)
DAC 4	Risk management	(RICS, 2012)
DAC 5	Scope and Change management	(Sinha & Wayal, 2007)
DAC 6	Quality management	(Sinha & Wayal, 2007)
DAC 7	Time management	(RICS, 2012)
DAC 8	Team leadership and Managing People	(Bagshaw, 1998)
DAC 9	Data and information management	(Sinha & Wayal, 2007)
SKILLS		
DAS 1	Computer skills	(Briscoe et al, 2001)
DAS 2	Planning skills	(Briscoe et al, 2001)
DAS 3	Oral and written communication	(Rahman & Kumaraswamy, 2002)

SKILLS AND COMPETENCIES		REFERENCE
DAS 4	Team building skills	(Rahman & Kumaraswamy, 2002)
DAS 5	Team working skills	(Bagshaw, 1998)
DAS 6	Ability to understand and acknowledge other's needs and interests	(Bagshaw, 1998)
DAS 7	Skills for recognising and responding to cultural differences	(Hunter, 2000)
DAS 8	Ability to be flexible	(Rahman & Kumaraswamy, 2002)
DAS 9	Ability to act fairly and impartially	(Rahman & Kumaraswamy, 2002)
DAS 10	Skills for continuously improving performance level	(Rahman & Kumaraswamy, 2002)

2.7.2 Skills and competencies for DR

The skills and competencies of the people involved in the dispute resolution process is a major contributing factor to determine its success. Especially, the outcome of DR techniques with third party intervention for instance mediation, conciliation and adjudication heavily depends on the skills and competencies of such involved neutral third party or the dispute resolver (S. O. Cheung, 2014; S. Cheung et al., 2002).

Daicoff (2012) has presented the following categorisation of expected skills from a lawyer as a dispute resolving professional;

- a) **Intrapersonal skills** (such as honesty, integrity, maturity, reliability, judgment, passion, motivation, engagement, diligence, self-confidence, tolerance, patience, independence, adaptability, general mood, stress management, and continued professional and self-development)
- b) **Interpersonal skills** and collaboration (such as general communication skills such as dealing effectively with others, understanding human behavior, empathy, listening, questioning, interviewing, counseling, influencing and advocating, instilling others' confidence in you, obtaining and keeping clients, developing relationships, and networking within the profession, teamwork, working cooperatively with others, and managing and mentoring others)
- c) **Conflict resolution skills**
- d) **Problem-solving skills**
- e) **Strategic planning**

In addition, literature presents different views on required skills and competencies in order to effectively resolve disputes through different DR mechanisms. Litigation and Arbitration is excluded here due to domination by legal professionals.

2.7.2.1 Skills and competency requirements for Negotiation

The participants of the negotiation process who represent the disputant parties should essentially possess knowledge and expertise in the subject matter on which the dispute has been arisen (Kharbanda & Stallworthy, 1991). However, technical competence and knowledge solely does not create a successful negotiator (Yates, 2011), rather it is soft skills that are highly valued. According to Kharbanda and Stallworthy (1991), such skills include the ability to listen, verbal and non-verbal communication, ability to understand, bargaining skills, evaluating skills and skill in interpreting. Creative decision-making skill such as fluency, flexibility, and originality is another highly valued skill area (Kurtzberg, 2010). American Council of Engineers Contractor's Guidelines to Practice as cited in Yates (2011) adds several other skills and competencies to this collection such as preparation and planning skills, ability to understand the true interests of the firm, ability to think clearly and rapidly under pressure, patience, ability to persuade others, understand others, control emotions and to maintain flexibility.

In addition, Pedler (1977) has applied a systematic approach in this regard, where negotiation skills and competencies are determined separately at each stage of the negotiation process. The author's findings are illustrated in fig 2.3

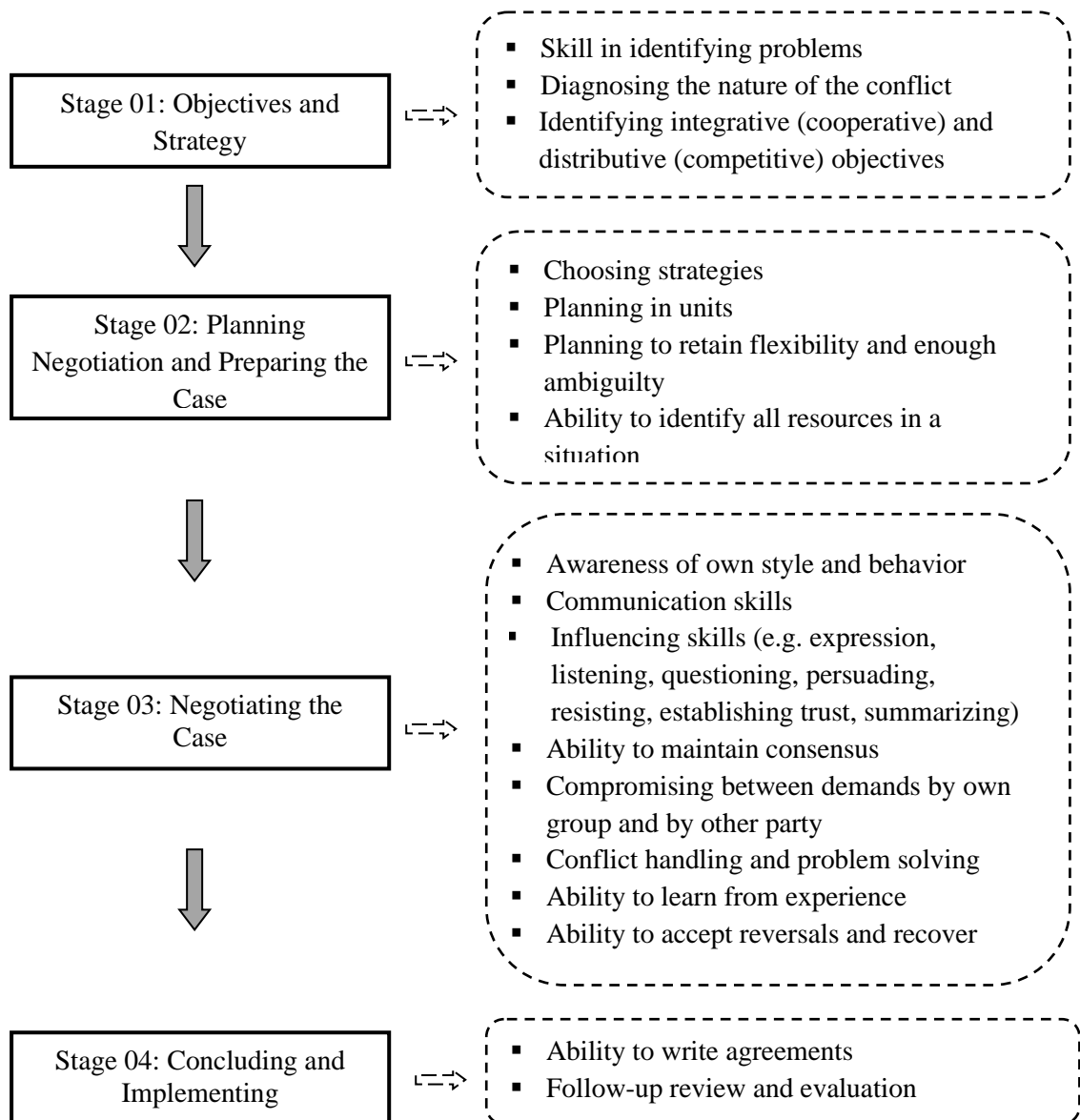


Figure 2.3: Skills and competencies required throughout negotiation process
Source: (Pedler, 1977)

2.7.2.2 Skills and competency requirements for Mediation / Conciliation

Mediator/conciliator play a key role in the process of resolving the dispute and are influential on the outcome where the level of such influence is depending on his skills, abilities and personal qualities (Fung, 2014).

Unlike in negotiation, the mediator or the conciliator does not have his own interest or a contribution in the dispute itself; hence, his ability to understand the particular

issue is of paramount importance (Betancourt & Crook, 2014). In the case of construction disputes where the subject is more technical and complex, expertise in the subject matter of dispute enables him to have a quick grasp of the issues and to share his knowledge among the parties (Fung, 2014). In order to facilitate resolving the dispute or to provide an independent opinion, he should possess well developed analytical skills, problem solving skills, skills to communicate interests, concerns and proposals in understandable terms, ability to establish rapport with parties, ability to deal with their own and other party's emotions and feelings, co-coordinating skills (Betancourt & Crook, 2014) and listening ability (Fung, 2014). As viewed by Vandeputte (2015), mediator / conciliator is further expected to demonstrate ability to see the world from the other party's perspective and to express that viewpoint in a nonjudgmental way, skill to detect hidden interests of the parties and to effectively intervene with persistent positions, ability to detect difference in communication and negotiation styles and manage their effect on the process and ability to bridge the cross-cultural difference. In addition, with related to the procedure, the mediator or the conciliator should be aware of the mediation/conciliation theories and practices and be able to develop and implement a process which is most appropriate to the specific circumstance (Betancourt & Crook, 2014), control the process including managing conflicts and handling challenges, reframe issues i.e. to frame or express the issues differently, create doubts, intervene suitably and to distinguish confidential information from the information to be communicated openly (Fung, 2014) and also he should be able to summarise (Wade, 1999). Moreover, according to S. Cheung, et al. (2002), drafting skill of the facilitator provide great assistance to the parties to draw up a settlement agreement reflecting the true intention of both parties.

With regard to personal qualities, he should be impartial, neutral, patient, assertive, sincere, non-judgmental (avoiding judgments based on one's personal and especially moral standards), optimistic and persistent (continuing firmly or obstinately in an opinion or course of action in spite of difficulty or opposition), trustworthy, creative and flexible (Fung, 2014). Besides, structured informality is another aspect that should a mediator should hold (Hunter, 2000). As further perceived by wade (1999),

persistence, patience and listening skills are the core requirements of mediator competence.

2.7.2.3 Skills and competency requirements for Adjudication / DAB

An adjudicator is a person who plays a judicial role by listening to the parties' dispute, applying relevant law and thus making a binding decision on the parties (CIArb, 2016).

Accordingly, several authors have presented different skill and competency areas required of an adjudicator. To the viewpoint of Pickavance (2015), an adjudicator should necessarily be equipped with the following skills and competencies;

a) Technical ability

This includes adequate knowledge required to understand complex legal and factual affairs and to identify and analyse the relevant issues, experience related to the subject matter and area of dispute and updated awareness on adjudication and construction law.

b) Procedural competence

This includes awareness of procedural requirements related to adjudication.

c) Case management skills

The adjudicator needs to have the ability to make decisions quickly and to proactively deal with critical issues in order to conclude the process within the tight time scale.

As stated by Coulson (2011), the three most essential skills of an adjudicator are the ability to manage time of his own and that of the parties', ability to grasp essential issues quickly and focus on them and the ability to treat the parties fairly and courteously. An adjudicator should be proactive, drive forward, flexible, able to make considered decisions and sensible conclusions quickly and effectively (decisive), able to assess and initiate things independently (initiative) together with proven analytical ability, logical thinking and clarity of thoughts (Riches & Dancaster, 2008). Further to him, he should have the ability to set procedures that enable him acquiring maximum information necessary to arrive at the decision. In

addition, FIDIC (2017) affirms that an adjudicator should be familiar with conditions of the contract and has experience in contract administration and dispute resolution while possessing inter-personal and communication skills, language skills including fluency in English and ability to be impartial and objective.

Especially with regard to dispute boards which include dispute adjudication board, Chern (2008) presented the following aspects that should be possessed by its members.

- a) Good people skills comprising oral and written communication skills to communicate with other board members and with parties, ability to effectively listen to what is said by each witness, management skills and team working skills.
- b) Independence (lack of latent or patent bias, freedom from financial ties, sense),
- c) Understanding as to the type of project
- d) Confidentiality to keep confidential any information obtained in the course of dispute resolution
- e) Objectivity, neutrality and impartiality
- f) Expertise and experience in the particular type of project and type of construction technique
- g) Experience in interpretation of contract documentation, and standard forms
- h) Sufficient legal understanding and experience in the substantive law (desirable but not necessary for all the members)
- i) Knowledge and understanding of Dispute Board process and procedural rules

These perspectives of different authors on competencies and skills requirements for each type of dispute resolution method is categorised in Table 2.3

Table 2.3: Skills and Competency requirements for each DR method

FOR NEGOTIATION	
Competencies	
Competency in subject matter to identify the issue	(Kharbanda & Stallworthy, 1991)
Choosing negotiation strategies and identifying own style and behavior	(Pedler, 1977)
Ability to identify and manage all resources in a situation	(Pedler, 1977)
Skills	
Creative solution making skills	(Kurtzberg, 2010)
Evaluating skills	(Kharbanda & Stallworthy, 1991)
Skill in interpreting	(Kharbanda & Stallworthy, 1991)
Skills in handling conflicts	(Pedler, 1977)
Oral and written communication, listening ability	(Kharbanda & Stallworthy, 1991)
Ability to persuade and influence others	(Pedler, 1977; Yates, 2011)
Ability to understand and acknowledge others, their styles and behaviors	(Yates, 2011)
Patience, ability to accept reversals and recover	(Pedler, 1977; Yates, 2011)
Ability to maintain flexibility	(Pedler, 1977)
Ability to learn from experience and self-development skills	(Pedler, 1977)
Ability to think clearly and rapidly under pressure	(Yates, 2011)
Bargaining skill, Ability to maintain consensus and to compromise	(Kharbanda & Stallworthy, 1991; Pedler, 1977)
Ability to control emotions	(Yates, 2011)
Agreement drafting skills	(Pedler, 1977)
FOR MEDIATION/CONCILIATION	
Competencies	
Competency in subject matter	(Fung, 2014)
Knowledge of mediation theories and practice	(Fung, 2014)
Ability to develop and implement a process which is appropriate to the specific circumstance	(Betancourt et al., 2014)
Co-ordination and integration	(Betancourt et al., 2014)
Skills	
Creativeness	(Fung, 2014)
Analytical skills	(Betancourt et al., 2014)
Ability to manage conflicts	(Betancourt et al., 2014)
Oral and written communication, listening ability	(Betancourt et al., 2014)
Skill to understand others and to see the world from the other party's perspective	(Vandeputte, 2015)
Skill to detect hidden interests	(Vandeputte, 2015)
Ability to recognise and respond to cross-cultural difference	Vandeputte, 2015)
Ability to establish rapport	(Betancourt et al., 2014)
Patience	(Fung, 2014)

Ability to maintain flexibility	(Fung, 2014)
Ability to treat parties impartially and neutrally	(Fung, 2014)
Ability to deal with own and other party's emotions and feelings	(Betancourt et al., 2014)
Agreement drafting skills	(Cheung, Suen & Lam, 2002)
Non- judgmental (skill of avoiding judgments based on one's personal and moral status)	(Fung, 2014)
Ability to handle challenges	(Fung, 2014)
Confidentiality (Distinguish and keep confidential information)	(Fung, 2014)
Ability to quickly understand the issue	(Betancourt et al., 2014)
FOR ADJUDICATION/DAB	
Competencies	
Knowledge and skills in subject matter	(Pickavance, 2015)
Familiar with Conditions of Contract	(FIDIC, 2017)
Contract administration	(FIDIC, 2017)
Legal knowledge and understanding	(Pickavance, 2015)
Procedural competence	(Pickavance, 2015)
Time management	(Coulson, 2011)
Skills	
Analytical ability	(Riches & Dancaster, 2008)
Logical thinking, clarity of thoughts	(Riches & Dancaster, 2008)
Decisive (ability to make decisions quickly and effectively)	(Riches & Dancaster, 2008)
Communication skills, Listening ability, language skills	(FIDIC, 2017)
Team working skills	(Chern, 2008)
Ability to be flexible	(Riches & Dancaster, 2008)
Ability to treat the parties fairly, impartially, objectively and courteously	(Coulson, 2011)
Confidentiality (keep confidential information)	(Chern, 2008)
Initiative (ability to assess and initiate things independently)	(Riches & Dancaster, 2008)
Ability to grasp essential issues quickly and focus on those issues	(Coulson, 2011)

Accordingly, Table 2.4 presents a common set of competencies and skills required for resolving construction disputes;

Table 2.4: Summary of Skills and Competencies required for DR

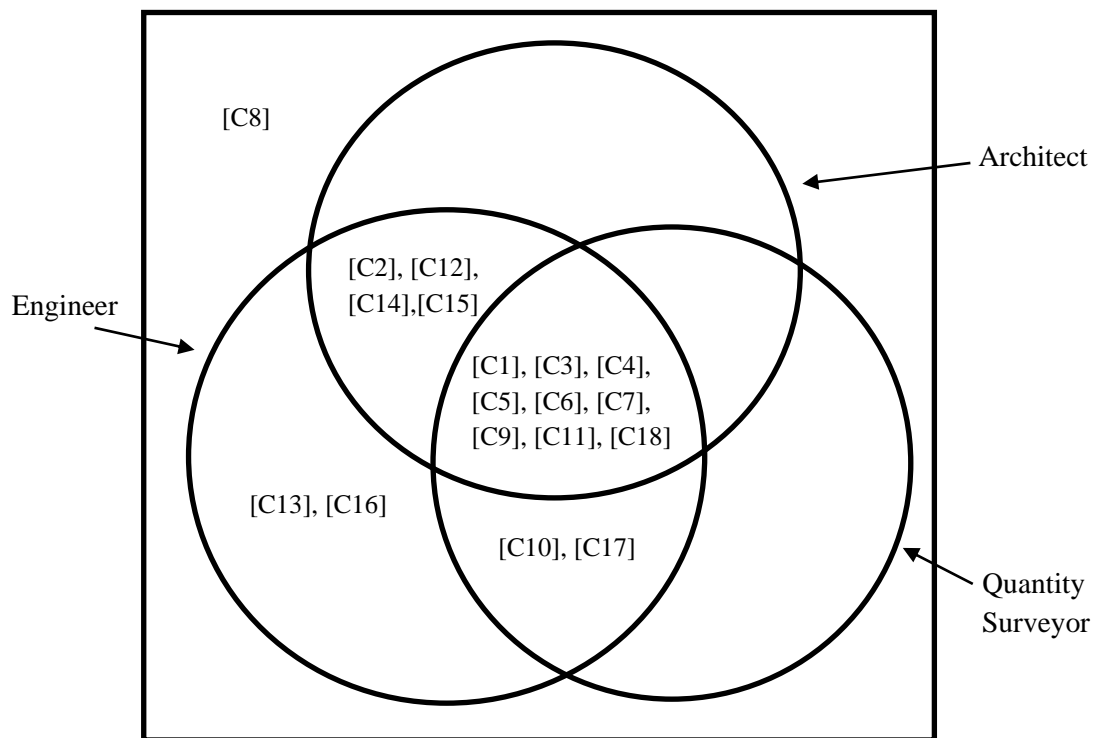
Dispute Resolution Competencies (DRCs)	
DRC 1	Competency in subject matter
DRC 1a	Knowledge, understanding and application of construction technology
DRC 1b	Producing designs to satisfy overall requirement
DRC 1c	Cost estimation, management and reporting
DRC 1d	Procurement and tendering
DRC 1e	Contract administration
DRC 2	Legal knowledge and understanding
DRC 3	Procedural competence on dispute resolution procedures
DRC 4	Co-ordination and integration
DRC 5	Time management
DRC 6	Identifying and managing resources
Dispute Resolution Skills (DRSs)	
DRS 1	Creative solution making skills
DRS 2	Analytical skills
DRS 3	Logical thinking, clarity of thoughts
DRS 4	Evaluating skills
DRS 5	Skill in interpreting
DRS 6	Decisive (ability to make decisions quickly and effectively)
DRS 7	Skills in handling conflicts
DRS 8	Oral and written communication skills
DRS 9	Ability to persuade and influence others
DRS 10	Team Working Skills
DRS 11	Ability to understand and acknowledge others, their styles, behavior, hidden interests
DRS 12	Ability to recognise and respond to cross-cultural differences
DRS 13	Skill in establishing rapport
DRS 14	Patience and tolerance
DRS 15	Ability to maintain flexibility
DRS 16	Ability to treat parties fairly and impartially
DRS 17	Learn from experience and self-development skills
DRS 18	Ability to control own emotions
DRS 19	Ability to deal with other party's emotions and feelings
DRS 20	Ability to think clearly and rapidly under pressure
DRS 21	Ability to grasp essential issues quickly and focus on those issues
DRS 22	Initiative (ability to assess and initiate things independently)
DRS 23	Non- judgmental (skill of avoiding judgments based on one's personal and moral status)
DRS 24	Ability to handle challenges
DRS 25	Bargaining skill, ability to maintain consensus and to compromise
DRS 26	Confidentiality (Distinguish and keep confidential information)
DRS 27	Agreement drafting skills

2.8 Skills and competencies of construction professionals

Architects, Engineers and Quantity Surveyors are the traditionally recognized construction professionals who deal with diversified aspects related to the construction projects (H.W. Chan et al., 2002). Engineers are the professionals who implement, design, develop, operate and manage the construction projects based on their knowledge, skills and competencies in the field of mathematics, science and technology together with business and management competencies (Nguyen, 1998). Quantity Surveyors engage in cost management aspects throughout the project lifecycle, starting from the inception stage while assuring the client's interests and managing the process in a way minimising claims and unexpected financial impacts on the budget (Australian Institute of Quantity Surveyors [AIQS], 2012). Architects are the project designers and in most situations project team leaders and project supervisors (Kwofie, Adinyira & Botchway, 2015).

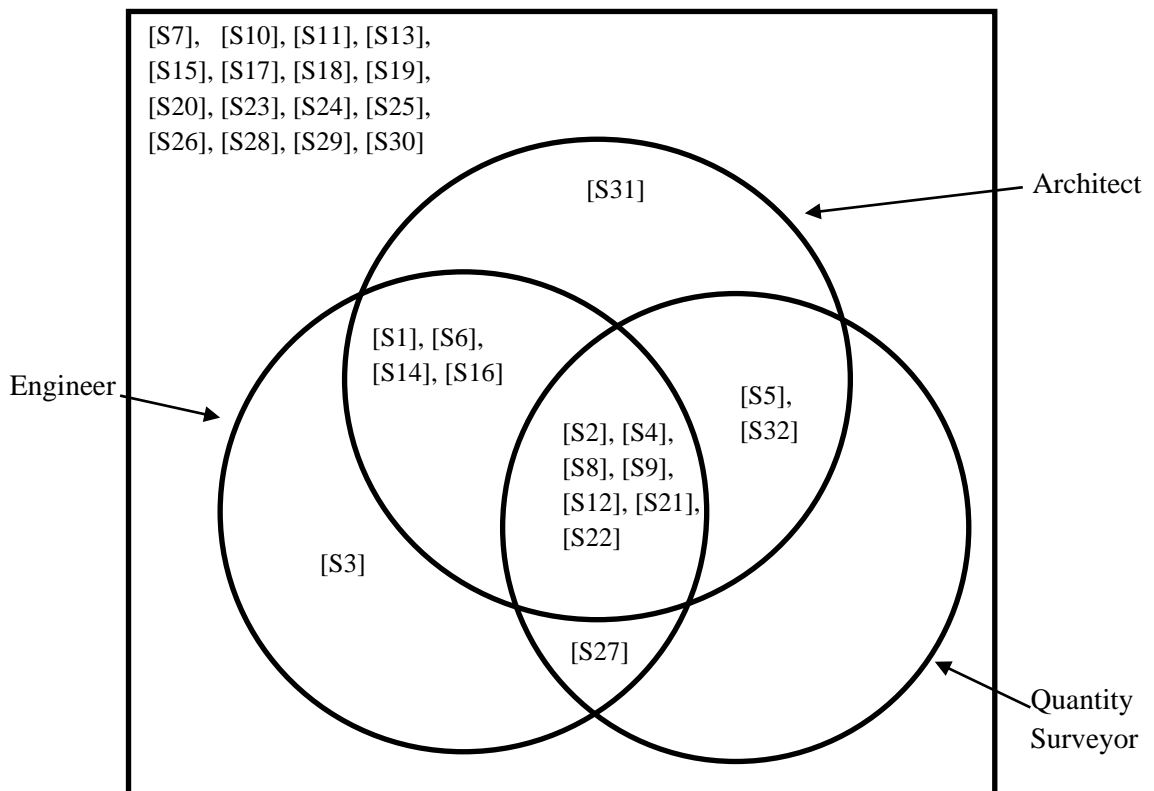
In order to effectively play the roles these construction professionals are assigned, they are expected to demonstrate an amalgamation of skills and competencies with the focus on their responsibilities. Such skills and competencies are presented in Appendix B.

Accordingly, the common and distinct areas of skills and competencies which are looked into in qualifying construction professionals in the Sri Lankan construction industry are demonstrated respectively in figure 2.3 and figure 2.4.



- [C1] Knowledge, understanding and application of construction technology
- [C2] Producing designs to satisfy overall requirement
- [C3] Cost estimation, management and reporting
- [C4] Procurement and tendering
- [C5] Contract administration
- [C6] Legal knowledge and understanding
- [C7] Financial management
- [C8] Procedural competence on dispute resolution procedures
- [C9] Ethical practice, discipline and professional conduct
- [C10] Risk management
- [C11] Scope and change management
- [C12] Co-ordination and integration
- [C13] Health and safety management
- [C14] Quality management
- [C15] Time management
- [C16] Team leadership & managing people
- [C17] Identifying and managing resources
- [C18] Data and information management

Figure 2.4 : Competencies expected from construction professionals in Sri Lankan construction industry (SLIA, 1998; SLIA, 2014; IESL, 2015; IQSSL, 2007)



[S1]	Creative thinking and finding innovative solutions.	[S17]	Skill in recognizing and responding to cultural differences
[S2]	Analytical skills	[S18]	Skill in establishing rapport
[S3]	Logical thinking, clarity of thoughts	[S19]	Patience and tolerance
[S4]	Evaluation skills	[S20]	Ability to be flexible
[S5]	Skills in interpreting	[S21]	Ability to act fairly and impartially
[S6]	Decision-making skills	[S22]	Self –development skills
[S7]	Skills in handling conflicts	[S23]	Ability to control own emotions
[S8]	Computer skills	[S24]	Ability to deal with other party’s emotions and feelings
[S9]	Planning skills	[S25]	Ability to think clearly and rapidly under pressure
[S10]	Delegation skills	[S26]	Ability to grasp essential issues quickly and focus on those issues
[S11]	Business skills	[S27]	Initiative
[S12]	Oral and written communication skills	[S28]	Non- judgmental
[S13]	Influencing skills	[S29]	Ability to handle challenges
[S14]	Team-building skills	[S30]	Bargaining skill, ability to maintain consensus and to compromise
[S15]	Team working skills	[S31]	Confidentiality
[S16]	Ability to understand and acknowledge others, their needs and interests	[S32]	Agreement drafting skills

Figure 2.5: Skills expected from construction professionals in Sri Lankan construction industry (SLIA, 1998; SLIA, 2014; IESL, 2015; IQSSL, 2007)

2.9 Summary

A dispute is the presence of an argument between the parties which is really detrimental to the interests of the construction project. Hence, in order to seek optimal project performance, managing these disputes is essential through dispute avoidance and dispute resolution techniques. Literature identifies thirty-one (31) main sources that generate disputes which in other terms, are the targets in dispute avoidance effort.

Due to the technicality and complexity involved in construction disputes and the contribution made by the construction professionals towards the generation of disputes, the construction professional involvement is highly envisaged in the process of managing construction disputes. Engineers, Quantity Surveyors and Architects are the construction professionals who are expected to be involved in construction dispute management.

Effective dispute management in the construction industry requires a spectrum of skills and competencies with deviated emphasis for dispute avoidance and for different techniques of dispute resolution. The literature review identified thirteen (13) competencies [considering sub-area as one competency] and ten (10) skills required for Dispute Avoidance and ten (10) competencies [considering sub-area as one competency] and twenty-seven (27) skills required for Dispute Resolution techniques in general.

On the other side, the literature review revealed that the construction professionals are expected to be skilled and competent in specific areas related to their own profession as well as in a common area in order to render mutual responsibilities in the industry. Such competencies and skills as expected in professional qualification in the Sri Lankan construction industry were categorized into eighteen (18) competency areas and thirty-two (32) skill areas. Out of the eighteen competencies Engineers, Quantity Surveyors and Architects are expected to possess respectively seventeen (17), eleven (11) and thirteen (13) competencies and out of the thirty-two skills Engineers, Quantity Surveyors and Architects are expected to possess respectively thirteen (13), ten (10) and fourteen (14) skills.

Thus, these literature findings provide a sound basis for further comparisons in actual construction industry set up in Sri Lanka.

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology adopted in order to achieve the research aim. In the beginning, the chapter provides an overview of the total research process and subsequently, the research design including research approach, data collection and analyzing techniques are explained in detail.

3.2 Research process

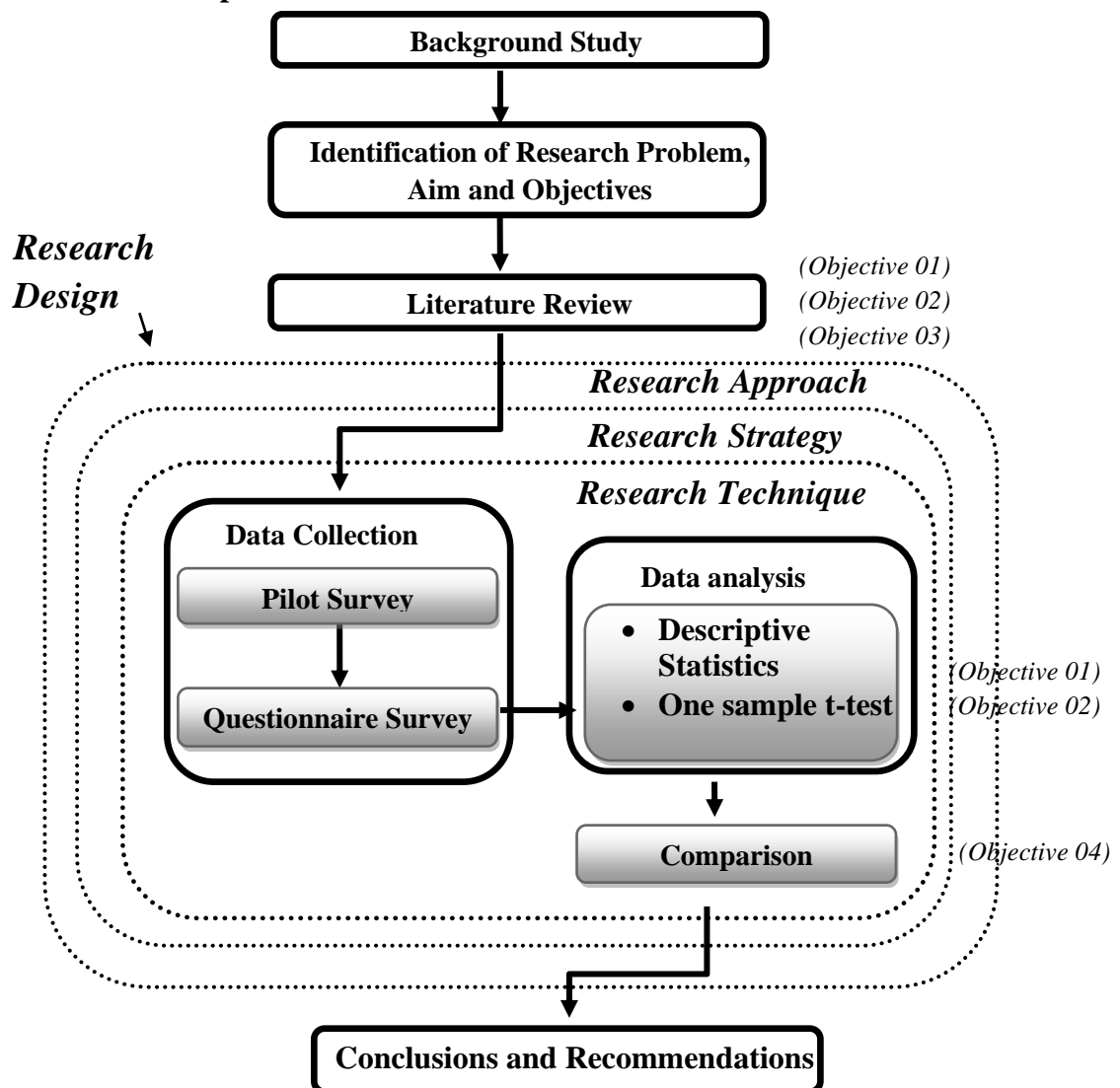


Figure 3.1 Research process

The research process is the series of steps organized in the sequence that is necessary for the effective execution of the research (Kothari, 2004). The research process to be adopted in this study is illustrated in Figure 3.1.

3.3 Research design

Research design is the systematic procedures to solve the research problem by linking data collection and analysis to results and thereby to conclusions (Fellows & Liu, 2008). Research design may be quantitative which deals with numerical data or maybe qualitative with analysis of complex data in terms of its content or narrative interpretation (Taylor, 2010).

The research design of this research study is developed throughout the following subsections.

3.3.1 Research approach and research strategy

The research approach can be broadly divided into two categories namely the quantitative approach and qualitative approach. Research strategies under the quantitative approach include survey and experiment while case study, ethnography and grounded theory belong to the qualitative research approach (Taylor, 2010).

Considering several aspects, 'Survey' which is under the quantitative research approach was decided as the most applicable research strategy for this study. The survey approach involves collecting data from a fraction of the population which is called 'Sample', analysing the collected data through statistical methods and generalising the findings to the population with quantitative descriptions (Kraemer, 2002).

3.3.1.1 Reasoning behind the selection of survey approach

As viewed by Yin (2009), a research problem is the leading criterion for the maybe of research approach for a particular study. Further according to the author, '*Who*', '*What*', '*Where*', '*How Many*' and '*How Much*' type questions requires the conduct of surveys which is under the quantitative research approach. This research is aimed at exploring the skill and competency requirement of construction professionals in

order to effectively manage disputes in the construction industry. It denotes 'What' type of research problem. This is the prime reason behind the selection of 'survey' as the research strategy for this research.

Quantitative approaches seek to gather factual data and to study relationships between facts and analysis of the data to yield quantified results (Fellows & Liu, 2008). This fits with the data analysis requirement of this research. In addition, according to Kraemer (2002), survey approach is appropriate when it is impossible or not desirable to control the variables, when the phenomenon which is being investigated is occurring or has occurred in the recent past and when the phenomenon is to be studied in its natural setting. These characteristics are also consistent with the features of this research proving that the survey approach is the most applicable to this research. Being quantitative, survey approach produces valid and objective descriptions of the phenomena studied (Taylor, 2010).

Moreover, a similar methodology has been followed in Kwofie et al. (2015) to identify the critical project management competencies of the architects in the Ghanaian construction industry and Poist (2007) to identify the skill requirement of senior-level logisticians. This also proves the suitability of the selected research approach and strategy for this study.

3.3.2 Research technique- data collection

The questionnaire survey was used as the data collecting technique for this research with view to quantitatively extract the general view of the construction industry experts related to the subject area.

3.3.2.1 Pilot survey

After preparing the draft questionnaire based on the literature findings, a pilot survey was conducted with view to identify whether the questionnaire is comprehensive enough to collect reliable data from the industry professionals and whether it is designed in a way to successfully address the anticipated research objectives. Nine respondents (three respondents from each profession) were engaged for the pilot

survey who were easily reachable while satisfying the requirements considered for becoming a respondent to this research.

3.3.2.2 Questionnaire survey

- **Target population**

The target population for this research study was construction industry professionals namely Engineers, Quantity Surveyors and Architects who hold corporate membership in the related Sri Lankan professional institutes.

- **Sample selection**

The sample for this survey was selected randomly using MS Excel from the contact lists of Engineers, Quantity Surveyors and Architects who are fulfilling the following requirements;

- Corporate members of the related Sri Lankan professional institutes
- Knowledgeable and/or experienced in considered ADR techniques in the construction industry.

These contacts were collected from the Institution of Engineers Sri Lanka (IESL), Institute of Quantity Surveyors Sri Lanka (IQSSL) and Sri Lanka Institute of Architects (SLIA).

a) Sample size

The sample size is very important in reflecting the characteristics of the population adequately (Taylor, 2010). Further according to the author, the sample size must be sufficiently large; as a thumb rule, it should be at least 30 in order to follow parametric statistics. According to Kothari (2004), where the sample is large (i.e. more than 30), it is assumed that the sampling distribution tends to be normal which is a prerequisite to conduct statistical t-test. Concerning all these factors and the time constraints, the sample size was decided as 32 for this research study.

b) Questionnaire design

The questionnaire consists of three sections namely 'Section A', 'Section B' and 'Section C' (*Annex B*).

Section A: demographic characteristics

Section A includes demographic characteristics of the respondents in six numbers of questions. Accordingly, the questions asked in this section includes the respondents' name and e-mail address (Q1), type of current organization (Q2), profession (Q3), total experience in the construction industry (Q4), knowledge and experience in ADR techniques used in the construction industry (Q5) and professional involvement in DR as per their experience (Q6).

Section B: Sources of Disputes and Construction Professional Involvement in Generating Disputes

Section B aims at identifying the significant sources of disputes and the contribution of construction professionals for the generation of disputes through such sources. This section relates to the first objective of the research, which was predominantly fulfilled through the literature review. This section comprises of a single question (Q7) with two subsections comprising thirty-one sources of construction disputes identified from the literature review, for the respondents to identify the significant sources and at which construction professionals' control each source of dispute is rested.

Section C: Dispute Management Skills and Competencies

The aim of Section C is to identify to what extent the skills and competencies identified from literature survey as requisites for dispute management are really important for DM in the construction industry set up, to the viewpoint of the construction industry practitioners. The section comprises of four main questions; the first and second questions (Q08 and Q09) are related to dispute avoidance while the third and fourth questions (Q10 and Q11) relates to ADR techniques. This section intends to fulfill the second objective of the research. In this section, the respondents are provided with a five-point response scale (1= Do not Required to be Possessed at

all, 2= Required to be Possessed at Low Level, 3= Required to be Possessed at Moderate Level, 4= Required to be Possessed at High Level, 5= Required to be Possessed at Extremely High Level).

c) Conducting the questionnaire survey

The final questionnaire was delivered by hand as well as through electronic mail after confirming the respondents' accomplishment of the criteria established to identify experts to the research.

3.3.3 Research technique- data analysis

3.3.3.1 Descriptive analysis

Descriptive statistics uses graphs, charts, percentages, tables and numerical descriptive measures including mode, median, mean, range etc. to indicate how a particular characteristic is distributed among a group of people (Taylor, 2010).

Section A (demographic characteristics) and section B Q7 (b) (Construction professional's control over generating disputes) of the questionnaire were analysed using graphical analysis techniques such as pie charts, percentage subdivided bar diagrams and tables.

3.3.3.2 Single sample t-test

T-test is a parametric test that uses statistical procedures to make generalisation about the population from the studies done to the samples drawn from it (Kothari, 2004). Further according to the author, one-sample t-tests compare means of a single sample with a hypothesis.

This test is useful for this research because it is capable of giving a decision on whether the parameter considered is significant or not, with related to a hypothesised value. Moreover, the research has used a continuous scale from 1-5 making it possible to use the t-test.

Therefore, single sample two-tailed t-test was adopted to analyse the following two sections of the questionnaire survey.

Section B Q7 (a) (Contribution of each source to generate disputes)

T-test was used as the analysis method to identify sources of disputes that significantly effective in the construction industry. This analysis completed objective 01 of the research which had been already fulfilled partly through the literature review.

Section C (Dispute management skills and competencies)

T-test was used to identify the competency and skill requirement for construction dispute avoidance and for each type of dispute resolution in the construction industry, in order to fulfill objective 02 of the research.

Accordingly the two hypothesis were defined as follows,

Null hypothesis **H₀: $\mu = \mu_0$** (Required level of the skill or competency equals to moderate level)

Alternative hypothesis **H₁: $\mu \neq \mu_0$** (Required level of the skill or competency different from moderate level)

Where,

μ - Population mean

μ_0 - Hypothesized value of population mean

In the analysis, μ_0 was positioned at '3' which is the moderate level of existence/ importance above which the particular skill or competency is considered to be significantly exists/important.

Test statistic was used as,

$$t = \frac{\bar{x} - \mu_0}{s / \sqrt{n}} \sim t_{n-1}$$

Where,

t	-	Test statistic
\bar{x}	-	Sample mean
μ_0	-	Hypothesized value of the population mean
S	-	Sample standard deviation
n	-	Sample size

T-tests were conducted using ‘statistical Package for Social Science (SPSS)’ software. Type I error (α) was placed at 0.05 hence 95% was used as the confident interval percentage.

When the ‘p-value’ or in other words ‘significance’ of the tested skill and competency area is less than 0.05 (level of significance used for the test), the null hypothesis was rejected. In other words, the skill and competency area is considered as statistically significantly different from the moderate level required for construction DM. Out of such skills and competencies, the ones of which the t-test statistic is positive only, was considered as significantly required for construction DM above the moderate level.

3.3.3.3 Comparison

Mainly two comparisons were conducted using the questionnaire survey results and literature findings in order to fulfill objective 03 of the research.

The first comparison was done among the ‘significant sources of disputes identified through t-test under Q7 (a)’, ‘significant competency and skill requirement for dispute avoidance identified through t-test under Q8 and Q9’ and ‘skills and competencies possessed by construction professionals as identified through literature survey. This comparison revealed the skill and competency areas that need to be improved in construction professionals for effective dispute avoidance in the current Sri Lankan construction industry.

The second comparison was done among the ‘significant competency and skill requirement for dispute avoidance identified through t-test under Q10 and Q11’ and

'skills and competencies possessed by construction professionals as identified through the literature survey. This comparison revealed the skill and competency areas that need to be improved in construction professionals for effective dispute resolution through each dispute resolution mechanism in the construction industry

3.4 Summary

This chapter described the research methodology used to complete (*objective 01*) and (*objective 02*) which were partly covered through literature review and to totally achieve (*objective 04*). The research methodology adopted was the survey approach with data collection through questionnaire survey and analysis mainly through one-sample t-test and further comparison of the results.

4.0 DATA ANALYSIS AND FINDINGS

4.1 Introduction

The previous chapter described in detail the total methodology adopted for collecting and analyzing data. This chapter analyses the collected data of the questionnaire survey, following the data analysis techniques presented in the methodology chapter.

This chapter comprises of three main sections to respectively analyse the three sections of the questionnaire; Section A: respondents' information, Section B: sources of disputes and CPs responsible for disputes and Section C: DACs, DASs, DRCs and DRSs.

4.2 Respondents' information

4.2.1 Response rate

The questionnaire survey was carried out by delivering forty-six (46) questionnaires to Engineers, Quantity Surveyors and Architects who were selected as mentioned in section 3.3.2.2 (research technique). Thirty-five (35) of the delivered questionnaires were returned. However, three of the respondents did not have at least knowledge in certain DR mechanisms under Q5. Therefore, only 32 responses were considered for the analysis. As illustrated in Figure 4.1, the response rate of effective questionnaires is 70%.

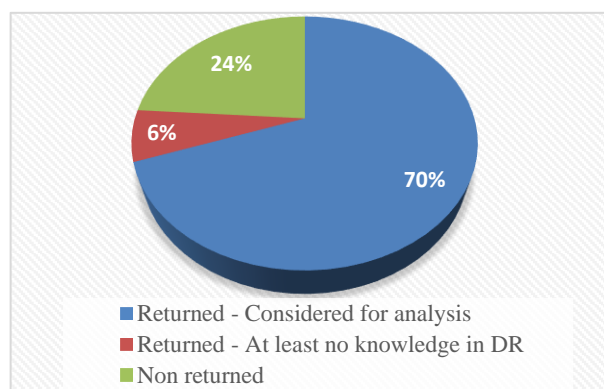


Figure 4.1: Overall response rate

4.2.2 Composition of respondents according to the current organisation

Figure 4.2 illustrates the composition of the effective responses according to the type of current organization. The majority (50% out of 32) respondents were consultants while client and contractors represent the remaining 44% and 6% respectively.

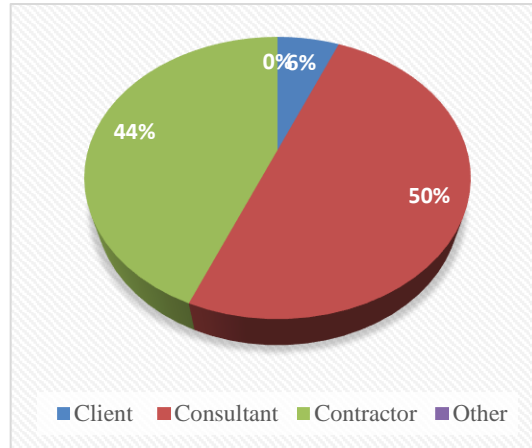


Figure 4.2: Type of current organisation

4.2.3. Composition of respondents according to qualified profession

As illustrated in Figure 4.3, the study represents the view of construction professionals practicing as Engineer, Quantity Surveyor and Architect at the proportions of 34.4%, 34.4% and 31.3% respectively of the effective responses.

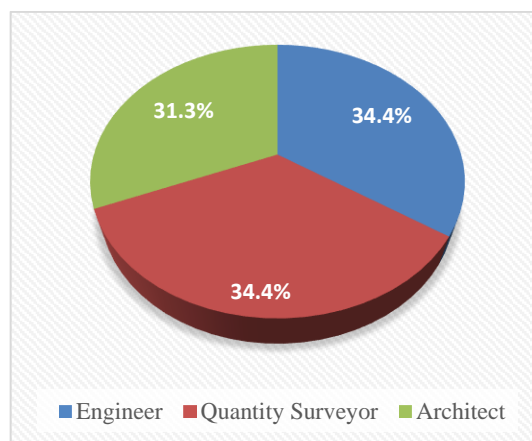


Figure 4.3: Distribution of respondent's profession

4.2.4 Experience in the construction industry

As signified in Figure 4.4, more than 80% of respondents were having over 10 years of experience while the rest 19% of respondents were having less than 10 years of experience.

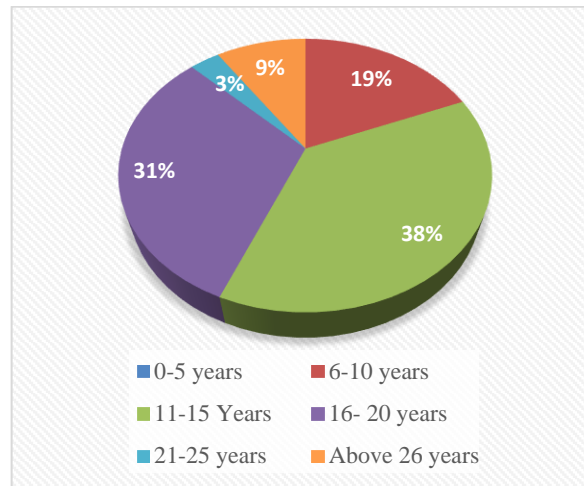


Figure 4.4: Distribution of experience of respondents

4.2.5 Knowledge and experience in DR

Effective respondents for the analysis were selected by targeting construction professionals with either knowledge or experience in each type of DR method. Accordingly, the rate of knowledge of the effective respondents on each DR method is 100%.

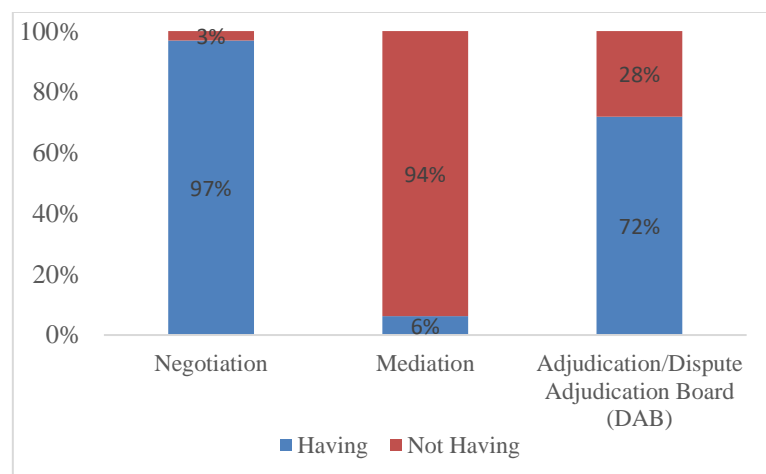


Figure 4.5: Experience in DR methods

Figure 4.5 indicates the experience level of the effective respondents in each type of DR method. Accordingly, 97% of the respondents have experience in negotiation, 6% in Mediation / conciliation and 72% in Adjudication/ DAB.

4.2.6 Professionals involved in DR

Figure 4.6 indicates the involvement of professionals in DR in the Sri Lankan construction industry, at the viewpoint of professionals who have marked in Q5 as having experience in each DR method. For instance, 100% of the respondents who have experience in Adjudication/DAB indicated that Engineers are involved in Adjudication/DAB while it is 70%, 10% and 25% respectively for Quantity Surveyors, Architect and other professionals.

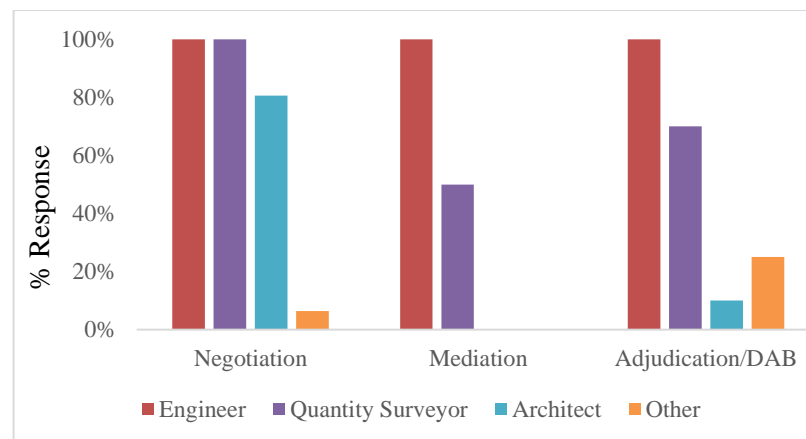


Figure 4.6: Professional involvement in DR

4.3 Sources of disputes and construction professionals responsible for them

4.3.1 Sources of disputes

First subsection under section B of the questionnaire collected the responses with respect to the level at which each source contribute to generate disputes in the construction industry on a scale of 1 to 5, where '5' represent extremely high level of contribution and '1' represent no contribution at all. Subsequently, a single sample t-test as described in section 3.3.3.2 was conducted for each source of dispute to

identify whether each of them is significant in terms of their contribution to generate disputes in the construction industry.

Out of thirty-one (31) sources tested, twenty (20) sources of which the significance is lesser than 0.05 were thus identified as significantly contributing sources. Table 4.1 indicates all the sources in two groups as ‘Significant’ and ‘Not significant’ together with their mean, standard deviation, significance and t value. Further, the significant sources are ranked according to their t value.

Table 4.1: Significance of sources of disputes

No	Source of dispute	Mean	Std. Deviation	Sig (2 tailed)	t-value	Rank
Significant Sources (‘significance <0.05’ and ‘ t value>0’)						
S01	Ambiguities in contract documents	4.69	.492	.000	18.689	01
S02	Variations	4.59	.499	.000	18.068	02
S13	Adversarial / controversial culture	4.56	.504	.000	17.537	03
S21	Lack of team spirit	4.52	.507	.000	17.085	04
S28	Litigious mindset of project participants	4.38	.492	.000	15.813	05
S27	Contradictory goals and needs	4.34	.483	.000	15.752	06
S03	Inadequate / incomplete specifications, information and instructions	4.41	.560	.000	14.207	07
S18	Delays in work progress by Contractor	4.22	.553	.000	12.475	08
S04	Unrealistic pricing /errors in tender	4.09	.530	.000	11.667	09
S19	Poor project administration and management by contractor	3.75	.568	.000	7.470	10
S22	Disruption	3.81	.644	.000	7.132	11
S31	External Factors (Weather, Legal, Economic, Public interruption)	3.81	.644	.000	7.132	11
S05	Payment delays	3.69	.644	.000	6.035	13
S16	Poor project administration and management by consultants	3.59	.560	.000	5.999	14
S12	Unfair and unclear risk allocation	3.81	.780	.000	5.890	15
S15	Extension of time for completion	3.69	.693	.000	5.614	16

S14	Unforeseen Site conditions	3.63	.751	.000	4.706	17
S09	Poor communication	3.35	.545	.001	3.566	18
S30	Financial incapacity of the Contractor	3.44	.759	.003	3.259	19
S29	Poor project planning and scheduling	3.41	.837	.010	2.746	20
Not Significant Sources statistically						
S25	Technical inadequacy of the Contractor	3.28	.924	.095	1.722	
S08	Poor quality /defective works by Contractor	3.19	.738	.161	1.438	
S26	Suspension of Work	3.19	.859	.226	1.235	
S11	Unrealistic expectations/targets of Employer	3.13	.660	.292	1.072	
S07	Design errors	3.06	.669	.601	.528	
S17	Acceleration	2.66	.545	.001	-3.556	
S06	Slow client's responses	2.53	.671	.000	-3.950	
S10	Late giving of possession	2.44	.669	.000	-4.756	
S20	Inappropriate procurement strategy/Contract type	2.34	.602	.000	-6.171	
S23	Lack of professionalism of Employer, consultants and Contractor	2.34	.602	.000	-6.171	
S24	Over/under measurement of work progress by consultants	2.22	.659	.000	-6.705	

Out of the tested sources of disputes, ‘S1: Ambiguities in the contract document (t=18.689)’ is the most significant source of dispute. ‘S2: Variations (t=18.068)’, ‘S13: Adversarial / controversial culture (t=17.537)’, ‘S21: Lack of team spirit (t=17.085)’, ‘S28: Litigious mindset of project participants (t=15.813)’, ‘S27: Contradictory goals and needs (t=15.752)’, ‘S3: Inadequate/incomplete specifications, information and instructions (t=14.207)’, ‘S18: Delays in work progress by Contractor (t=12.475)’ and ‘S04: Unrealistic pricing /errors in tender (t=11.667)’ are among the other most significant sources of disputes. ‘S22: Disruption’ and ‘S31: External Factors’ have yield equal weights according to the level at which they contribute to generate disputes.

4.3.2 Construction professionals' involvement in dispute generation

The second subsection of Section B of the questionnaire collected responses on who are the construction professionals responsible for generating disputes through each source of dispute. Only the significant sources of disputes as identified through the analysis under the above subsection 4.3.1 (Sources of disputes) were considered for the analysis under this section. Accordingly, Figure 4.7 indicates the respondents' views on construction professional (s) who are responsible for generating disputes through each of the significant sources of disputes.

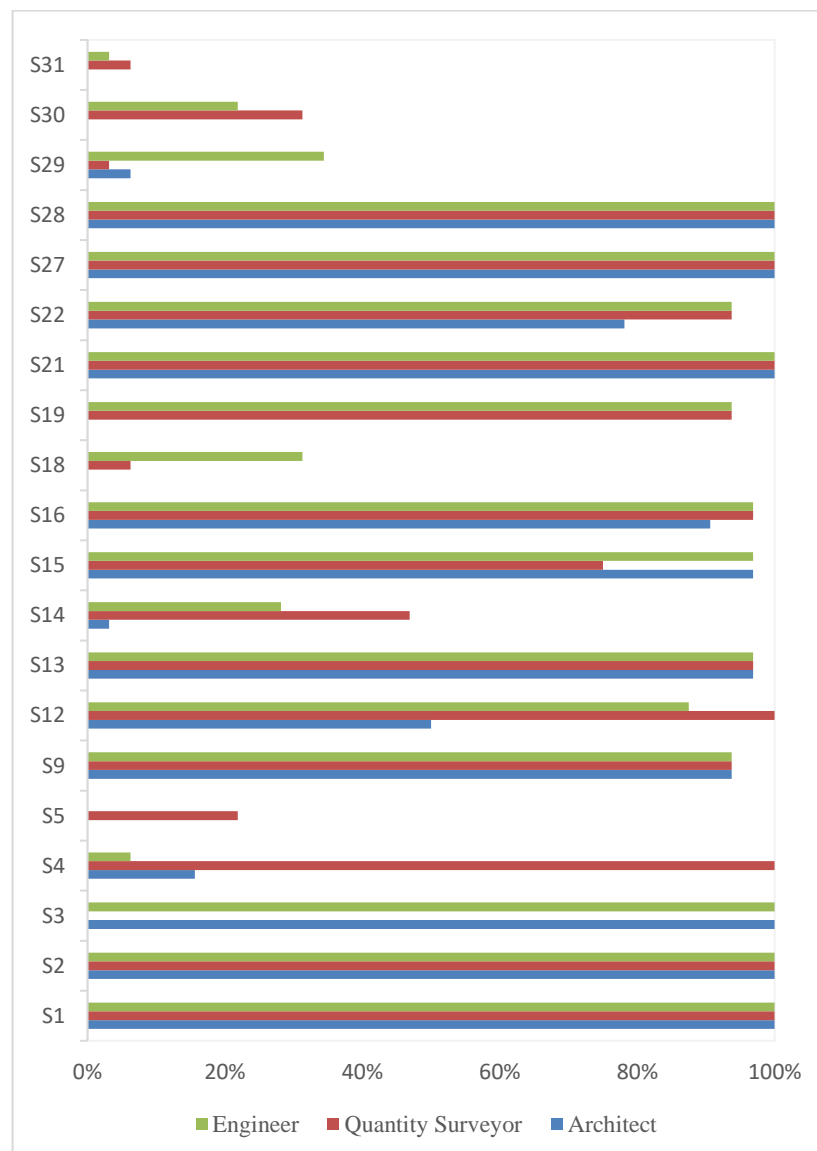


Figure 4.7: Professional involvement in dispute generation

For example, 100% of the respondents have admitted that all the professionals are responsible for generating disputes through S1: Ambiguities in Contract Documents. 6%, 100% and 16% of the respondents admit that respectively Engineer, Quantity Surveyor and Architect are responsible for generating disputes through S4: Unrealistic pricing /errors in tender.

Accordingly, Table 4.2 presents the summary of the respondents view on construction professional's responsibility for significant sources of disputes;

Table 4.2: Construction professionals' responsibility for significant sources of disputes

Type (s) of Construction Professionals Responsible	Related Significant Sources	Number of Significant Sources
Engineer, Quantity Surveyor and Architect	S01, S02, S04, S09, S12, S13, S14, S15, S16, S21, S22, S27, S28, S29	14
Engineer and Quantity Surveyor	S18, S19, S30, S31	4
Engineer and Architect	S03	1
Quantity Surveyor and Architect	-	0
Quantity Surveyor	S05	1
No construction professional	-	0
Total		20

It is noteworthy that all three types of construction professionals are responsible for the majority of the significant sources of disputes. They are;

- Ambiguities in contract documents
- Variations
- Unrealistic pricing /errors in tender
- Poor communication
- Unfair and unclear risk allocation
- Adversarial/controversial culture
- Unforeseen Site conditions
- Extension of time for completion
- Poor project administration and management by consultants
- Lack of team spirit
- Disruption
- Contradictory goals and needs
- Litigious mindset of project participants
- Poor project planning and scheduling

Moreover, Engineer and quantity surveyor are responsible for disputes arisen through delays in work progress by Contractor, poor project administration and management

by contractor, financial incapacity of the Contractor and external factors (weather, legal, economic, public interruption while Engineer and Architect are responsible for disputes arisen through inadequate/incomplete specifications, information and instructions. Quantity surveyor is the only professional responsible for disputes arisen through payment delays.

Another important finding under this analysis is that there is no significant source of dispute where none of the construction professionals are responsible.

This denotes that construction professionals have a high contribution to the generation of disputes in the construction industry. This intern highlights the responsibility vested on each construction professional towards avoiding disputes in the construction industry.

4.4 Dispute management skills and competencies

4.4.1 Dispute Avoidance Competencies (DACs)

First question under section C of the questionnaire collected the respondents view on the level at which each DAC is required to be possessed for avoiding disputes in the contraction industry on a scale of 1 to 5, where '5' represent extremely high level and '1' represent not required to possess at all. Data thus collected was analysed through single-sample t-test conducted for each DAC. Table 4.3 presents the significant DACs along with their mean, standard deviation and significance and ranked according to the t value.

Accordingly, all the competencies tested are highly important in order to avoid disputes in the construction industry. 'DAC5: Scope and change management competencies (t=21.284)' is the most important competency required for dispute avoidance while 'DAC7: Time management (t= 19.416), 'DAC1e: Contract administration (t= 18.068), 'DAC1c: Cost estimation, management and reporting (t= 17.085)', 'DAC1d: Procurement and tendering (t = 16.703), 'DAC6: Quality management (t= 16.387) are other high ranked DACs. Although 'DAC9: Data and information management' is ranked lowest, it has proved a high significance for dispute avoidance in the construction industry.

Table 4.3: Competencies for dispute avoidance

No	Competency	Mean	Std. Deviation	Sig (2 tailed)	t-value	Rank
Competencies – Highly Important ('significance <0.05' and ' t value>0')						
DAC5	Scope and change management	4.72	.457	.000	21.284	1
DAC7	Time management	4.66	.483	.000	19.416	2
DAC1e	Contract administration	4.59	.499	.000	18.068	3
DAC1c	Cost estimation, management and reporting	4.53	.507	.000	17.085	4
DAC1d	Procurement and tendering	4.5	.508	.000	16.703	5
DAC6	Quality management	4.47	.507	.000	16.387	6
DAC1b	Producing designs to satisfy overall requirement	4.41	.499	.000	15.942	7
DAC8	Team leadership and managing people	4.41	.499	.000	15.813	8
DAC2	Financial management	4.31	.471	.000	15.766	9
DAC1a	Knowledge, understanding and application of construction technology	4.34	.483	.000	15.752	10
DAC3	Ethical conduct and discipline	4.31	.471	.000	14.603	11
DAC4	Risk management	4.34	.483	.000	13.919	12
DAC9	Data and information management	4.16	.574	.000	11.392	13

4.4.2 Dispute Avoidance Skills (DASs)

Similar to DACs, the second question under section C of the questionnaire collected data on the important level of DASs for dispute avoidance in the construction industry and was analysed through single-sample t-test.

Table 4.4 shows up the skills required to be possessed for dispute avoidance in the construction industry together with their mean, standard deviation and significance while ranked according to their t value.

Table 4.4: Skills for dispute avoidance

No	Skill	Mean	Std. Deviation	Sig (2 tailed)	t-value	Rank
Skills -Highly Important ('significance <0.05' and ' t value>0')						
DAS9	Ability to act fairly and impartially	4.47	.507	.000	16.387	1
DAS5	Team working skills	4.44	.504	.000	16.134	2
DAS8	Ability to be flexible	4.41	.499	.000	15.942	3
DAS6	Ability to acknowledge other's needs and interests	4.38	.492	.000	15.813	4
DAS2	Planning skills	4.34	.483	.000	15.752	5
DAS7	Skill for recognising and responding to cultural differences	4.34	.545	.000	13.939	6
DAS10	Skill for continuously improving performance level	4.25	.508	.000	13.919	7
DAS3	Oral and written communication	4.06	.435	.000	13.806	8
DAS4	Team building skills	4.00	.440	.000	12.858	9
DAS1	Computer skills	3.38	.660	.003	3.215	10

As denoted in table 4.4, all the tested DASs too have exhibited a high level of importance for avoiding disputes in the construction industry by yielding less than 0.05 significance. 'DAS9: Ability to act fairly and impartially (t= 16.387) is the highest-ranked, while 'DAS5: Team working skills (t= 16.134)', 'DAS8: Ability to be flexible (t=15.942), 'DAS6: Ability to acknowledge other's needs and interests (t= 15.813), 'DAS2: Planning skills (t=15.752) are among other DASs which are having privileged positions in this regard. Although 'DAS1: Computer skills' has proven to be significant for dispute avoidance, its contribution level is less compared to the other DASs (significance = 0.03 and t=3.215).

4.4.3 Dispute Resolution Competencies (DRCs)

Following the data collection on competencies and skills for dispute avoidance, third question under section C of the questionnaire addressed the important level of DRCs for resolving disputes through each alternative dispute resolution technique considered namely negotiation, mediation/conciliation and adjudication/DAB, on the same scale of 1 to 5. The same data analysis technique i.e. single-sample t-test was used.

Table 4.5 presents the significance, t-value and the rank of each highly important competency for resolving disputes through each of the ADR technique.

Accordingly, out of ten (10) DRCs tested, nine (9) are significantly important for dispute resolution through **negotiation** in the construction industry. ‘DRC2: Legal knowledge and understanding’ is the DRC which is not significantly important. ‘DRC1e: Competency in contract administration’ is the most important DRC where ‘DRC 1a: Knowledge, understanding and application of construction technology’ is the next significant DRC for negotiation.

Out of the ten (10) DRCs considered, eight (8) are significant for dispute resolution through **mediation/conciliation** where ‘DRC 1b: competency in Producing designs to satisfy overall requirement’ and ‘DRC2: Legal knowledge and understanding’ are not significant for resolving construction disputes through mediation/conciliation. ‘DRC 4: Co-ordination and integration’ achieves the highest position while ‘DRC1d: competency in Procurement and tendering achieves the second-highest position according to their importance for DR through mediation/conciliation.

Table 4.5 further indicates that ‘DRC1b: competency in producing designs to satisfy overall requirement’ is not significantly important for DR through **adjudication / DAB** in the construction industry while other nine (9) DRCs out of the ten (10) DRCs tested are highly important. ‘DRC3: Procedural competence on dispute resolution procedures’ is the most important DRC and ‘DRC1e: Competency in contract administration’ is the next important competency for resolving disputes through adjudication / DAB.

Table 4.5: Competencies for dispute resolution

No	Competency	Negotiation			Mediation / Conciliation			Adjudication / DAB		
		Sig (2 tailed)	t-value	Rank	Sig (2 tailed)	t-value	Rank	Sig (2 tailed)	t-value	Rank
DRC 1	Competency in subject matter									
DRC 1a	Knowledge, understanding and application of construction technology	.000	23.990	2	.000	19.414	3	.000	28.273	3
DRC 1b	Producing designs to satisfy overall requirement	.030	2.273	9	Not Important			Not Important		
DRC 1c	Cost estimation, management and reporting	.000	21.284	3	.000	16.102	5	.000	21.284	6
DRC 1d	Procurement and tendering	.000	19.416	4	.000	19.416	2	.000	23.990	5
DRC 1e	Contract administration	.000	28.273	1	.000	18.068	4	.000	31.566	2
DRC 2	Legal knowledge and understanding	Not Important			Not Important			.000	10.418	8
DRC 3	Procedural competence on dispute resolution procedures	.000	5.568	6	.000	9.092	6	.000	36.413	1
DRC 4	Co-ordination and integration	.000	9.667	5	.000	21.284	1	.001	12.182	7
DRC 5	Time management	.000	4.211	8	.000	6.313	7	.000	25.855	4
DRC 6	Identifying and managing resources	.000	5.614	7	.016	2.552	8	.023	2.396	9

4.4.4 Dispute Resolution Skills (DRSs)

Similar to DRCs, forth question under section C of the questionnaire collected data on the important level of each DRS for resolving construction disputes through each ADR technique considered, on the same scale of 1 to 5. The data collected was analysed through the same data analysis technique. The findings are presented in a similar format in Table 4.6 indicating the significance, t-value and the rank of each significantly required skill for resolving disputes through each ADR technique.

According to the test results, as tabulated in Table 4.6, twenty-five (25) skills out of twenty-seven (27) skills tested are important for resolving construction disputes through **negotiation**. ‘DRS 10: Team Working Skills’ and ‘DRS16: Ability to treat parties fairly and impartially’ are the two types of skills that are not significant. ‘DRS 8: Oral and written communication skills’ and ‘DRS11: Ability to understand and acknowledge others, their styles, behavior, hidden interests’ are the first and second most important skills required for negotiation.

When it comes to **mediation/conciliation**, a different set of twenty-five (25) skills out of the twenty-seven (27) skills tested are important for resolving construction disputes. ‘DRS 10: Team Working Skills’ is one of the insignificant skills similar to negotiation, while the other skill is ‘DRS25: Bargaining skill, ability to maintain consensus and to compromise’. The two topmost important skills for mediation/conciliation is similar to the case of negotiation i.e. ‘DRS 8: Oral and written communication skills’ and ‘DRS11: Ability to understand and acknowledge others, their styles, behavior, hidden interests’.

Although there are some similarities in the most important skills for negotiation and mediation, the top most significant skills for **adjudication / DAB** is quite different. ‘DRS2: Analytical skills’ is the evidence skill while both ‘DRS3: Logical thinking, clarity of thoughts’ and ‘DRS 8: Oral and written communication skills’ hold the second place in terms of their importance for adjudication / DAB. However, the list of significant skills for adjudication / DAB is identical with the list of significant skills for mediation/conciliation however with different priorities.

Table 4.6: Skills for dispute resolution

No	Skill	Negotiation			Mediation			Adjudication/DAB		
		Sig (2 tailed)	t-value	Rank	Sig (2 tailed)	t-value	Rank	Sig (2 tailed)	t-value	Rank
DRS 1	Creative solution making skills	.000	18.689	4	.000	11.365	20	.000	8.473	20
DRS 2	Analytical skills	.000	10.522	19	.000	16.387	10	.000	21.284	1
DRS 3	Logical thinking, clarity of thoughts	.000	7.440	21	.000	8.984	22	.000	20.270	2
DRS 4	Evaluating skills	.000	12.703	18	.000	15.109	14	.000	15.866	10
DRS 5	Skill in interpreting	.000	12.938	16	.000	14.571	16	.000	14.046	12
DRS 6	Decisive (ability to make decisions quickly and effectively)	.000	18.940	3	.000	14.408	17	.000	18.068	5
DRS 7	Skills in handling conflicts	.000	16.134	10	.000	19.416	3	.000	9.644	19
DRS 8	Oral and written communication skills	.000	21.284	1	.000	21.284	1	.000	21.270	2
DRS 9	Ability to persuade and influence others	.000	17.537	8	.000	18.068	4	.000	6.566	23
DRS 10	Team Working Skills	Not Important			Not Important			Not Important		
DRS 11	Ability to understand and acknowledge others, their styles, behavior, hidden interests	.000	20.270	2	.000	20.270	2	.000	14.603	11
DRS 12	Ability to recognise and respond to cross-cultural differences	.000	5.230	24	.000	4.030	25	.006	2.946	25
DRS 13	Skill in establishing rapport	.000	15.866	12	.000	15.813	12	.000	4.385	24
DRS 14	Patience and tolerance	.000	17.085	9	.000	17.085	7	.000	10.522	15
DRS 15	Ability to maintain flexibility	.000	18.068	5	.000	17.537	6	.000	13.919	13
DRS 16	Ability to treat parties fairly and impartially	Not Important			.000	15.766	13	.000	19.416	4
DRS 17	Learn from experience and self-development skills	.000	6.313	23	.000	6.705	24	.000	7.048	22
DRS 18	Ability to control own emotions	.000	14.046	15	.000	16.703	8	.000	9.656	18

No	Skill	Negotiation			Mediation			Adjudication/DAB		
		Sig (2 tailed)	t-value	Rank	Sig (2 tailed)	t-value	Rank	Sig (2 tailed)	t-value	Rank
DRS 19	Ability to deal with other party's emotions and feelings	.000	15.766	14	.000	18.068	4	.000	9.698	16
DRS 20	Ability to think clearly and rapidly under pressure	.000	16.073	11	.000	14.940	15	.000	9.658	17
DRS 21	Ability to grasp essential issues quickly and focus on those issues	.003	3.215	25	.000	16.414	9	.000	17.537	6
DRS 22	Initiative (ability to assess and initiate things independently)	.000	6.387	22	.000	10.649	21	.000	16.703	9
DRS 23	Non- judgmental (skill of avoiding judgments based on one's personal and moral status)	.000	17.708	7	.000	14.046	18	.000	17.537	6
DRS 24	Ability to handle challenges	.000	7.996	20	.000	8.313	23	.000	8.127	21
DRS 25	Bargaining skill, ability to maintain consensus and to compromise	.000	15.866	12	Not Important			Not Important		
DRS 26	Confidentiality (Distinguish and keep confidential information)	.000	17.730	6	.000	16.073	11	.000	17.085	8
DRS 27	Agreement drafting skills	.000	12.858	17	.000	11.925	19	.000	12.858	14

Accordingly, findings of section C of the questionnaire survey revealed that all the DACs and DASs identified from literature are significantly important for DA in the construction industry. Further, nine (9), eight (8) and nine (9) DRCs are significantly important respectively for negotiation, mediation and adjudication, out of the then (10) DRCs found from literature. Moreover, different sets of twenty-five (25) DRCs are required for each dispute resolution method out of twenty-seven (27) DRSs identified from literature.

4.5 Summary

Analysis of demographic characteristics ensured that all the respondents have achieved the criteria concerned in refining experts related to this research.

As the findings of analysing the data collected under Section B of the questionnaire, twenty (20) sources out of the thirty-one (31) sources found in literature were identified as significant sources of disputes in the Sri Lankan construction industry. Further, it was identified that all the construction professionals play an inevitable role in generating such significant sources of disputes in the construction industry.

In addition, analysis of the data collected under Section C of the questionnaire unveiled different sets of competencies and skills important for dispute management in the construction industry, separately for dispute avoidance and for each ADR technique of dispute resolution namely negotiation, Mediation/Conciliation and Adjudication/DAB.

5.0 DISCUSSION

5.1 Introduction

The previous chapter analysed the data collected through the questionnaire survey and subsequently concluded the findings. This chapter discusses such findings in two sections in order to reach the conclusions and recommendations of the research.

The first section discusses the findings of data analysis related to sources of disputes and DM skills and competencies with the corresponding literature findings. The second section includes a comparison of such findings with literature findings on skills and competencies possessed by CPs.

5.2 Discussion of survey findings with corresponding literature findings

5.2.1 Sources of disputes and construction professionals' responsibility

Questionnaire survey findings indicated that twenty (20) sources of disputes out of the thirty-one (31) identified through literature are significant in the Sri Lankan context. It could be noticed that the majority of such significant sources in the SL context are with a higher frequency of occurrence in the global context as well, as summarised in Table 2.1 under literature findings. According to questionnaire survey findings, the top two most significant sources of disputes in the Sri Lankan construction industry are 'Ambiguities in contract documents' and 'Variations'. This finding exactly coincides with the global context where the same two are the sources most frequently marked in literature worldwide as causes for construction disputes.

Out of the next most significant sources of disputes in the SL industry of which the mean value is above 4, 'Inadequate / incomplete specifications, information and instructions', 'Unrealistic pricing /errors in tender' and 'Delays in work progress by Contractor' are marked in literature with higher frequency whereas 'Adversarial / controversial culture', 'Lack of team spirit', 'Litigious mindset of project participants' and 'Contradictory goals and needs' are marked in literature with lesser

frequency. It is noticeable that the former set of sources of disputes which coincide with the global context is of technical nature where the latter set represent aspects related to project culture and people. This denotes that the poor project culture and personal attitudes in the SL construction industry have considerable contribution to dispute generation as opposed to global context.

Moreover, as per questionnaire survey findings, construction professionals are responsible for all these significant sources of disputes in the SL construction industry. Therefore this research continued with the exploration of competencies and skills required by the construction professionals to deal with disputes.

5.2.2 Competencies and skills important for DM

a) For Dispute Avoidance

As per questionnaire survey findings, the most important **competencies** for dispute avoidance in the construction industry include ‘Scope and change management competencies’, ‘Time management competencies’ ‘Competency in contract administration’, ‘Competency in cost estimation, management and reporting’ and ‘Competency in procurement and tendering’. This survey result is in line with the view of Sinha and Wayal (2007) and RICS (2012) while all these competencies are linked with the most significant sources of disputes common to both SL construction context and global context as discussed in above section 5.2.1. For example, ‘Scope and change management competencies’ which is the topmost DAC, is essential to avoid disputes arisen through two topmost sources in both global and SL construction industry i.e. ‘Ambiguities in contract documents’ and ‘Variations’.

The most important **skills** for dispute avoidance in the construction industry as identified through questionnaire survey findings include ‘Ability to act fairly and impartially’, ‘Team working skills’, ‘Ability to be flexible’ and ‘Ability to acknowledge other’s needs and interests’. It is noteworthy that all of them are personal and interpersonal skills related to the cultural and people related sources of disputes. Further, this result can also be supported by the view of Kumarassawamy, (1997) who has stated that the origin of almost all the disputes are marked with

conflicts which are inescapable in any human interaction while according to Yie and Cheung (2007), construction projects are born with complex human interactions. Accordingly, these interpersonal skills have yield the priority in terms of their importance to treat the root of the construction disputes.

b) For Dispute Resolution

The study has identified ten **competencies** commonly important for resolving disputes through any of the DR method in the construction industry. However, these competencies influence each DR method to a different extent. Considering the T value ‘Knowledge, understanding and application of Construction Technology’, ‘Competency in cost estimation, management and reporting’, ‘Competency in Procurement and Tendering’ and ‘Competency in Contract Administration’ are almost influential for any type of DR method. This result is in line with the view of Fung (2014), Kharbanda and Stallworthy (1991) and Pickavance (2015) where the importance of competency in the relevant subject matter to identify the issue in resolving disputes has been highlighted. Meanwhile, out of the common DR competencies ‘Co-ordination and integration’ is predominantly required for mediation consistent with the opinion of Betancourt et al. (2014). This result is justifiable because the role of the mediator is to assist and guide the parties in dispute to reach an agreement. Further, considering the T value, ‘Procedural competence on Dispute Resolution Procedures’ and ‘Time management’ are predominantly required for Adjudication / DAB, similar to the view of Pickavance (2015) and Coulson (2011). The dispute adjudication agreement under FIDIC conditions of contract used in construction projects includes procedural rules and a certain timeframe to give the decision. Further, ‘Identifying and managing resources’ is a common but less influential competency for all three DR methods.

Other than the competencies commonly required for all DR methods, ‘Producing Designs to Satisfy overall Requirement’ is required only for negotiation and ‘Legal knowledge and understanding’ is required only for adjudication / DAB. The result is in line with the opinion of Pickavance (2015), where the adjudicator will have to

draw their technical and legal knowledge to give an informed decision based on the evidence put forward before him.

Statistical analysis of the data collected through the questionnaire survey revealed that out of the twenty-seven **skills** tested, twenty-four are commonly required by all DR methods in the construction industry. Nevertheless, as per the T value, the degree of influence of these skills on each dispute resolution method vary. Accordingly, 'Oral and written communication skills' are almost required for all three DR methods corresponding with the view of Betancourt et al. (2014), FIDIC (2017) and Kharbanda and Stallworthy (1991). 'Ability to understand and acknowledge others, their styles, behavior, hidden interests', 'Patience and tolerance', 'Ability to maintain flexibility' 'Ability to persuade and influence others' and 'Skill in establishing rapport' are predominantly required by Negotiation and Mediation/conciliation where the quality of human interactions play a key role in achieving the success of these methods. This view is in line with the perception of Fung (2014), Pedler (1977), Vandeputte (2015) and Yates (2011). While 'Ability to grasp essential issues quickly and focus on those issues' is predominantly required by Mediation/conciliation and Adjudication/DAB, 'ability to make decisions quickly and effectively' is principally required by Negotiation and Adjudication/DAB. Betancourt et al. (2014) and Coulson (2011) are in a similar opinion regarding the first finding where the latter is similarly viewed by Riches and Dancaaster (2008). In addition, despite the importance for all DR methods, t-test results indicate that some skills are highly required for certain DR methods over the other methods. 'Creative solution making skills' is such skill important for negotiation while 'Skills in handling conflicts', 'Ability to control own emotions' and 'Ability to deal with other party's emotions and feelings' are important for Mediation/conciliation. Similarly, 'Analytical skills' 'Logical thinking, clarity of thoughts' and 'Ability to assess and initiate things independently' are mostly required for Adjudication/DAB. Other than that, there are some skills which are comparatively less influential for any DR methods. They include 'Evaluating skills', 'Skill in interpreting', 'Ability to recognise and respond to cross-cultural differences', 'Learn from experience and

self-development skills’, ‘Ability to think clearly and rapidly under pressure, ‘Ability to handle challenges’ and ‘Agreement drafting skills’.

Out of the other skills which are not common to all DR methods, ‘Ability to treat parties fairly and impartially’ is required for Mediation/conciliation and Adjudication/DAB corresponding with the view of Coulson (2011) and Fung (2014) and ‘Bargaining skill, ability to maintain consensus and to compromise’ is required only for Negotiation in line with Kharbanda and Stallworthy (1991) and Pedler (1977). However, statistically ‘Team Working Skills’ are not required for any DR method while as per Chern (2008) it is necessary for Adjudication/DAB. This deviation in the respondents’ view from literature can be justified by non-compulsoriness of an unanimous decision by all the parties of the DAB to resolve the dispute. As per procedural rules annexed to dispute adjudication agreement in FIDIC (1999) and CIDA/SBD 02 (2002), if it is impossible to reach a unanimous decision, it is open for the majority of the members to make the decision.

5.3 Comparison of literature findings and questionnaire findings to identify skills and competency requirements for DM

5.3.1 Dispute Avoidance

a) Comparison between DACs and competencies possessed by construction professionals

Table 5.1 compares the competency requirement for dispute avoidance as identified through questionnaire analysis with the competencies possessed by construction professionals as identified in the literature. The DACs are ranked according to their significance for dispute avoidance.

The results indicate that all the significant DACs are possessed by at least one CP. Eight (8) of the significant DACs are expected to be possessed by all three CPs whereas, four (4) and one (1) of the significant DACs are expected to be possessed respectively by two (2) and one (1) of the CPs.

However, since the dispute avoidance of a construction project is a team effort, non-possession of certain significant DACs by all the CPs will not demote DA in the

Table 5.1: Comparison between DACs and Competencies of CPs

DISPUTE AVOIDANCE COMPETENCIES		CONSTRUCTION PROFESSIONAL COMPETENCIES			
Ref. No	Competencies	CPs who possess DACs			Reference to CP Competency List
DAC5	Scope and change management	E	QS	A	[C11]
DAC7	Time management	E		A	[C15]
DAC1e	Competency in contract administration	E	QS	A	[C5]
DAC1c	Competency in cost estimation, management and reporting	E	QS	A	[C3]
DAC1d	Competency in procurement and tendering	E	QS	A	[C4]
DAC6	Quality management	E		A	[C14]
DAC1b	Competency in producing designs to satisfy overall requirement	E		A	[C2]
DAC8	Team leadership and managing people	E			[C16]
DAC2	Financial management	E	QS	A	[C7]
DAC3	Ethical conduct and discipline	E	QS	A	[C9]
DAC1a	Knowledge, understanding and application of construction technology	E	QS	A	[C1]
DAC4	Risk management	E	QS		[C10]
DAC9	Data and information management	E	QS	A	[C18]

industry. Accordingly, possession of ‘DAC7: Time management’, ‘DAC6: Quality management’, ‘DAC1b: Producing designs to satisfy overall requirement’, ‘DAC8: Team leadership and managing people’ and ‘DAC4: Risk management’ by one or two CPs will be sufficient for DA.

Thus, it can be concluded that the professional bodies in the industry ensures the CPs to possess the competencies required for DA in the construction industry.

b) Comparison between DASs and skills possessed by construction professionals

In the same way, table 5.2 indicates a comparison between skills required for dispute avoidance as identified through questionnaire analysis and the skills possessed by construction professionals as identified in the literature.

Out of the ten (10) significant DASs, five (5) and two (2) skills are expected to be possessed by respectively all CPs and two (2) of the CPs. It can be noticed that ‘DAS5: Team working skills’ and ‘DAS8: Ability to be flexible’ which are among the topmost significant DASs are not given weightage in qualifying CPs in the industry.

Further, considering the nature of the skills it can be expected that team composition will overcome the effect of possessing ‘DAS4: Team building skills’ by only two of the CPs whereas it is unlikely related to ‘DAS6: Ability to acknowledge other’s needs and interests’. Accordingly, the latter is required to be possessed by all members of the project team.

Consequently, it can be concluded that following DASs are not sufficiently expected in the professional qualification criteria in the construction industry;

- DAS5: Team working skills
- DAS6: Ability to acknowledge other’s needs and interests
- DAS7: Skill in recognising and responding to cultural differences
- DAS8: Ability to be flexible

Table 5.2: Comparison between DASs and Competencies of CPs

DISPUTE AVOIDANCE SKILLS		CONSTRUCTION PROFESSIONAL SKILLS			
Ref. No	Skills	CPs who possess DAS			Reference to CP Skill List
DAS9	Ability to act fairly and impartially	E	QS	A	[S21]
DAS5	Team working skills				[S15]
DAS8	Ability to be flexible				[S20]
DAS6	Ability to acknowledge other's needs and interests	E		A	[S16]
DAS2	Planning skills	E	QS	A	[S9]
DAS7	Skill for recognising and responding to cultural differences				[S17]
DAS10	Skill for continuously improving performance level	E	QS	A	[S22]
DAS3	Oral and written communication	E	QS	A	[S12]
DAS4	Team building skills	E		A	[S14]
DAS1	Computer skills	E	QS	A	[S8]

c) Comparison between ‘DACs/DASs’, ‘Competencies and Skills possessed by CPs’ and ‘Sources of disputes’

Section 4.3.1 identifies what are the significant causes of disputes in the construction industry and further section 1.3.2 concludes that construction professionals are responsible for all these significant sources.

Meanwhile, the above subsection (a) and subsection (b) under section 5.3.1 concludes what are the DACs and DASs that are sufficiently possessed and not possessed by construction professionals.

This suggests that these lacking skills and competencies of construction professionals contribute to generate disputes in the industry where the same skills and competencies are to be targeted in dispute avoidance effort as well.

Accordingly, a link between ‘significant causes of disputes in the construction industry for which construction professionals are responsible’, ‘skills and competencies significantly required for DA’ and ‘availability of DACs/DASs with CPs’ will establish the exact requirement of ensuring the availability of DACs / DASs with CPs in order to avoid disputes more effectively in the construction industry.

Table 5.3, Table 5.4 and Figure 5.1 in combination establish such a link. Table 5.3 and Table 5.4 presents a comparison between causes of disputes and availability of DACs / DASs with CPs while Figure 5.1 presents the rationale and subsequently conclude the DACs / DASs that are truly required to be cultivated in CPs for effective dispute avoidance in the industry.

Table 5.3: Comparison between causes of disputes and availability of DACs with CPs

SIGNIFICANT DISPUTE AVOIDANCE COMPETENCIES		Whether Sufficiently Expected or Not Expected in professional qualification criteria [as per section 5.3.1 (a) above]	Related sources of disputes	Significance of the source of dispute
DAC5	Scope and change management	Sufficiently expected	S 02, S01	Significant sources
DAC7	Time management	Sufficiently expected	S18,S15,S29	Significant sources
			S17	Insignificant sources
DAC1e	Contract administration	Sufficiently expected	S03,S19,S16,S09	Significant sources
DAC1c	Cost estimation, management and reporting	Sufficiently expected	S04	Significant sources
DAC1d	Procurement and tendering	Sufficiently expected	S01,S03,S04, S12	Significant sources
			S20	Insignificant sources
DAC6	Quality management	Sufficiently expected	S03	Significant sources
			S08	Insignificant sources
DAC1b	Producing designs to satisfy overall requirement	Sufficiently expected	S03	Significant sources
			S07	Insignificant sources
DAC8	Team leadership and managing people	Sufficiently expected	S13, S21, S27, S28	Significant sources
DAC2	Financial management	Sufficiently expected	S30, S31	Significant sources
DAC3	Ethical conduct and discipline	Sufficiently expected	S23	Insignificant sources
DAC1a	Knowledge, understanding and application of construction technology	Sufficiently expected	S07,S08,S25	Insignificant sources
DAC4	Risk management	Sufficiently expected	S12,S14,S31	Significant sources
DAC9	Data and information management	Sufficiently expected	S03	Significant sources

Table 5.4: Comparison between causes of disputes and availability of DASs with CPs

SIGNIFICANT DISPUTE AVOIDANCE SKILLS		Whether Sufficiently Expected or Not Expected in professional qualification criteria [as per section 5.3.1 (b) above]	Related sources of disputes	Significance of the source of dispute
DAS9	Ability to act fairly and impartially	Sufficiently expected	S27, S21	Significant sources
			S23	Insignificant sources
DAS5	Team working skills	Not Sufficiently expected	S21,S13,S27,S28	Significant sources
DAS8	Ability to be flexible	Not Sufficiently expected	S28, S13	Significant sources
DAS6	Ability to acknowledge other’s needs and interests	Not Sufficiently expected	S21, S27	Significant sources
DAS2	Planning skills	Sufficiently expected	S29	Significant sources
DAS7	Skill for recognising and responding to cultural differences	Not Sufficiently expected	S21	Significant sources
DAS10	Skill for continuously improving performance level	Sufficiently expected	S1,S2,S3,S18,S4,S19, S16, S29	Significant sources
			S8, S7, S24	Insignificant sources
DAS3	Oral and written communication	Sufficiently expected	S09	Significant sources
DAS4	Team-building skills	Sufficiently expected	S16	Significant sources
DAS1	Computer skills	Sufficiently expected	S4, S29	Significant sources
			S7, S24	Insignificant sources

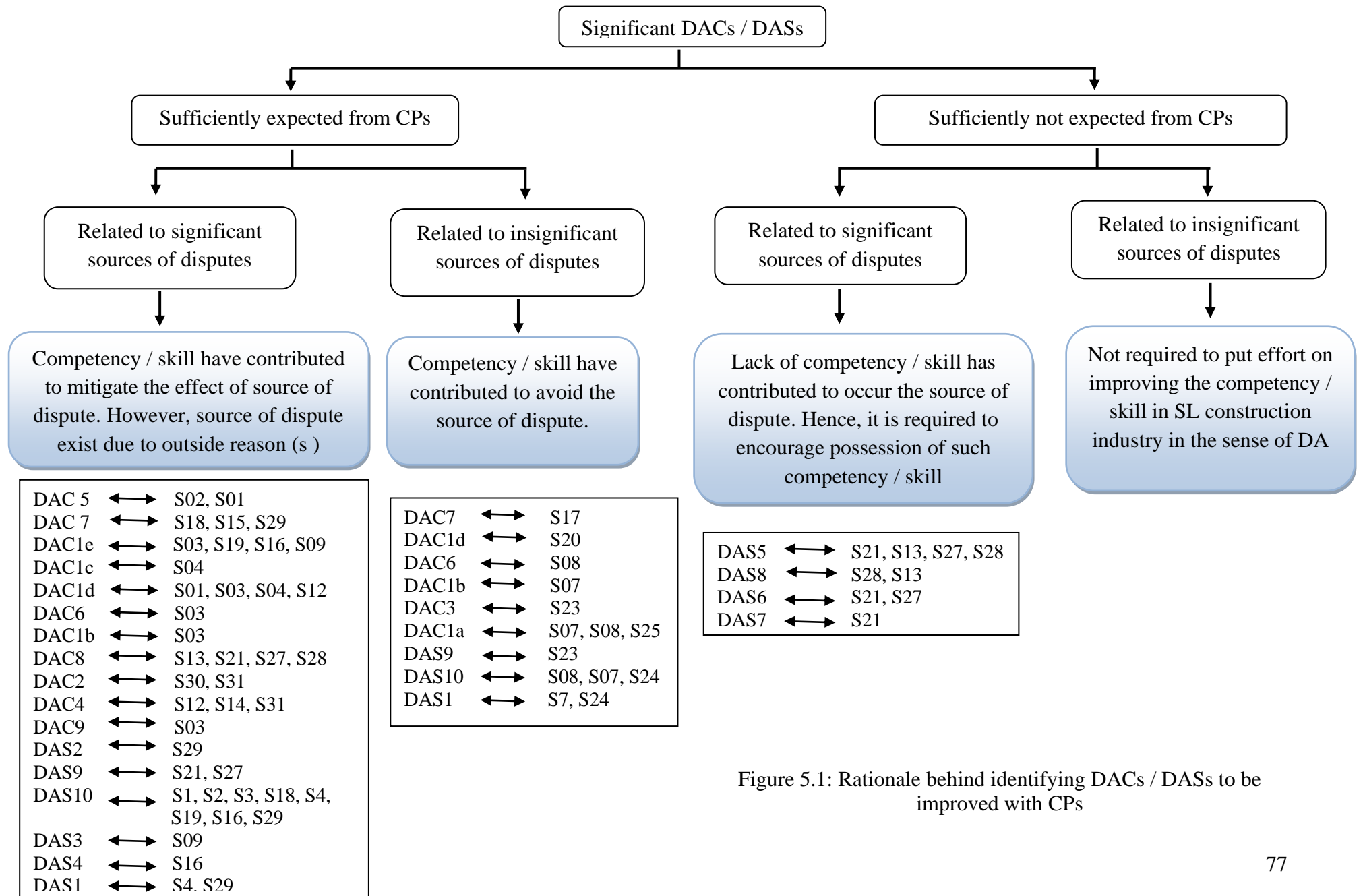


Figure 5.1: Rationale behind identifying DACs / DASs to be improved with CPs

As denoted in table 5.3 and 5.4, there are eleven (11) competencies and six (6) skills which are sufficiently expected in professionals in the construction industry but related to significant causes of disputes. The same competencies and skills are again summarised under the first branch of the tree diagram in figure 5.1. Since these skills and competency areas which are already possessed by construction professionals are linked with the significant causes of disputes in the construction industry, it can be assumed that these skills and competencies have already contributed to mitigate the effect of the related sources of disputes. In view of that, these sources of disputes are still effective due to reasons outside the deficits of referred skills and competencies of construction professionals. However, since no dispute is generated outside the contribution of construction professionals as concluded in section 4.2.2.2 above, such reasons undoubtedly include other factors related to construction professionals in the industry.

As summarised under the second branch of the tree diagram in figure 45.1, there are certain skills and competencies which are sufficiently expected in professionals in the construction industry while related to insignificant causes of disputes. There are six (6) such competencies and three (3) such skills, determined respectively from table 5.3 and table 5.4. Since these skills and competency areas which are already possessed by construction professionals are related to the sources of disputes which are not significantly exist in the present Sri Lankan construction industry, it can be concluded that these skills and competencies have already contributed to eliminate the related sources of disputes from the construction industry.

Four (4) skills determined from table 5.4 are listed under the third branch of the tree diagram in figure 5.1, which are not sufficiently expected from construction professionals while linked with significant sources of disputes in the construction industry. Further, it is noteworthy that the significances of such linked sources of disputes are very high in comparison with the other sources of disputes. Accordingly, these lacking skills highly contribute to generate disputes in the construction industry, hence it is essential to ensure the possession of these skills in the construction professionals for the sake of avoiding disputes.

The fourth branch of the tree diagram in figure 5.1 is allocated for the skills and competencies which are not sufficiently expected from construction professionals while they are related to insignificant causes of disputes. Since these skills and competencies are not effective in eliminating or mitigating the significant sources of disputes, effort on improving them is a waste in the sense of dispute avoidance in the construction industry. However, as denoted table 5.3 and table 5.4, no such skill or competency is available in the current Sri Lankan construction industry.

5. 3.2 Dispute Resolution

(a) Comparison between DRCs and competencies possessed by construction professionals

Table 5.5 compares the competencies important for dispute resolution through negotiation, mediation/conciliation and adjudication/DAB and the competencies possessed by construction professionals as identified in the literature.

Table 5.5: Comparison between DRCs and Competencies of CPs

DISPUTE RESOLUTION COMPETENCIES		CONSTRUCTION PROFESSIONAL COMPETENCIES			
Ref. No	Competencies	CPs who possess DR competencies			Reference to Competency List
COMMON COMPETENCIES FOR ALL DR METHODS					
Almost important for all DR methods					
DRC 1a	Knowledge, understanding and application of Construction Technology	E	QS	A	[C1]
DRC 1c	Competency in cost estimation, management and reporting	E	QS	A	[C3]
DRC 1d	Competency in procurement and tendering	E	QS	A	[C4]
DRC 1e	Competency in contract administration	E	QS	A	[C5]
Predominantly important for Mediation / Conciliation					
DRC 4	Co-ordination and integration	E		A	[C12]
Predominantly important for Adjudication/DAB					
DRC 3	Procedural competence on Dispute Resolution Procedures				[C8]

DISPUTE RESOLUTION COMPETENCIES		CONSTRUCTION PROFESSIONAL COMPETENCIES			
Ref. No	Competencies	CPs who possess DR competencies			Reference to Competency List
DRC 5	Time management	E	QS	A	[C15]
Less influential on all DR methods					
DRC 6	Identifying and managing resources	E	QS		[C17]
SPECIFIC COMPETENCIES FOR CERTAIN DR METHODS					
Important only for negotiation (less influential)					
DRC 1b	Competency in producing Designs to Satisfy overall Requirement	E		A	[C2]
Important only for Adjudication/DAB (medium effect)					
DRC 2	Legal knowledge and understanding	E	QS	A	[C6]

The comparison denotes that the majority of the competencies important to engage in any DR method in the construction industry are possessed by CPs in the SL context.

However, ‘Procedural competence on Dispute Resolution Procedures’ is lacking with all construction professionals which is an impediment especially for dispute resolution through Adjudication / DAB. Therefore, incorporating this competency to the qualification criteria of construction professionals is essential to strengthen their involvement in DR. Further, deficiency in ‘Co-ordination and integration’ would be a barrier for Quantity Surveyors for engaging in dispute resolution particularly through Mediation/Conciliation due to high negative influence. Besides, it would be advantageous for the Architect to acquire competency in ‘Identifying and managing resources’ to involve in any DR method in the construction industry. However, the influence is comparatively less.

In addition to the competencies required by all DR methods, competency in ‘producing designs to satisfy overall requirement’ is lacking with Quantity Surveyors which is important for negotiation. However, as per the statistical results the influence is least. On the other hand, ‘knowledge on principles of design and interpretation of drawings/specifications’ is expected as a QS competency area (IQSSL, 2007). Accordingly, there will not be a significant benefit of giving more weightage to this competency in improving QS competencies.

(b) Comparison between DRS and skills possessed by Construction professionals

Table 5.6 denotes a comparison between the skills required for dispute resolution through negotiation, mediation/conciliation and adjudication/DAB and the skills expected to be possessed by CPs as identified in the literature

Table 5.6: Comparison between DRSs and skills of CPs

DISPUTE RESOLUTION SKILLS		CONSTRUCTION PROFESSIONAL SKILLS			
Ref. No	Skills	CPs who possess DR skills			Reference to CP Skill List
COMMON SKILLS FOR ALL DR METHODS					
Almost important for all DR methods					
DRS 8	Oral and written communication skills	E	QS	A	[S12]
Predominantly important for Negotiation and Mediation / Conciliation					
DRS 11	Ability to understand and acknowledge others, their styles, behavior, hidden interests	E		A	[S16]
DRS 14	Patience and tolerance				[S19]
DRS 15	Ability to maintain flexibility				[S20]
DRS 9	Ability to persuade and influence others				[S13]
DRS 13	Skill in establishing rapport				[S18]
Predominantly important for Mediation/conciliation and Adjudication/DAB					
DRS 21	Ability to grasp essential issues quickly and focus on those issues				[S26]
Predominantly important for Negotiation and Adjudication/DAB					
DRS 6	Decisive (ability to make decisions quickly and effectively)	E		A	[S6]
Predominantly important for Negotiation					
DRS 1	Creative solution making skills	E		A	[S1]
Predominantly important for Mediation/conciliation					
DRS 7	Skills in handling conflicts				[S7]
DRS 18	Ability to control own emotions				[S23]
DRS 19	Ability to deal with other party's emotions and feelings				[S24]
Predominantly important for Adjudication/DAB					
DRS 2	Analytical skills	E	QS	A	[S2]
DRS 3	Logical thinking, clarity of thoughts	E			[S3]
DRS 22	Initiative (ability to assess and initiate things)	E	QS		[S27]

DISPUTE RESOLUTION SKILLS		CONSTRUCTION PROFESSIONAL SKILLS			
Ref. No	Skills	CPs who possess DR skills			Reference to CP Skill List
	independently)				
Less influential on all DR methods					
DRS 4	Evaluating skills	E	QS	A	[S4]
DRS 5	Skill in interpreting		QS	A	[S5]
DRS 12	Ability to recognise and respond to cross-cultural differences				[S17]
DRS 17	Learn from experience and self-development skills	E	QS	A	[S22]
DRS 20	Ability to think clearly and rapidly under pressure				[S25]
DRS 24	Ability to handle challenges				[S29]
DRS 27	Agreement drafting skills		QS	A	[S32]
DRS 23	Non- judgmental (skill of avoiding judgments based on one's personal and moral status)				[S28]
DRS 26	Confidentiality (Distinguish and keep confidential information)			A	[S31]
SPECIFIC COMPETENCIES FOR CERTAIN DR METHODS					
Required only for Mediation/conciliation and Adjudication/DAB					
DRS 16	Ability to treat parties fairly and impartially	E	QS	A	[S21]
Required only for Negotiation					
DRS 25	Bargaining skill, ability to maintain consensus and to compromise				[S30]
Not required for any DR method					
DRS 10	Team Working Skills				[S15]

It can be noticed that several important DRSs are not possessed by professionals in the SL construction industry, as opposed to DRCs.

Accordingly, for the participation in all DR methods especially in Negotiation and Mediation/Conciliation, it should be ensured that all three construction professionals possess 'Patience and tolerance', 'Ability to maintain flexibility', 'Ability to persuade and influence others' and 'Skill in establishing rapport' while Quantity Surveyor is required to be equipped with 'Ability to understand and acknowledge others, their styles, behavior, hidden interests' as well. Similarly, all the construction professionals are required to be skillful to 'grasp essential issues quickly and focus on those issues' in order to ensure their participation in all DR methods especially in

Mediation/Conciliation and Adjudication/DAB while quantity surveyor is required to be skilled in ‘making decisions quickly and effectively’, to involve especially in Negotiation and Adjudication/DAB. Further, among the skills common to all DR methods ‘Creative solution making skills’ which is predominantly important for negotiation is lacking with Quantity Surveyors while ‘Skills in handling conflicts’, ‘Ability to control own emotions’ and ‘Ability to deal with other party’s emotions and feelings’ which are predominantly important for Mediation/conciliation are lacking with all CPs. Moreover, it should be required to draw attention to ensure the possession of ‘Logical thinking, clarity of thoughts’ and ‘ability to assess and initiate things independently’ with Architect, in order to participate in DR especially in Adjudication/DAB. Other than that there are seven, five and four skills that are deficient respectively with Engineers, Quantity Surveyors and Architects which are important for all three DR methods but less influential. It would be beneficial to ensure the possession of such skills to strengthen the participation of the referred professionals in DR.

In addition to the skills commonly required by all DR methods, all CPs are deficient in ‘Ability to maintain consensus and to compromise’ which has a medium effect on negotiation as per statistical results. Therefore, ensuring the possession of this skill with construction professionals will promote their involvement in Negotiation.

5.4 Summary

Discussion of survey findings with corresponding literature findings revealed that the questionnaire survey findings on sources of disputes and skills and competencies important for dispute management in the construction industry are mostly consistent with the parallel literature except for some minor deviations.

Comparison of the above survey findings with literature findings on availability of competencies and skills with construction professionals prioritise competency and skill areas that should be looked into in promoting each construction professionals’ involvement in dispute avoidance and in dispute resolution through desired DR method (s).

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

Chapter 04 analysed the data collected through the questionnaire survey and presented the findings and chapter 05 discussed the survey findings with literature findings. This chapter is focused on deriving the conclusions from the findings and further providing recommendations on improving the competencies and skills of construction professionals in a way promoting their contribution in Dispute Management. Moreover, the chapter contains the limitations of the research and further research directions.

6.2 Conclusions

The construction industry, which is an imperative contributor to the national economy, exhibits performance deficits due to frequent disputes. Management of these disputes urges thorough involvement of the Construction professionals due to the technicality and complexity associated and the contribution made by Construction professionals towards the generation of disputes through various sources. Nevertheless, literature identifies that the construction professionals' participation in dispute management does not cater to the requirement, due to lack of necessary competencies and skills. Therefore, direct insights on how skills and competencies of construction professionals should be improved to promote dispute management will effectively uplift their contribution in dispute management, which in turn will enhance the performance level of construction projects.

Before studying the matter in deep, the first attempt was to recognise the current status of construction professionals' involvement in dispute management in the Sri Lankan construction industry in order to identify who should be the focus of this research. Literature identified thirty-one (31) sources of disputes out of which twenty (20) were identified through the questionnaire survey as significantly contributing sources to generate disputes in the Sri Lankan construction industry. Among them

'Ambiguities in contract documents', 'Variations', 'Adversarial / controversial culture', 'Lack of team spirit', 'Litigious mindset of project participants' and 'Contradictory goals and needs' are the topmost significant sources of disputes in the SL construction industry. Further, the questionnaire survey revealed that none of these significant sources are generated outside the contribution of construction professionals which confirms the responsibility vested on them towards avoiding disputes in the construction industry. Further, according to literature, Engineers, Quantity Surveyors and Architects are the construction professionals expected to be involved in construction dispute management while questionnaire survey confirms their participation in each dispute resolution method.

Having confirmed the contribution of the construction professionals towards dispute management, the next attempt was to identify the competencies and skills important for dispute management in the construction industry which is the second objective of the research. This objective was achieved through both the literature review and the questionnaire survey. Thirteen (13) dispute avoidance competencies, ten (10) dispute avoidance skills, ten (10) dispute resolution competencies and twenty-seven (27) dispute resolution skills were extracted through the literature survey. Subsequent statistical t-tests results of the questionnaire survey established that all thirteen (13) dispute avoidance competencies and all ten (10) dispute avoidance skills as significantly important. Among them 'Scope and change management competencies', 'Time management competencies' 'Competency in contract administration', 'Competency in cost estimation, management and reporting' and 'Competency in procurement and tendering' are the most important DACs while 'Ability to act fairly and impartially', 'Team working skills', 'Ability to be flexible' and 'Ability to acknowledge other's needs and interests' are the most important DASs. Out of the DRCs and DRSs tested, nine (9), eight (8) and nine (9) competencies are respectively important for negotiation, mediation/conciliation and adjudication/DAB and different sets of twenty-five (25) skills are important for each dispute resolution method. Subsequently, the same DRCs and DRSs were categorised as common competencies and skills important for any DR method while

distinguishing according to their level of influence and competencies and skills important particularly for certain DR methods.

The third objective to identify the skills and competencies possessed by construction professionals was achieved through reviewing literature on construction professional qualification criteria. Such competencies and skills as expected in professional qualification in the Sri Lankan construction industry were categorized into eighteen (18) competency areas and thirty-two (32) skill areas. Out of the eighteen competencies Engineers, Quantity Surveyors and Architects are expected to possess respectively seventeen (17), eleven (11) and thirteen (13) competencies and out of the thirty-two skills Engineers, Quantity Surveyors and Architects are expected to possess respectively thirteen (13), ten (10) and fourteen (14) skills.

Subsequent comparison of identified ‘skills and competencies significant for DA’, ‘availability of skills and competencies with CPs’ and ‘significant sources of disputes in the construction industry for which construction professionals are responsible’ unveiled the followings;

- a) The competencies and skills that have contributed to mitigate the effect of source of dispute, while the source of dispute exist due to outside reason (s)
- b) The competencies and skills that have contributed to avoid the source of dispute.
- c) The lacking competencies and skills that have contributed to occur the sources of dispute.
- d) The competencies and skills that do not contribute to generate significant sources of dispute.

Further, comparison of identified ‘skills and competencies significant for DR’ and ‘availability of skills and competencies with CPs’ revealed the skills and competency areas that should be developed in each construction professional in order to involve in dispute resolution. The comparison provides clear guidance on which skills and competencies should be given priority with related to each CP, to ensure their involvement or effective participation in dispute resolution through selected DR method (s).

6.3 Recommendations

The professional institutes in Sri Lanka can consider the findings of this research as a guidance in improving the professional qualification criteria or in organizing professional development programmes in a way to promote the construction professionals' involvement in Dispute Management. Alternatively, the construction professionals can regard these findings as guidance to be self-directed towards desired DR method (s). Accordingly, the following are the recommendations that can be drawn based on the research findings;

Competencies and Skills for Dispute Avoidance

It is strongly recommended to improve the DACs and DASs under above category (c) with construction professionals in order to strengthen the CP's contribution in avoiding disputes.

However, there is no DAC under this category since the construction professionals are sufficiently equipped with all the competencies important for dispute avoidance. The DASs under this category include 'Team working skills', 'Ability to be flexible' and 'Skill in recognising and responding to cultural differences' which are to be improved with all CPs while 'Ability to acknowledge other's needs and interests' is to be improved with Quantity Surveyors. This effort should be considered as critical since the referred skills are related to the topmost significant sources contributing to dispute generation.

It is not necessary to pay attention in the sense of DA to incorporate or to strengthen the availability of DACs and DASs under above category of (a), (b) and (d).

Competencies and Skills for Dispute Resolution

With reference to DRCs, it is highly effective to ensure the possession of 'Procedural competence on Dispute Resolution Procedures' with all three professionals in order to ensure their involvement, especially in adjudication/DAB while improving 'Co-ordination and integration' with Qs is highly effective for increasing their participation in mediation/conciliation. However, with related to 'Identifying and managing resources' of which the influence is less on all DR methods, there is an

opportunity to strike a balance between the real requirements of improving and other external factors.

Regarding the DRSs, there are eight (8) skill areas that are required to be improved with all three CPs, which are commonly required for any type of DR method while highly influential on all or particular DR method (s). They include 'Patience and tolerance', 'Ability to maintain flexibility', 'Ability to persuade and influence others', 'Skill in establishing rapport', 'Ability to grasp essential issues quickly and focus on those issues', 'Skills in handling conflicts', 'Ability to control own emotions' and 'Ability to deal with other party's emotions and feelings'. Such other highly influential common skills that are required to be improved only with Quantity Surveyor are 'Ability to understand and acknowledge others, their styles, behavior, hidden interests', 'ability to make decisions quickly and effectively', Creative solution making skills' while 'ability to assess and initiate things independently' is to be developed only with Architect and 'Logical thinking' is to be developed with both Quantity Surveyor and Architect. However, the priorities should be decided based on their level of influence on desired DR method. However, with regard to other lacking skills identified of which the influence is less, there is an opportunity to strike a balance between the real requirements of improving them considering the level of effect on DR and the other external factors. In addition to these commonly required skills to all DR methods, all construction professionals need to develop 'Ability to maintain consensus and to compromise', with view to effectively participate in Negotiation.

6.4 Limitations of the research

It is important for the readers to have a clear image of the limitations of the research for the correct application of the research findings.

The research was conducted limited to the boundaries of Sri Lanka. In order to ascertain the skills and competencies possessed by construction professionals, professional qualification criteria used in Sri Lankan professional institutes were considered. Further, dispute resolution methods considered in this research is limited to negotiation, mediation/conciliation and adjudication / DAB.

6.5 Further research

- a) Arbitration, which is a dispute resolution mechanism used in the construction industry however with very poor involvement of construction professionals, is not considered in this research. Therefore, the research can be extended to investigate on how construction professional's involvement can be increased in arbitration.
- b) The research revealed that there are some significant sources of disputes contributed by construction professionals but outside the skill and competency deficits. It will be a valuable research option in the sense of dispute avoidance, to investigate what the contributions are made by construction professionals towards such significant sources of disputes.

REFERENCES

- Abenayake, M. (2015). Dispute adjudication board as an ADR method in the construction industry of Sri Lanka. In *Proceedings of the 4th World Construction Symposium*, (pp. 231-238). Retrieved from <http://dl.lib.mrt.ac.lk/handle/123/11219>
- Acharya, N. K., Lee, Y. D., & Im, H. M. (2006). Conflicting factors in construction projects: Korean perspective. *Engineering, Construction and Architectural Management*, 13 (6), 543-566. doi:10.1108/09699980610712364
- American Arbitration Association (AAA). (2010). *Handbook on construction arbitration and ADR* [DX reader version]. Retrieved from https://books.google.lk/books?id=ucHNAwAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
- Architect Accreditation Council of Australia. (2003). *National competency standards in architecture (NCSA 01)*. Retrieved from <http://www.aaca.org.au/NCSA01.PDF>
- Australian Institute of Quantity Surveyors (AIQS). (2012). *Competency standards for quantity surveyors, construction economists and cost engineers*. Retrieved from http://www.aiqs.com.au/IMIS/documents/AIQS%20Competency_Standards_2012.pdf
- Bagshaw, M. (1998). Conflict management and mediation: key leadership skills for the millennium. *Industrial and Commercial Training*, 30(6), 206-208. doi: 10.1108/00197859810232942
- Betancourt, J. C., & Crook, J. A. (2014). *ADR, Arbitration and mediation- A Collection of Essays* [DX reader version]. Retrieved from https://books.google.lk/books?hl=en&lr=&id=Q7mfAgAAQBAJ&oi=fnd&pg=PA83&dq=alternative+dispute+resolution+in+construction&ots=aIkFPiX1wa&sig=0hlEWx8CEJe1hmTkdVlhkfiG7xk&redir_esc=y#v=onepage&q=alternative%20dispute%20resolution%20in%20construction&f=false
- Bennett, J., & Jayes, S. (1995). *Trusting the team- the best practice guide to partnering in construction*. [DX reader version]. Retrieved from <http://books.google.lk/books?id=2j4xT9jDNdgC&lpg=PP1&pg=PP1#v=onepage&q&f=false>

- Bowes, D. (2008). Identifying barriers to the establishment of dispute boards in UK construction. In *Proceedings of the 24th Annual Association of Researchers in Construction Management (ARCOM) Conference*, (pp. 859-867). Retrieved from http://www.arcom.ac.uk/-docs/proceedings/ar2008-859-867_Bowes.pdf
- Briscoe, G., Dainty, A. R. J., & Millett, S. (2001). Construction supply chain partnerships: skills, knowledge and attitudinal requirements. *European Journal of Purchasing & Supply Management*, 7(4), 243-255. doi: 10.1016/S0969-7012(01)00005-3
- Brooker, P. (1997). Survey of construction lawyers' attitudes and practice in the use of ADR in contractors' disputes. *Construction Management and Economics*, 17(6), 757-765. doi: 10.1080/014461999371097
- Brooker, P., & Lavers, A. (1997). Perceptions of alternative dispute resolution as constraints upon its use in the UK construction industry. *Construction Management and Economics*, 15(6), 519-526. doi: 10.1080/014461997372728
- Cakmak, E., & Cakmak, P.I. (2013). An analysis of causes of disputes in the construction industry using analytical network process. In *Proceedings of the 2nd World Conference on Business, Economics and Management*, (pp. 183-187). doi: 0.1016/j.sbspro.2013.12.441
- Chan, E. H. W., Chan, M.W., Scott, D., & Chan, A T. S. (2002). Educating the 21st century construction professionals. *Journal of Professional Issues in Engineering Education and Practice*, 128 (1), 44-51. doi: 10.1061/(ASCE)1052-3928(2002)128:1(44)
- Chan, E. H. W., & Suen, H. C. H. (2002). A multi-attribute utility model for dispute resolution strategy selection. *Construction Management and Economics*, 20 (1), 557-467. doi:10.1180/01446190210157568
- Chan, A. P. C., Chan, D. W. M., & Ho, K. S. K. (2003). An empirical study of the benefits of construction partnering in Hong Kong. *Construction Management and Economics*, 21(5), 523-533. doi: 10.1080/0144619032000056162
- Chartered Institute of Arbitrators (CI Arb). (2016). *Become a Construction Adjudicator*. Retrieved from <http://www.ciarb.org/training-and-development/why-train-with-ciarb/become-a-construction-adjudicator>

- Chern, C. (2008). *Chern on dispute boards* [DX reader version]. Retrieved from <https://books.google.lk/books?id=iWsCQAAQBAJ&printsec=frontcover#v=onepage&q&f=false>
- Cheung, S. (1999). Critical factors affecting the use of alternative dispute resolution process in construction. *International Journal of Project Management*, 17(3), 189-194. Retrieved from [https://doi.org/10.1016/S0263-7863\(98\)00027-1](https://doi.org/10.1016/S0263-7863(98)00027-1)
- Cheung, S.O. (2006). Mandatory use of adr in construction—a fundamental change from voluntary participation. *Journal of Professional Issues in Engineering Education and Practice*, 132(3), 224-234. Retrieved from [http://dx.doi.org/10.1061/\(ASCE\)1052-3928\(2006\)132:3\(224\)](http://dx.doi.org/10.1061/(ASCE)1052-3928(2006)132:3(224))
- Cheung, S. O. (2014). *Construction dispute research – conceptualisation, avoidance and resolution* [DX reader version]. Retrieved from https://books.google.lk/books?id=AoC5BQAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
- Cheung, S., & Suen, H. C. H. (2002). A multi-attribute utility model for dispute resolution strategy selection. *Construction Management and Economics*, 20(1), 557-568. doi: 10.1080/01446190210157568
- Cheung, S., Suen, H., & Lam, T. (2002). Fundamentals of alternative dispute resolution. *Journal of Construction Engineering and Management*, 128(5), 409-417. doi:10.1061/(ASCE)0733-9364(2002)128:5(409)
- Cheung, E. H. W., & Suen, H. C. H. (2004). Dispute resolution management for international construction projects in china. *Management Decision*, 43(4), 589-602. doi:10.1108/00251740510593576
- Chan, E. H. W., & Suen, H.C.H. (2005). Dispute and dispute resolution systems in Sino-Foreign joint venture construction projects in China. *Journal on Professional Issues in Engineering Education and Practice*, 131 (2), 141-148. doi:10.1061/(ASCE)1052-3928(2005)131:2(141)
- Cheung, S. O., & Yiu, T. W. (2006). Are construction disputes inevitable?. *IEEE Transactions on Engineering Management*, 53(3), 456-470. doi: 10.1109/TEM.2006.877445
- Corporative Research Center for Construction Innovation (CRCCI). (2009). *Guide to leading practice for dispute avoidance and resolution* (978-0-9804262-0-5).

Retrieved from <http://www.sbenrc.com.au/wp-content/uploads/2013/10/17guidetoleadingpracticefordisputeavoidanceandresolution.pdf>

Coulson, P. (2011). *Coulson on construction adjudication*. [DX reader version]. Retrieved from <https://books.google.lk/books?id=hzQ4ywlN9hgC&printsec=frontcover&vq=skill#v=onepage&q=18.2&f=false>

Daicoff, S. S. (2012). Expanding the lawyer's toolkit of skills and competencies: synthesizing leadership, professionalism, emotional intelligence, conflict resolution, and comprehensive law. *Santa Clara Law Review*, 52(3), Retrieved from <http://digitalcommons.law.scu.edu/cgi/viewcontent.cgi?article=2716&context=lawreview>

Dainty, A. R. J., Cheng, M., & Moore, D. R. (2004). A competency-based performance model for construction project managers. *Construction Management and Economics*, 22(8), 877-886. doi: 10.1080/0144619042000202726

Diekmann, J., & Girard, M. (1995). Are contract disputes predictable?. *Journal of Construction Engineering and Management*, 121(4), 355–363. doi: 10.1061/(ASCE)0733-9364 (1995)121:4(355)

Edum-Fotway, F. T., & McCaffer, R. (2000). Developing project management competency: perspectives from the construction industry. *International Journal of Project Management*, 18(2), 111-124. Retrieved from <http://www.sciencedirect.com/science/article/pii/S0263786398900758>

Ekhator, O. J. (2016a). Identifying strategies for preventing disputes in building construction projects in Nigeria. *International Journal of science, Environment and technology*, 5(5), 3558-3569. Retrieved from <http://www.ijset.net/journal/1341.pdf>

Ekhator, O. J., (2016b). Investigating causes of disputes in building construction projects in Nigeria. *International Journal of science, Environment and technology*, 5 (5), 3516-3527. Retrieved from <http://www.ijset.net/journal/1336.pdf>

- Enshassi, A., & Mosa, J. A. (2008). Risk management in building projects: owners' perspective. *The Islamic University Journal (Series of Natural Studies and Engineering)*, 16(1), 95-123. Retrieved from <http://www.iugaza.edu.ps/ara/research/>
- Farooqui, R. U., & Ahmed, S. M. (2009). Key skills for graduating construction management students - a comparative study of industry and academic perspectives. *Construction Research Congress*, 20 (1), 1469-1448. doi: 10.1061/41020%28339%29147
- Fenn, P., & Gameson, R. (Eds). (1997). *Proceedings of First International Construction Management Conference*. London: E & F N Spon.
- Fung, J. (2014). Mediators qualifications and skills. In *Proceedings of mediation conference 2014*, (pp.1-19). Retrieved from <http://mediation.judiciary.hk/en/doc/Mediator%20Qualifications%20and%20Skills.pdf>
- Gebken, R. J., & Gibson, G. E. (2006). Quantification of costs for dispute resolution procedures in the construction industry. *Journal of professional Issues in Engineering Education and Practice*, 132(3), 264-271. Retrieved from [http://ascelibrary.org/doi/abs/10.1061/\(ASCE\)1052-3928\(2006\)132:3\(264\)](http://ascelibrary.org/doi/abs/10.1061/(ASCE)1052-3928(2006)132:3(264))
- Gerber, P. (2010). Dispute avoidance procedures ("DAPs") - the changing face of construction dispute management. *International Construction Law Review*, 18(1), 122-129. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2270265
- Gibs, T., Brigden, D, & Hellenberg, D. (2004). The Education versus Training and the Skills versus Competency debate. *South African Family Practice*, 46(10), 5-6. doi: 10.1080/20786204.2004.10873146
- Harmon, K. M. J. (2003). Resolution of construction disputes: a review of current methodologies. *Leadership and Management in Engineering*, 3(4), 187-201. doi: 10.1061/(ASCE)1532-6748(2003)
- Hughes, M. J. (2003). Expert determination: a suitable dispute resolution technique for offshore construction project disputes? Part I. *Journal of International Trade Law and Policy*, 2(2), 3-23. Retrieved from <http://dx.doi.org/10.1108/14770020380000345>

- Hunter, M. (2000). International commercial dispute resolution: the challenge of the twenty-first century. *Arbitration International*, 16(4), 379-392. Retrieved from http://www.arbitrationicca.org/media/4/88504745154966/media012232932950890martin_nottingham_adress.pdf
- Institute of Civil Engineers. (2012). *ICE arbitration procedure*. [Adobe Digital Editions version]. Retrieved from <https://www.ice.org.uk/ICEDevelopmentWebPortal/media/Documents/Disciplines%20and%20Resources/09-2-ICE-Arbitration-procedure-2012-04-30.pdf>
- Institute for Construction Training and Development (ICTAD). (2002). Scope of consultancy services. Colombo 07, Sri Lanka: ICTAD
- Institute of Quantity Surveyors Sri Lanka (IQSSL). (2007). Assessment of professional competence. Colombo 07, Sri Lanka: IQSSL
- Institution of Engineer's Sri Lanka (IESL). (2015). *Professional review rules (revised)*. Retrieved from <http://www.iesl.lk/page-1541974>
- International Chamber of Commerce (ICC). (2015). *Dispute boards*. Retrived from <https://iccwbo.org/dispute-resolution-services/dispute-boards/>
- International Federation of Consulting Engineers (FIDIC). (2017). *President's list of approved dispute adjudicators*. Retrived from <http://fidic.org/node/808>
- Jaffar, N., Tharim, A. H. A., & Shuib, M. N. (2011). Factors of conflicts in construction industry: a literature review. In *Proceedings of 2nd international Building Control Conference*, (pp.193-202). doi: 0.1016/j.proeng.2011.11.156
- Jahren, C., & Dammeier, B. (1990). Investigation into construction disputes. *Journal of Management in Engineering*. 6(1), 39-46. doi: 10.1061/(ASCE)9742-597X(1990) 6:1(39).
- Jambro, J. D., & Siddiqi, K. M. (2008). *Conflict resolution and negotiation skills in undergraduate construction management curriculum*. Southern Polytechnic State . (Master's thesis, University Marietta, Georgia). Retrieved from <http://ascpro0.ascweb.org/archives/cd/2008/paper/CEUE210002008.pdf>

- Jannadia, M. O., Assaf, S., Bubshait, A. A., & Naji, A. (2000). Contractual methods for dispute avoidance and resolution. *International Journal of Project Management*, 18(1), 41-49. doi: 10.1016/S0263-7863(98)00070-2.
- Jayalath, C. (2013). *Arguing construction claims*. Colombo, Sri Lanka: S. Godage & Brothers (pvt) Ltd
- Jeyavernee, J., & Abenayake, M. (2016). Legal framework for effective amplification of ADR methods under the construction industry development act. In *Proceedings of the 5th World Construction Symposium*, (pp. 322-333). Retrieved from <http://dl.lib.mrt.ac.lk/handle/123/11999>
- Jha, K. N., & Iyer, K. C. (2006). Critical factors affecting quality performance in construction projects. *Total Quality Management*, 17(9), 1155-1170. doi: 10.1080=14783360600750444
- Jones, D. (2006). Construction project dispute resolution: options for effective dispute avoidance and management. *Journal of Professional Issues in Engineering Education and Practice*, 132(3), 225-235. Retrieved from [http://ascelibrary.org/doi/full/10.1061/\(ASCE\)1052-3928\(2006\)132:3\(225\)](http://ascelibrary.org/doi/full/10.1061/(ASCE)1052-3928(2006)132:3(225))
- Khan, R. A. (Eds). (2008). *Proceedings of the First International Conference on Construction in Developing Countries (ICCIDC)*. Retrieved from [www.neduet.edu.pk/ICCIDC-I/Conference% 20Proceedings/Papers/030.pdf](http://www.neduet.edu.pk/ICCIDC-I/Conference%20Proceedings/Papers/030.pdf)
- Kharbanda, O. P., & Stallworthy, E. A. (1991). Negotiation: an essential management skill. *Journal of Managerial Psychology*, 6(4), 2-52. doi: 10.1108/EUM0000000001732
- Kothari, C.R. (2004). *Research methodology; methods and techniques* [Adobe Digital Editions version]. Retrieved from http://www.scribd.com/document_downloads/direct/19680689?extension=pdf&f t=1369890582<=1369894192&user_id=75913657&uahk=YAG+TVwIx1pLS 2RQrPMU4L/DYUg
- Kraemer, L.K., & Pinsonneault, A. (2002). *Survey research methodology in management information systems: an assessment (#URB-022)*. Retrieved from [http://staf.cs.ui.ac.id/WebKuliah/TKSI/Survey% 20Method% 20in% 20MIS. pdf](http://staf.cs.ui.ac.id/WebKuliah/TKSI/Survey%20Method%20in%20MIS.pdf)
- Kululanga, G., Kuotcha, W., McCaffer, R., & Edum-Fotwe, F. (2001). Construction contractor's claims process framework. *Journal of Construction Engineering*

and Management, 127(4), 309-314. doi: 10.1061/(ASCE)0733-9364(2001)127:4(309)

Kumaraswamy, M. (1997). Consequences of Construction Conflict: A Hong Kong Perspective. *Journal of Management in Engineering*, 3(66), 66-74. doi: 10.1061/(ASCE)0742-597X(1998)14

Kurtzberg, T. R. (1998). Creative Thinking, a Cognitive Aptitude, and Integrative Joint Gain: A Study of Negotiator Creativity. *Creativity Research Journal*, 11(4), 283-293. Retrieved from http://dx.doi.org/10.1207/s15326934crj1104_2

Kwofie, T. E., Adinyira, E., & Botchway, E. A. (2015). Identification of the critical project management competencies of architects in the Ghanaian construction industry. *International Journal of Construction Management*, 15(4), 288-298. doi: 10.1080/15623599.2015.1067347

Lampel, J. (2001). The core competencies of effective project execution: the challenge of diversity. *International Journal of Project Management*, 19(8), 471-483. doi: 10.1016/S0263-7863(01)00042-4

Lewis, W. P. (2002). An analysis of professional skills in design: implications for education and research. *Design Studies*, 23(4), 385-406. doi: 0142-694X(02)00003-0

Lie, C. K., Yiu, T. W., & Cheung, S.O. (2016). Selection and use of Alternative Dispute Resolution (ADR) in construction projects — Past and future research. *International Journal of Project Management*, 34(3), 494-507. doi: 10.1016/j.ijproman.2015.12.008

Love, P.E.D., Davis, P., London, K., & Jasper, T. (2008). Causal Modeling of Construction Disputes. In *Proceedings of the 24th Annual ARCOM Conference*, (pp. 869-878). Retrieved from http://www.construction-innovation.info/images/pdfs/Research_library/Extension/2007-06EP/conf_papers/RCP_Causal_Modelling_of_Construction_Disputes.pdf

Mashwama, N. X., Aigbovboa, C., & Thwala D. (2016). Investigation of construction stakeholders' perception on the effects and cost of construction disputes in swaziland. In *Proceedings of Creative Construction Conference*, (pp.91-99). Retrieved from http://2016.creative-construction-conference.com/proceedings/CCC2016_14_Aigbavb_oa.pdf

- McGeorge, P. D. (2007). *Dispute avoidance and resolution*. (Report No. 2007-006-EP). Brisbane Qld 4000, Australia: Cooperative Research Centre for Construction Innovation. Retrieved from http://www.construction-innovation.info/images/pdfs/Literature_Review.pdf
- McLennan, A. (2000). Relationship Contracting: the main roads' perspective. *In Proceedings of the Government Officials' Conference*, (pp.1-10). Retrieved from <tp://ns1.ystp.ac.ir/YSTP/1/1/ROOT/DATA/PDF/SME/McLennan.pdf>
- Mitropoulos, P., & Howell, G. A. (2001). Model for understanding, preventing and resolving project disputes. *Journal of Construction Engineering and Management*, 126 (3), 223-231. doi:10.1061/(ASCE)0733-9364(2001)127:3(223)
- Mohan, A., Merle, D., Jackson, C., Lannin, J., & Nair, S. S. (2010). Professional skills in the engineering curriculum. *IEEE Transactions On Education*, 53(4), 562-571. doi: 10.1109/TE.2009.2033041
- Navigant Construction Forum (NCF). (2013). *Delivering dispute free construction projects part 1- planning, design and bidding* (305904398). Retrieved from https://www.researchgate.net/publication/305904398_Delivering_Dispute_Free_Projects_-_Part_I_Planning_Design_Bidding
- Newey, J. (1992). Construction Industry. *In proceedings of the first International Construction Management Conference*, (pp. 20-25). Retrieved from http://s3.amazonaws.com/academia.edu.documents/30768084/construction_conflict_management_and_resolution.pdf?
- Nguyen, D.Q. (1998). The essential skills and attributes of an engineer: a comparative study of academics, industry personnel and engineering students. *Global Journal of Engineering Education*, 2(1), 65-76. Retrieved from <https://pdfs.semanticscholar.org/8677/1a27a77115cd5c6c279de7f977be6773b26f.pdf>.
- Nkado, R., & Meyer, T. (2001). Competencies of professional quantity surveyors: A South African perspective. *Construction Management and Economics*, 19(5), 481-491. doi: 10.1080/01446193.2001.9709624.
- Odusami, K. T. (2002). Perceptions of construction professionals concerning important skills of effective project leaders. *Journal of Management in*

Engineering, 18(2), 61-67. Retrieved from
[http://ascelibrary.org/doi/abs/10.1061/\(ASCE\)0742-597X\(2002\)18:2\(61\)](http://ascelibrary.org/doi/abs/10.1061/(ASCE)0742-597X(2002)18:2(61))

Oxford. (2017). English Oxford living dictionaries. Retrived from
<https://en.oxforddictionaries.com/>

Palaneeswaran, E., Kumaraswamy, M., Rahman, M., & Ng, T. (2003). Curing congenital construction industry disorders through relationally integrated supply chains. *Building and Environment*, 38(1), 571–582. doi:10.1016/S0360-1323(02)00188-9

Pedler, M. (1977). Negotiation Skills Training—Part 2. *Journal of European Industrial Training*, 1(5), 12-16. doi:10.1108/eb002276

Pedler, M. (1978). Negotiation skills training — part 4: learning to negotiate. *Journal of European Industrial Training*, 2(1), 20-25. doi: 10.1108/eb002291

Pena-More, F. A., Sosa, C. E., & Mc-Cone, D. S. (2003). *Introduction to construction dispute resolution* [DX reader version]. Retrieved from
<https://academiccommons.columbia.edu/catalog/ac:206972>

Pickavance, J. (2015). *A practical guide to construction adjudication*. [DX reader version]. Retrieved from
<https://books.google.lk/books?id=8XBXCQAAQBAJ&pg=PA481&lpg=PA481&dq=adjudicator+competencies&source>

Poist, P. M. R. F. (2007). Skill requirement of senior-level logisticians:a longitudinal assessment. *Supply Chain Management: An International Journal* , 23(4), 553-574. doi: 10.1108/13598540710826353

Rahman, M. M., & Kumaraswamy, M. M. (2002). Joint risk management through transactionally efficient relational contracting. *Construction Management and Economics*, 20(1), 45-54. doi: 10.1080/01446190110089682

Rahman, M. M., Kumaraswamy, M. M., & Ling, F. Y. Y. (2007). Building relational contracting culture and integrated teams. *Canadian Journal of Civil Engineering Eng*, 34(1), 75-88. doi: 10.1134/L06-119

Reid, A., & Ellis, R.C.T. (2007). Common sense applied to the definition of a dispute. *Structural Survey*, 25(3/4), 239-252. doi: 10.1108/02630800710772827

- Royal Institute of British Architects (RIBA). (2016). *Professional experience and development record*. Retrieved from <https://www.pedr.co.uk/Guide/StudentPart3Criteria>
- Riches, J., & Dancaster, C. (2008). *Construction adjudication* [DX reader version]. Retrieved from https://books.google.lk/books?id=U1VavyBLfOsC&dq=adjudication+in+construction&lr=&source=gbs_navlinks_s
- Royal institute of Architects in Ireland (RIAI). (2009). *Standard of knowledge, skill and competence for practice as an architect*. Retrieved from https://www.riai.ie/uploads/files/RIAI_Standard_Knowledge_Skill_Compentence_Architect.pdf
- Royal Institution of Chartered Surveyors (RICS). (2012). *Conflict avoidance and dispute resolution in construction: RICS guidance notes*. Great Britain: Page Bros
- Royal Institution of Chartered Surveyors (RICS). (2014). *Assessment of professional competence- APC Requirements and Competencies*. Retrieved from <http://www.rics.org/Global/RICS-APC-Requirements-and-Competencies-Aug-2014-WEB.pdf>
- Rugarcia, A., Felder, R. M., Woods, D. R., & Stice, J. E. (2000). The future of engineering education. a vision for a new century. *Chemical Engineer Education*, 34 (1), 16-25. Retrieved from <http://www4.ncsu.edu/unity/lockers/users/f/felder/public/Papers/Quartet1.pdf>
- Semple, C., Hartman, F., & Jerjeas, G. (1994). Construction claims and disputes: courses and Cost/Time overruns. *Journal on Construction Engineering and Management*, 120 (4), 785-795. Retrieved from http://140.116.249.155/file.php/39168/readings/_Week_11_Claims_and_Disputes_in_Construction.pdf
- Sinha, M., & Wayal A. S. (2007). Dispute causation in construction projects. In *Proceedings of 2nd International Conference on Emerging Trends in Engineering*, (pp. 54-58). Retrieved from https://www.researchgate.net/profile/Abhay_Wayal/publication/283510175_Dispute_Causation_In_Construction_Projects/links/563c8e4808ae45b5d2894d7b.pdf

- Spittler, J. R., & Jentzen, G. H. (1992). *Dispute Resolution: Managing Construction Conflict with Step Negotiations*. *Transactions of the American Association of Cost Engineers*. Retrieved from <http://search.proquest.com/openview/5d7d9561fbf093d0ff5ac6afdbe739c0/1?pq-origsite=gscholar>
- Sri Lankan institute of architects (SLIA). (1998). *Conditions of engagement and mandatory minimum scales of professional fees and charges & form of agreement between owner and architect*. Colombo 7, Sri Lanka: SLIA
- Sri Lankan institute of architects (SLIA). (2014). *Trainee's experience record book (BAE-107)*. Colombo 7, Sri Lanka: Board of Architectural Education, SLIA
- Stipanowich, T. J. (1996). Beyond Arbitration: Innovation and Evolution in the United States Construction Industry. *Wake Forest Law Review*. 31(1), 65-182. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2060438
- Sturgess, G. (2012, December). *Skills vs competencies. what's the difference?*. Retrieved from <http://www.talentalign.com/author/admin/>
- Suter, E., Arndt, J., Arthur, N., Parboosingh, J., Taylor, E., & Deutschlander, S. (2009). Role understanding and effective communication as core competencies for collaborative practice. *Journal of Interprofessional Care*, 23(1), 41-51. doi: 10.1080/13561820802338579
- Taylor, G.R. (2010). *Integrating quantitative and qualitative methods in research* (3rd ed.). United Kingdom: University press of America.
- Tang, S. F. Y. (1986). Developing conflict management skills in Hong-Kong: an analysis of some cross-cultural implications. *Management Education and Development*, 7(3), 287-301. Retrieved from <http://journals.sagepub.com/doi/abs/10.1177/135050768601700315>
- Toor, S., & Ofori, G. (2008). Developing construction professionals of the 21st century: renewed vision for leadership. *Journal of Professional Issues in Engineering Education and Practice*, 134(3), 279-286. doi: 10.1061/(ASCE)1052-3928(2008)134:3(279)

- United States Department of labour. (2015). *Engineering competency model*.
Retrieved from
http://www.aaes.org/sites/default/files/Engineering_Competency_Model_draft-0115.pdf
- Vandeputte, P. (2015). Mediation and negotiation in business conflicts. *Business, Ethics and Peace*, 24(3), 315-331. doi: /10.1108/S1572-832320150000024022
- Wade, J. (1999). What skills and attributes do experienced mediators possess. *ADR Bulletin*. 2 (5), 67-77. Retrieved from
<http://epublications.bond.edu.au/cgi/viewcontent.cgi?article=1068&context=adr>
- Wall, C. J. (1993). The dispute resolution adviser in the construction industry. *Building Research & Information*. 21 (2), 122-127. doi: 10.1080/09613219308727272
- Wao, J. C., & Flood, I. (2016). The role of quantity surveyors in the international construction arena. *International Journal of Construction Management*. 16 (2), 126-137. doi 10.1080/15623599.2016.1142251
- Yates, J. K. (2011). The art of negotiation in construction contract disputes. *IEEE Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*. 3 (3), 94-96. Retrieved from
<http://ascelibrary.org/doi/abs/10.1061/%28ASCE%29LA.1943-4170.0000060>.
- Yeung, J.F.Y., Chan, A.P.C., & Chan, D.W.M. (2007). The definition of alliancing in construction as a Wittgenstein family-resemblance concept. *International Journal of Project Management*, 25(1). 219-231. doi: 10.1016/j.ijproman.2006.10.003
- Yin, R. K. (2009). *Case study research* (4th ed.). California: SAGE publications.
- Yiu, T. W., & Cheung, S. O., (2007). Behavioral transaction: a framework for the construction conflict -tension relationship. *IEEE Transactions on Engineering Management*. 54 (3), 498-505. Retrieved from
<http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=4278021>.

Younis, G., Wood, G., & Malak, M.A.A. (2008). Minimizing construction disputes: the relationship between risk allocation and behavioural attitudes. *In Proceedings of the International Conference on Building Education and Research (BEAR)*, (pp. 728–740). Retrieved from https://scholar.google.com/scholar?q=Minimizing+construction+disputes%3A+the+relationship+between+risk+allocation+and+behavioural+attitudes&btnG=&hl=en&as_sdt=0%2C5

**APPENDIX A: SKILLS AND COMPETENCIES FROM
CONSTRUCTION PROFESSIONALS**

COMPETENCY CATEGORY		ENGINEER		QUANTITY SURVEYOR		ARCHITECT	
		Competency	Reference	Competency	Reference	Competency	Reference
						Assist the client to issue letter of acceptance	
						Bid documents, bills of quantities, drawings, pre bid meetings, bid evaluation/negotiation	(SLIA, 2014)
C5	Contract Administration	Manage and plan budget, tasks, resources	(IESL, 2015)	Contract Administration (Interim valuation, financial reporting, evaluating variations , contractual correspondence, interpretation of contract, contractual and extra contractual claims, procurement plan, final accounts)	IQSSL, 2007;	Administer the building contract fairly between the client and the contractor	(SLIA, 1998)
						Contract administration (arrange to hand over the site and relevant documents to the Contractor, issue instructions, Progress meetings, variation orders, inspection/quality control, taking over procedures.), accepting responsibility and exercising the authority as set out in conditions of contract	(SLIA, 1998)
						Post Construction (As built drawings, maintenance manual, carry out inspection during defect notification period and arrange to get rectified the defects, review warranties and guarantees, completion certificate, final certificate)	
						Progress meetings/technical meetings, variation orders, inspection/quality control, certification of payments, taking over procedures, As built drawings, maintenance manuals, final bill certification, guarantees/warranties, completion certificate, release of retention	(SLIA, 2014)
C6	Legal knowledge and Understanding	Familiar with relevant legislation in respect of safety, health and the environment	(IESL, 2015)	Knowledge on regulations and guidelines related to construction in relation to government and local authorities, statutory bodies and donor funded projects	(IQSSL, 2007)	Building and other legislation, knowledge on statutory requirement and consultation with authorities, assist the client to negotiate for approval under building acts, regulations and other statutory requirements.	(SLIA, 1998)
						Planning, building and other legislation, permit drawings	(SLIA, 2014)
C7	Financial Management	Provide commercial leadership – manage and plan budget	(IESL, 2015)	Financial auditing of construction projects, understand principals of accounting and economic principles, Prepare development budget for the project, coordinate client’s cash flows and advice on financing the projects	(IQSSL,2007)	Consider client’s budget requirement, advise client of any adjustment to previous statement of probable construction cost	(SLIA, 1998)
						Assist client in Project financing	(SLIA, 1998)

COMPETENCY CATEGORY		ENGINEER		QUANTITY SURVEYOR		ARCHITECT	
		Competency	Reference	Competency	Reference	Competency	Reference
C8	Procedural competence on dispute resolution procedures						
C9	Ethical practice, discipline and professional conduct	Professional conduct – Conduct Engineering activities to an ethical standard as laid down in the relevant standards.	(IESL, 2015)	Ethical practice	(IQSSI, 2018)	Comply with the code of professional conduct set by SLIA	(SLIA, 2014)
C10	Risk management	Identify and assess engineering risk	(IESL, 2015)	Risk management	(IQSSI, 2007)		
C11	Scope and Change Management	Manage budget	(IESL, 2015)	Variation process up to finalization of variation accounts	(IQSSL,2007)	Variation orders Advise the client of the consequences of the subsequent changes on the cost and programme.	(SLIA, 2014) (SLIA, 1998)
C12	Co-ordination and integration	Provide technical, commercial and managerial leadership	(IESL, 2015)			Coordinating all elements of design and of the construction process, Coordinating works of other consultants Coordinate engineering drawings	(SLIA, 1998) (SLIA, 2014)
C13	Health and Safety Management	Familiar with legislation in respect of safety, health and the environment , Application and management of safe systems of work	(IESL, 2015)				
C14	Quality Management	Quality management	(IESL, 2015)			Inspection/Quality control	(SLIA,2014)
C15	Time Management	Effective project planning	(IESL, 2015)			Review and finalise the programme, Examining work programme time to time and advice client and contractor to complete the project within contract period, conducting progress review meetings, project programming (establishing with or for the client a schedule for development of the overall project)	(SLIA,1998)
C16	Team Leadership & Managing People	Manage and plan people Develop the capability of staff to meet current needs Leadership and management	(IESL, 2015)				
C17	Identifying and managing resources	Manage and plan resources	(IESL, 2015)	Resource analysis and management	(IQSSL,2007)		
C18	Data and Information Management	Maintain a sound theoretical approach to technology, identify and comprehend engineering knowledge, introduce/exploit emerging technologies, participate in or specify research, design and/or development	(IESL, 2015)	Collection of cost data, establish data storing system and implement updating procedures	(IQSSL,2007)	Marketing studies: Identification, assembly, review and organization of data, arrangement for clearances for existing data, survey studies, analysis of data	(SLIA,1998)

Table 2: Skills expected from construction professionals

SKILL CATEGORY		ENGINEER		QUANTITY SURVEYOR		ARCHITECT	
		Skill	Reference	Skill	Reference	Skill	Reference
S1	Creative thinking and finding innovative solutions.	Promote innovation and advances in technology , Introduction / exploitation of new technologies	(IESL, 2015)			Creativity	(SLIA, 2013)
S2	Analytical Skills (understand something in terms of its components)	Identifies, defines, investigates, analyses complex engineering problems	(IESL, 2015)	Analyzing costs and benefits, cost analysis, analyse input requirements, analysis of prices, resource analysis, life cycle cost analysis	(IQSSL,2007)	Analysing project brief, analyzing probable site and location, analyzing requirement of services, analyzing site in relation to requirement and function analysis of operating functions, analysis of market survey data	(SLIA,1998)
S3	Logical Thinking, clarity of thoughts (uses reasoning consistently to come to a conclusion)	Apply appropriate theoretical and practical methods to solution of engineering problems	(IESL, 2015)				
S4	Evaluation Skills	Evaluate solutions	(IESL, 2015)	Evaluating variations, tender evaluation, evaluation of design solutions	(IQSSL,2007)	Tender evaluation, valuation of variations	(SLIA,1998)
S5	Skills in Interpreting			Interpretation of contract, cost reporting, drawings, specification and other documents	(IQSSL, 2007)	Interpret design requirements	(SLIA,1998)
S6	Decision Making Skills	Making decisions	(IESL, 2015)			Decision making with related to design	(SLIA,1998)
S7	Skills in handling conflicts						
S8	Computer Skills	Computer skills	(IESL, 2015)	Computer skills	(IQSSL, 2007)	Computerized analysis and modeling	(SLIA,1998)
S9	Planning Skills	Effective Project planning Planning solutions	(IESL, 2015)	Project implementation and procurement plan	(IQSSL,2007)	Establishing with or for client a schedule for the development of the overall project Planning	(SLIA,1998) (SLIA,2014)
S10	Delegation Skills						
S11	Business Skills						
S12	Oral and written Communication Skills	Oral and written communication skills , Ability to present and discuss ideas and plans	(IESL, 2015)	Communication and presentation skills	(IQSSL,2018)	Viva vose	(Board of Architectural education, 2018)
S13	Influencing Skills						

SKILL CATEGORY		ENGINEER		QUANTITY SURVEYOR		ARCHITECT	
		Skill	Reference	Skill	Reference	Skill	Reference
S14	Team Building Skills	Team building Skills	(IESL, 2015)			Selection and engagement of consultants	(SLIA, 1998)
S15	Team Working Skills						
S16	Ability to understand and acknowledge others, their needs and interests	Treats people with respect	(IESL, 2015)			Discuss client's requirement and preparation of brief	(SLIA, 1998)
S17	Skill in recognizing and responding to Cultural Differences						
S18	Skill in Establishing Rapport						
S19	Patience and tolerance						
S20	Ability to be flexible						
S21	Ability to act fairly and impartially	When acting as administrators of a contract be impartial between the parties in the interpretation of the contract	Code of ethics	when acting as administrators of a contract be impartial between the parties in the interpretation of the contract	Code of ethics	Administer the building contract fairly between the client and the contractor	(SLIA,1998)
S22	Self –Development skills	Identify what has been learnt from the activity, Bring about continuous improvement Engage in CPD to ensure competence in areas of future intended practice.	(IESL, 2015)	Continuous professional development	(IQSSL,2018)	Continue with her/his own professional development	(SLIA, 2014)
S23	Ability to control own emotions						
S24	Ability to deal with other party's emotions and feelings						
S25	Ability to think clearly and rapidly under pressure						
S26	Ability to grasp essential issues quickly and focus on those issues						
S27	Initiative (ability to assess and initiate things independently)	Plan and implement solutions, Ability to undertake independent practice	(IESL, 2015) (IESL, 2018)	Managing practical issues	(IQSSL,2018)		
S28	Non- judgmental (skill of avoiding judgments based on one's personal and moral status)						
S29	Ability to handle challenges						
S30	Bargaining skill, ability to maintain consensus						

SKILL CATEGORY		ENGINEER		QUANTITY SURVEYOR		ARCHITECT	
		Skill	Reference	Skill	Reference	Skill	Reference
	and to compromise						
S31	Confidentiality (Distinguish and keep confidential information)					Maintain confidentiality of the office work and act in responsible manner when dealing with outside parties	(SLIA, 2014)
S32	Agreement drafting skills			Preparation of nominated sub contract , Assist in Contract award	(IQSSL,2007)	Arrange contract documents for the signing of the contract by the client and the contractor, advice regarding service agreements on equipment and services in post construction stage	(SLIA, 1998)

APPENDIX B: QUESTIONNAIRE

QUESTIONNAIRE

Section A: Demographic Characteristics

Q1. Your Name and e-mail address (Optional):

Q2. Type of your current organization:

- Client Consultant Contractor Other

Q3. Your qualified Profession:

- Engineer Quantity Surveyor Architect Other

Q4. Your total experience in the construction industry:(Number of years)

Q5. Type (s) of Dispute Resolution mechanisms that you have been involved and/or known to you:

	Experience (Yes/No)	Knowledge (Yes/No)
Negotiation
Mediation/Conciliation
Adjudication/Dispute
Adjudication Board (DAB)

Q6. If you have been participated in Dispute Resolution processes, mark as per your experience, who are the professionals frequently involved in following Dispute Resolution mechanisms in Sri Lanka.

(Please mark with '√')

	Engineer	Quantity Surveyor	Architect	Other
Negotiation
Mediation/Conciliation
Adjudication/Dispute Adjudication Board (DAB)

Section B: Sources of disputes and Construction Professionals' Involvement in Generating Disputes.

Q7. (a) As per your experience, mark the level at which each source **contribute to generation of disputes** in the construction industry (*Please circle the relevant box*).

Rating scale

- 5 = Contribute at Extremely High Level**
- 4= Contribute at High Level**
- 3 = Contribute at Moderate Level**
- 2= Contribute at Low Level**
- 1 = Do not contribute at all**

(b) According to your view, mark the particular construction professional (s) who have **control** over generating disputes through each of the following sources. (*Please mark with '√'*)

E – Engineer

QS - Quantity Surveyor

A – Architect

No	Sources of Dispute	(a) Level of Contribution					(b) Have / Do not have control		
		1	2	3	4	5	E	QS	A
01	Ambiguities in contract documents	1	2	3	4	5			
02	Variations	1	2	3	4	5			
03	Inadequate / incomplete specifications, information and instructions	1	2	3	4	5			
04	Unrealistic pricing /errors in tender	1	2	3	4	5			
05	Payment delays	1	2	3	4	5			
06	Slow client's responses	1	2	3	4	5			
07	Design errors	1	2	3	4	5			
08	Poor quality /defective works by Contractor	1	2	3	4	5			
09	Poor communication	1	2	3	4	5			
10	Late giving of possession	1	2	3	4	5			
11	Unrealistic expectations/targets of Employer	1	2	3	4	5			
12	Unfair and unclear risk allocation	1	2	3	4	5			
13	Adversarial / controversial culture	1	2	3	4	5			
14	Unforeseen Site conditions	1	2	3	4	5			
15	Extension of time for completion	1	2	3	4	5			
16	Poor project administration and management by consultants	1	2	3	4	5			
17	Acceleration	1	2	3	4	5			
18	Delays in work progress by Contractor	1	2	3	4	5			
19	Poor project administration and management by contractor	1	2	3	4	5			
20	Inappropriate procurement strategy/Contract type	1	2	3	4	5			
21	Lack of team spirit	1	2	3	4	5			
22	Disruption	1	2	3	4	5			
23	Lack of professionalism of Employer, consultants and Contractor	1	2	3	4	5			
24	Over/under measurement of work progress by consultants	1	2	3	4	5			
25	Technical inadequacy of the Contractor	1	2	3	4	5			

No	Sources of Dispute	(a) Level of Contribution					(b) Have / Do not have control		
		1	2	3	4	5	E	QS	A
26	Suspension of Work	1	2	3	4	5			
27	Contradictory goals and needs	1	2	3	4	5			
28	Litigious mindset of project participants	1	2	3	4	5			
29	Poor project planning and scheduling	1	2	3	4	5			
30	Financial incapacity of the Contractor	1	2	3	4	5			
31	External Factors (Weather, Legal, Economic, Public interruption)	1	2	3	4	5			

Section C: Dispute Management Skills and Competencies

Rating scale relevant to section C

- 5 = Required to be Possessed at Extremely High Level**
4= Required to be Possessed at High Level
3 = Required to be Possessed at Moderate Level
2= Required to be Possessed at Low Level
1 = Do not Required to be Possessed at all

Q08. To what extent do you believe the following **Competencies** are important for **avoiding disputes** in the Construction Industry? *(Please circle the relevant box)*

Note: Dispute avoidance includes planning and managing construction projects in a way demoting generation of disputes, adopting collaborative and relational procurement approaches, Dispute Review Boards etc.

Ref. No	COMPETENCIES	REQUIRED LEVEL				
DISPUTE AVOIDANCE COMPETENCIES (DACs)						
DAC 1	Competency in subject matter					
DAC 1a	Knowledge, understanding and application of construction technology	1	2	3	4	5
DAC 1b	Producing designs to satisfy overall requirement	1	2	3	4	5
DAC 1c	Cost estimation, management and reporting	1	2	3	4	5
DAC 1d	Procurement and tendering	1	2	3	4	5
DAC 1e	Contract administration	1	2	3	4	5
DAC 2	Financial management	1	2	3	4	5
DAC 3	Ethical conduct and discipline	1	2	3	4	5
DAC 4	Risk management	1	2	3	4	5
DAC 5	Scope and change management	1	2	3	4	5
DAC 6	Quality management	1	2	3	4	5
DAC 7	Time management	1	2	3	4	5
DAC 8	Team leadership and managing people	1	2	3	4	5
DAC 9	Data and information management	1	2	3	4	5

Q09. To what extent do you believe the following **Skills** are important for **avoiding disputes** in the Contraction Industry? *(Please circle the relevant box)*

Ref. No	SKILLS	REQUIRED LEVEL				
		1	2	3	4	5
DISPUTE AVOIDANCE SKILLS (DASs)						
DAS 1	Computer skills	1	2	3	4	5
DAS 2	Planning skills	1	2	3	4	5
DAS 3	Oral and written communication	1	2	3	4	5
DAS 4	Team building skills	1	2	3	4	5
DAS 5	Team working skills	1	2	3	4	5
DAS 6	Ability to acknowledge other's needs and interests	1	2	3	4	5
DAS 7	Skill for recognising and responding to cultural differences	1	2	3	4	5
DAS 8	Ability to be flexible	1	2	3	4	5
DAS 9	Ability to act fairly and impartially	1	2	3	4	5
DAS 10	Skill for continuously improving performance level	1	2	3	4	5

Q10. To what extent do you believe the following **Competencies** are important for resolving disputes through each technique of **Alternative Dispute Resolution** in the Contraction Industry? *(Please circle the relevant box)*

Ref. No	COMPETENCIES	REQUIRED LEVEL														
		Negotiation					Mediation / Conciliation					Adjudication/ DAB				
DISPUTE RESOLUTION COMPETENCIES (DRCs)																
DRC 1	Competency in subject matter															
DRC 1a	Knowledge, understanding and application of construction technology	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRC 1b	Producing designs to satisfy overall requirement	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRC 1c	Cost estimation, management and reporting	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRC 1d	Procurement and tendering	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRC 1e	Contract administration	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRC 2	Legal knowledge and understanding	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRC 3	Procedural competence on dispute resolution procedures	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRC 4	Co-ordination and integration	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRC 5	Time management	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRC 6	Identifying and managing resources	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

Q11. To what extent do you believe the following **Skills** are important for resolving disputes through each technique of **Alternative Dispute Resolution** in the Construction Industry? *(Please circle the relevant box)*

Ref. No	SKILLS	REQUIRED LEVEL														
		Negotiation					Mediation / Conciliation					Adjudication/ DAB				
DISPUTE RESOLUTION SKILLS (DRSs)																
DRS 1	Creative solution making skills	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 2	Analytical skills	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 3	Logical thinking, clarity of thoughts	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 4	Evaluating skills	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 5	Skill in interpreting	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 6	Decisive (ability to make decisions quickly and effectively)	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 7	Skills in handling conflicts	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 8	Oral and written communication skills	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 9	Ability to persuade and influence others	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 10	Team Working Skills	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 11	Ability to understand and acknowledge others, their styles, behavior, hidden interests	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 12	Ability to recognise and respond to cross-cultural differences	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 13	Skill in establishing rapport	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 14	Patience and tolerance	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 15	Ability to maintain flexibility	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 16	Ability to treat parties fairly and impartially	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 17	Learn from experience and self-development skills	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 18	Ability to control own emotions	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 19	Ability to deal with other party's emotions and feelings	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 20	Ability to think clearly and rapidly under pressure	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 21	Ability to grasp essential issues quickly and focus on those issues	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 22	Initiative (ability to assess and initiate things independently)	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 23	Non- judgmental (skill of avoiding judgments based on one's personal and moral status)	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 24	Ability to handle challenges	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 25	Bargaining skill, ability to maintain consensus and to compromise	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 26	Confidentiality (Distinguish and keep confidential information)	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DRS 27	Agreement drafting skills	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5