

AMERICAN UNIVERSITY OF BEIRUT

AN IN-DEPTH READING AND CLASSIFICATION
OF THE ROLES OF THE ENGINEER
UNDER THE FIDIC'S 1999 RED BOOK

by
FARAH YOUSSEF EL MASRI

A thesis
submitted in partial fulfillment of the requirements
for the degree of Master of Engineering Management
to the Engineering Management Program
of the Faculty of Engineering and Architecture
at the American University of Beirut

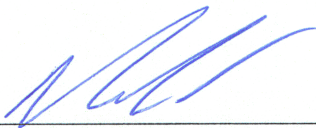
Beirut, Lebanon
October 2012

AMERICAN UNIVERSITY OF BEIRUT

AN IN-DEPTH READING AND CLASSIFICATION
OF THE ROLES OF THE ENGINEER
UNDER THE FIDIC's 1999 RED BOOK

by
FARAH YOUSSEF EL MASRI

Approved by:



Dr. M. Asem Abdul Malak, Professor
Engineering Management Program

Advisor



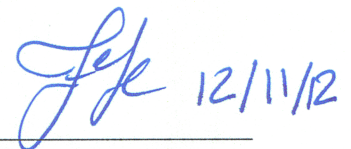
Dr. Issam Srour, Assistant Professor
Engineering Management Program

Member of Committee

FAROOK HAMZEH

Dr. Farook Hamzeh, Assistant Professor
Department of Civil and Environmental Engineering

Member of Committee



Date of thesis defense: 29 October, 2012

AMERICAN UNIVERSITY OF BEIRUT

THESIS RELEASE FORM

I, Farah Youssef El Masri

authorize the American University of Beirut to supply copies of my thesis to libraries or individuals upon request.

do not authorize the American University of Beirut to supply copies of my thesis to libraries or individuals for a period of two years starting with the date of the thesis defense.

Signature

Date

ACKNOWLEDGMENTS

I would like to thank Dr. M. Asem Abdul Malak, for being a source of inspiration and encouragement through my journey to earn my Master degree in Engineering Management. Since my first day, he introduced me to the program and courses in an exciting and challenging way. I started my first elective course in his class and I became curious about the Construction Contracts world. Every following semester I took an elective course with him to learn more about Project Management, Contracts and project deliverance and Dispute Resolution. That was not satisfying for my new passion until I decided to do my thesis in this particular area of interest and insisted to have Dr. Abdul Malak as my advisor.

I would like to thank Dr. Issam Srour for being an excellent teacher to me. I would not think twice before asking for his advice and guidance. And will always consider myself I have an older brother at AUB.

I would like to thank Dr. Farook Hamzeh for his valuable input and comments during the comprehensive exam and thesis defense that enriched my thesis.

I would like to thank my father for transferring the civil engineering genes to me and for being an example for dedication and excellence to his profession and family. And my family, my mother, sister, brother and close friends for their unlimited support and love.

Finally, I would like to thank AUB for opening its doors and heart for my success academically and athletically.

AN ABSTRACT OF THE THESIS OF

Farah Youssef El Masri for Master of Engineering Management
Major: Engineering Management

Title: An in-depth Reading and Classification of the Roles of the Engineer under the FIDIC's 1999 Red Book

Even though the relationship between the Engineer and the Contractor is not defined through a formal contractual agreement, the duties and roles of the Engineer are at the core of the contract organizing the relationship between the Employer and the Contractor. Thus, the Engineer can be a prime contributor to the success or failure of a construction project. Traditionally, the role of the Engineer has been carried out by the design consulting firm in charge of not just designing, advising the Employer and supervising the work, but also contract administrating, adjudicating and arbitrating in case of dispute. This superhuman quasi-judicial burden that the 1987 FIDIC Red Book laid on the Engineer's shoulders, has received an amount of criticism, enough to give birth to the 1999 FIDIC Red Book, delete the impartiality clause and assign the "Engineer's Decision" to a DAB without restricting the liberty of the Employer to re-endorse it in the particular conditions. Due to the increase of the projects' size and complexity, the Employer tends to assign other entities for handling the managerial and administrative tasks normally required of the Engineer. An attempt to provide the Employer with a better understanding of the nature and type of the different roles the 1999 Red Book assigned to the Engineer will be the objective of this paper. An in-depth reading of the new Red Book, investigating a method that can help more rigorously classify the identified roles will be the followed methodology. And a matrix of roles that can be exclusively assigned to the design consulting entity as opposed to the roles that can be assigned to other equally or better qualified entities and the other roles that cannot be assigned to the designer in a good practice, will be discussed. Finally, a set of recommendations and guidelines will be proposed to be used by construction industry practitioners.

CONTENTS

ACKNOWLEDGMENTS	v
AN ABSTRACT OF THE THESIS OF	vi
LIST OF ILLUSTRATIONS	x
TABLES	xi
Chapter	
1. INTRODUCTION	1
1.1. Background and Problem Statement.....	1
1.2. Research Objectives and Methodology	3
1.3. Research Contribution	4
2. LITERATURE REVIEW	5
2.1. Construction Project Delivery and the success of the Project	5
2.1.1. Traditional Approach and its advantages.....	6
2.1.2. The three legs of the stool to a successful project delivery	9
2.2. Contract Administration in Construction projects	17
2.3. The Engineer, through the Project Life cycle	20
2.3.1. The Engineer, an assigned Design Professional	20
2.3.2. The Engineer, a Contract Administrator	21
2.3.3. The Engineer, when it comes to Dispute Resolution.....	22
2.4. Responsibility and Liability of the Engineer	24
2.4.1. Professional Liability	24
2.4.2. Responsibility towards the Contractor.....	25
2.4.3. Responsibility towards third parties other than the Contractor	27
2.4.4. Responsibility towards society	28

3.THE ROLE OF THE ENGINEER AS DESCRIBED IN THE 1999 FIDIC RED BOOK.....	29
3.1. Introduction to the 1999 FIDIC Red Book	29
3.2. A clause-by-clause reading of the different roles, duties and authorities required from the Engineer in the Standard document	30
3.2.1. Clause 1: General Provisions	30
3.2.2. Clause 2: The Employer	32
3.2.3. Clause 3: The Engineer	33
3.2.4. Clause 4: The Contractor	35
3.2.5. Clause 5: Nominated Subcontractors.....	38
3.2.6. Clause 6: Staff and Labour	40
3.2.7. Clause 7: Plant, Materials and Workmanship.....	41
3.2.8. Clause 8: Commencement, Delays and Suspension	43
3.2.9. Clause 9: Tests on Completion	45
3.2.10. Clause 10: Employer’s Taking Over	46
3.2.11. Clause 11: Defects Liability	47
3.2.12. Clause 12: Measurement and Evaluation.....	48
3.2.13. Clause 13: Variation and Adjustments	50
3.2.14. Clause 14: Contract Price and Payment.....	52
3.2.15. Clause 15: Termination by Employer	55
3.2.16. Clause 16: Suspension and Termination by Contractor.....	56
3.2.17. Clause 17: Risk and Responsibility	56
3.2.18. Clause 18: Insurance	57
3.2.19. Clause 19: Force Majeure	58
3.2.20. Claim, Disputes and Arbitration	58
3.3. Summary.....	60
 4.SCREENING OF THE ENGINEER’S ROLES AS DEDUCED FROM THE 1999 FIDIC RED BOOK	 62
4.1. Preamble	62
4.2. The different types of actions and their occurrence in the Standard Document 63	
4.3. A Zoom in to possible interrelationships among the different types of action 74	
4.3.1. “Up to the Engineer’s satisfaction”	74
4.3.2. “To Agree and Determine”	75
4.3.3. Under the Engineer’s direction... ..	78
4.3.4. After the Completion of the Works... ..	80

4.4. Summary.....	80
5. IN DEPTH ANALYSIS AND CLASSIFICATION OF THE ROLES OF THE ENGINEER	81
5.1. Preamble	81
5.2. Design of a system of classification for the extracted and analyzed roles	81
5.2.1. Interpretations and Analysis	100
5.3. Creating a matrix of roles of the Engineer, having the Consulting engineer as axis of reference.....	101
5.4. Recommendations to practitioners.....	112
6.CONCLUSION	114
REFERENCES	116

ILLUSTRATIONS

Figure		Pages
2.1	Required sophistication versus different Project delivery methods (Abdul Malak 2010).....	6
2.2	The Iron Triangle (Atkinson 1999) {modified with the three-legged stool}.....	10

TABLES

Table	Page
3.1. Roles of the Engineer in Clause 1.....	31
3.2. Roles of the Engineer in Clause 2.....	32
3.3. Roles of the Engineer in Clause 3.....	34
3.4. Roles of the Engineer in Clause 4.....	36
3.5. Roles of the Engineer in Clause 5.....	39
3.6. Roles of the Engineer in Clause 6.....	40
3.7. Roles of the Engineer in Clause 7.....	41
3.8. Roles of the Engineer in Clause 8.....	43
3.9. Roles of the Engineer in Clause 9.....	45
3.10. Roles of the Engineer in Clause 10.....	46

3.11.	Roles of the Engineer in Clause 11.....	47
3.12.	Roles of the Engineer in Clause 12.....	49
3.13.	Roles of the Engineer in Clause 13.....	50
3.14.	Roles of the Engineer in Clause 14.....	52
3.15.	Roles of the Engineer in Clause 15.....	55
3.16.	Roles of the Engineer in Clause 16.....	56
3.17.	Roles of the Engineer in Clause 17.....	57
3.18.	Roles of the Engineer in Clause 18.....	57
3.19.	Roles of the Engineer in Clause 19.....	58
3.20.	Roles of the Engineer in Clause 20.....	59
4.1.	Types of actions and their related sub-clauses.....	66
4.2.	Assessing, Agreeing and Determining.....	76
4.3.	Requesting/Requiring and Instructing.....	79
5.1.	Classification of the roles.....	82
5.2.	Matrix of the roles.....	102

CHAPTER 1

INTRODUCTION

1.1. Background and Problem Statement

Under Sub-Clause 1.1.2.4, “ “Engineer” means the person appointed by the Employer to act as the Engineer for the purposes of the contract and named in the Appendix to Tender, or other person appointed from time to time by the Employer and notified to the Contractor under Sub-Clause 3.4: Replacement of the Engineer” (FIDIC 1999). The aforementioned is an extract from Clause 1 of the FIDIC 1999 Red Book. The acronym FIDIC stands for the French name of the International Federation of Consulting Engineers: *Fédération Internationale des Ingénieurs-Conseils*, an organization whose members are national associations of consulting engineers. FIDIC is best known for publishing a series of contract conditions for international engineering projects. FIDIC contracts have been translated into about 15 languages, a fact that indicates their widespread relevance and use (Ludlow et al. 1992).

At the core of administrating the construction contract is the role assigned to the Engineer by such standard contract conditions. The importance of this role stems from the strategic position the Engineer assumes in relation to the parties to the construction contract: the Employer and the Contractor. Even though the relationship between the Engineer and the Contractor is not defined through a formal contractual agreement, the duties and roles of the Engineer are at the core of the contract organizing the

relationship between the Employer and the Contractor. As such, the Engineer, through his actions, determinations, decisions, etc., can be a prime factor in the success or the failure of the project. From the signature to the final completion of the contract, the Engineer has a diversity of roles and a package of proactive, reactive and passive duties that are assigned to him. The extent of his authority is described, and in a way limited, by two independent contractual agreements: one between the Employer and the Contractor and the other between the Employer and the Engineer (Bunni 1997, 2005). The role of the Engineer during the construction phase is traditionally carried out by a design consulting firm. Bunni (1997) stated: "Engineering and detailed design services should be followed by supervision services during the implementation period. The same consulting engineer should normally provide both services as it is a mistake to employ different professionals for these two interrelated services. There are many reasons for this conclusion, the most important of which is perhaps the avoidance of any doubt about the responsibility for the engineering and other services provided." However, with the increase in projects' size and complexity, owners nowadays resort to a different entity for the handling of the managerial and administrative tasks normally required of the Engineer. Even in some situations, the Owner is allowing himself to take over certain duties originally assigned for the Engineer to carry as per the FIDIC contract conditions (Hanlon 2009).

To what extent is that considered as a right practice? The standard document allows for the Owner, contractually known as the Employer, to have the ultimate liberty in expanding or suffocating the authority of the Engineer through the clauses of the particular conditions of contract. Whether some of the Engineer's traditional roles or authorities end up being transferred to the Owner himself or to another party, the

question remains: is there a good understanding on the part of concerned parties as to what these roles exactly entail before judging whether any such roles can be the subject of change or not?

1.2. Research Objectives and Methodology

Since the Engineer is viewed as a central player to the proper overseeing of the project's construction phase, clearly understanding the roles assigned to him under standard contract conditions, such as those offered by the FIDIC, becomes a must. The objective of this study is to examine and highlight the major roles expected of the Engineer under the FIDIC 1999 Red Book and to investigate a method that can help more rigorously classify these identified roles. The desired classification method shall allow practitioners a better chance to differentiate between the two general classes of technical versus administrative and managerial roles and to be able to judge the instances where the Engineer is expected to act as the Employer's agent versus an independent decision maker.

This thesis will closely address the different roles, as per the FIDIC 99 Red Book, which the Engineer is supposed to play in a project's construction phase including the Engineer's rights, authorities, duties, responsibilities, and liabilities. The methodology to be followed in this thesis research will consist of the following six steps:

- 1- Conducting a literature review concerning the role of the Engineer, particularly in relation to being the contract administrator during the construction phase;
- 2- Conducting an in depth reading of the FIDIC1999 Red Book to identify all major roles given to the Engineer;

- 3- Conceptually exploring and brainstorming suitable criteria (technical, administrative, independent, agent, partial, objective, judicial, etc.) that can be used for defining and better understanding each identified role;
- 4- Designing a system that can systematically help classify the highlighted Engineer's roles;
- 5- Using the suggested classification system to deduce who is best to carry out and fulfill the examined roles, thereby proposing a matrix of roles that can be exclusively assigned to the design consulting entity as opposed to other roles that can be variably assigned to other equally or better qualified entities, including the Owner himself; and
- 6- Formulating a list of recommendations that can be used by practitioners when the splitting of the Engineer's roles is found to be desirable.

1.3. Research Contribution

This study will be of significance to professional practitioners using the FIDIC 1999 Red Book. The intended classification of the different roles of the Engineer is expected to act as an aid to projects' owners in deciding on how best to allocate the technical and contract administration roles among the entities that are planned to contribute to the overseeing of the construction phase.

CHAPTER 2

LITERATURE REVIEW

2.1. Construction Project Delivery and the success of the Project

The selection of a suitable project delivery method plays a significant role in the relationship between the owner, the contractor and the engineer (A/E), affecting eventually the level of success of the project (Chan et al. 2004). During the construction process, each of the participants reflects his own perspective, goals and needs on the same project (Bryde and Brown 2005). Various Project Delivery Methods have evolved to serve these different needs from the traditional (design-bid-build) to the more complex (fast-track and EPC, BOT...). Each of them has its own strengths and weaknesses and some of them are conveniently tailored for specific types of projects (Berman 1999).

An appropriate knowledge of the scope of work, complexity, size and the accounted budget of the project will help minimize the risks, and select the adequate method. When selecting a project delivery system, there are certain considerations to be taken into account (IBSS Marketing 2005):

- The expected time of completion: Is it a question of Time/Money availability?
Or is Quality a primary issue?
- The complexity of the facility: How big is the project? What about specialized equipment and/or required expertise?
- Compliance with the procurement statutes and regulations: What are the

necessary permits to be obtained? Is there any expropriation (in case of public projects)?

- Budget constraints: What are the risks that the Owner is willing to take in the building process?

- Available time and expertise of the in-house staff: The level of knowledge and involvement of the owner, represented by the y-axis in the graph of Figure 2.1 as the “Required Sophistication” versus the different project delivery method (Abdul Malak 2010):

MP: Multiple Prime

DB: Design-Build

T: Traditional

GC: General

Contractor

CM: Construction

Manager

BOT: Build-Operate-

Transfer

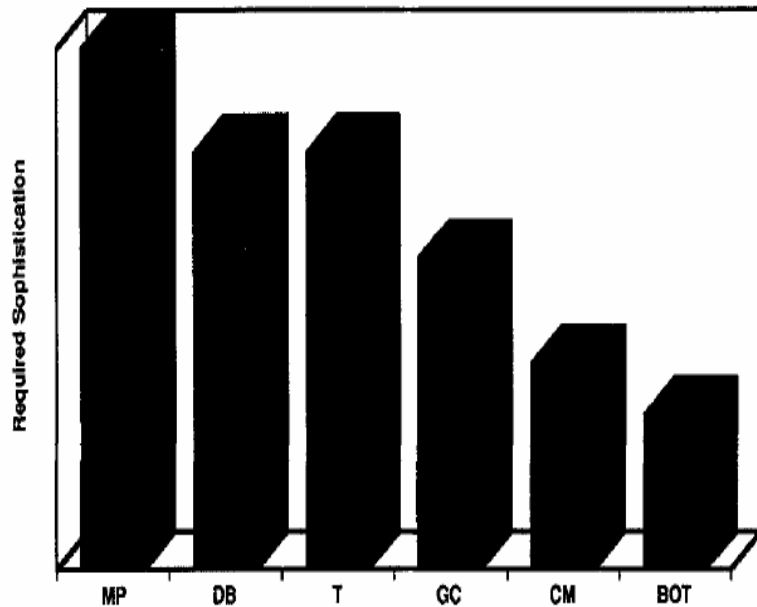


Figure 2. 2: Required sophistication versus different Project delivery methods (Abdul Malak)

2.1.1. Traditional Approach and its advantages

Normally and as it is best known to the public, buildings are constructed either on a design-build or on a design-bid-build basis. In a design-build contract, the contractor is responsible and liable towards the owner for both the design and the execution of the

work. In a design-bid-build basis, the contractor is engaged after the design is almost completed by a separate design professional (the engineer (A/E)) and only liable for the execution of the work (Berman 1999). The suitability of such approach comes from different aspects: It is easily manageable, has a clear scope, is designed to the detail level before construction, not necessarily executed in less time, less likely to undergo changes during construction and suitable for limited budget uncomplicated projects (Dolan 2003).

“The traditional design-bid-build (DBB) approach has been the most widely used and well understood because of clearly defined roles for the parties involved” (IBSS Marketing 2005). This method usually starts with the owner appointing an engineer (A/E) to do the design work, assist with the selection of the contractor then later supervise the work during the execution and administrate the contract signed by the owner and the contractor (Berman 1999).

The main problem of the DBB approach is its linear sequence of phases with rarely any overlaps which puts the engineer on the opposite riverside from the contractor. The engineer tends to feel nonchalant once the design work is achieved and moves to the next project. While the contractor who was absent during the design phase, sees the project hitting the wall of execution. A sort of adversarial relationship is born all the way through the project life cycle; whenever a small problem surfaces, both the engineer and the contractor are too ready to play the game of accusation. While reporting discovered mistakes to the owner is a requirement in most contracts, it leads to eliminating and minimizing the effect of such errors on the overall of the project. This system of checks and balances is what makes the DBB method primarily a promoter of quality (Berman 1999, Dolan 2003).

The DBB approach is best when the owner:

- Prefers a complete control over the design process. Figure 1 illustrates the
- relatively high level of involvement and required sophistication from the part of the owner;
- Requires an established total price before construction;
- Wants a single source of accountability towards construction.
- Can wait for the full completion of the design before engaging contractors; as

well as desires to use a traditional delivery method, well known, easily understood and implemented by all participants. The DBB project delivery method has different variations according to the project's requirements, including fast track, multiple prime and use of a construction manager (Berman 1999).

The advantages of the traditional method can be summarized as follows (Bunni 1997, Abdul Malak 2010):

- The Execution drawings are produced before the introduction of the Contractor;

And the reliance on competitive bidding;

- The professional judgment of the designer is not affected by any commercial plans;

- The assignment of supervision of the designer allows a higher degree of quality control;

- The client requirements can be altered or modified during construction, allowing for greater flexibility in the final design.

2.1.2. The Three Legs of the Stool to a Successful Project Delivery

The construction industry stands out with its complexity and magnitude. Much investment and many participants are involved in the industry. Thus, the journey for success is far from being smooth and easy: behind every set of objectives lies another set of obstructions and challenges (Acharya and Lee 2005). For more than 50 years, the Iron Triangle (Cost, Time and Quality) (Project Management Institute, 2004), Figure 2.2, has presented the most valuable success criteria for being easily available and measurable. This Iron Triangle is still used to describe project management today (Atkinson 1999). It was long believed that a project could be successful on only two but never three of the measures. Understanding of project success has become more complex and includes new ideas. (Kloppenborg et al. 2011). Maintaining the balance between the three corners of the triangle requires tremendous effort and cooperation from the stakeholders and participants in the game. Therefore teamwork is crucial for a successful project (Hassan 1995; Chan et al. 2004). This created system embodies the powers of a three-legged stool: the owner, with the money and the desire to invest in an idea; the architect/engineer (A/E) with the ability to design the idea and turn it into plans and specifications and the contractor with the adequate personnel and equipment to turn the plans and specifications into a built project. The complexity of this tripartite relationship will lead to conflicts then resolution of conflicts and compromises. However there are clear lines defining the rights, obligations and the extent of authority of each partner in this relationship for a successful project (Lynch 1983). “Project success means different to different stakeholders, a project that may seem successful to the client may be a completely unsuccessful venture for contractors or end users” (Toor and Ogunlana, 2008; Toor and Ogunlana, 2010).

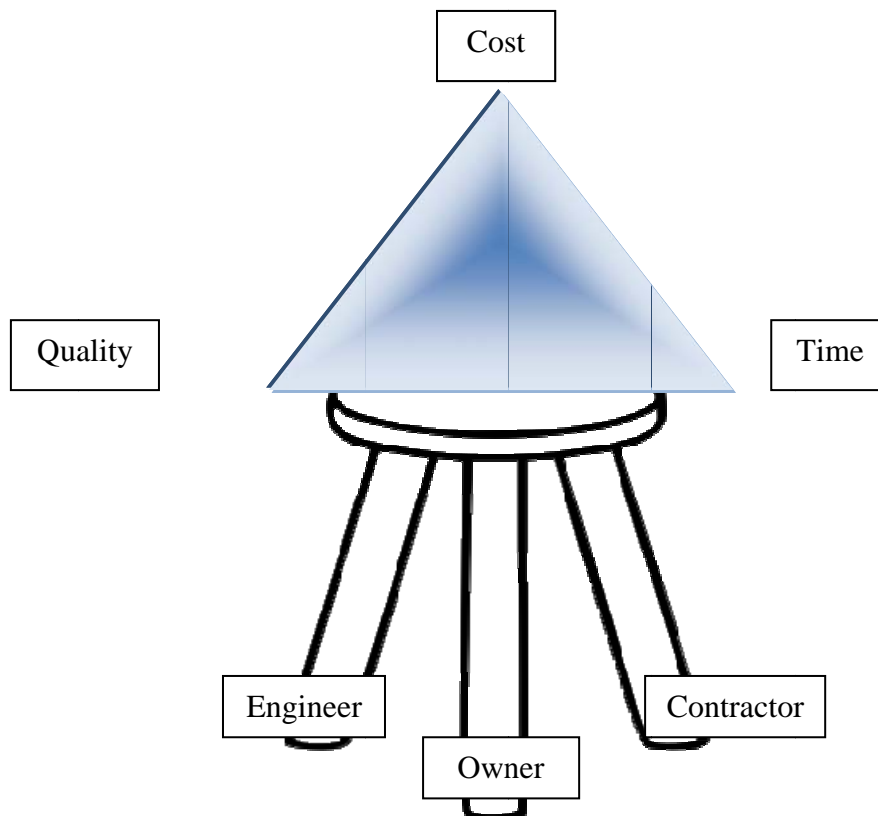


Figure 2. 3: the Iron Triangle (Atkinson 1999) {modified with the three-legged stool}

2.1.2.1. The Owner

A study in 2002 by Spencer and Winch showed the need for a more active role of the owner in the construction; thus, requiring a better understanding of a project's success. In more recent debates, the owner, the initiator and sponsor of the project, is considered the major steering force for determining construction processes and their results. He is the primary reason for the existence of the industry and satisfying his requirements is one of its major goals (Boyd and Chinyio 2006; Bertelsen et al. 2002; ByggherreForum 2006; National Commission of Construction 2002; Kamara et al. 2002; Danish Government, 2003; Lindahl and Ryd 2007). Engineers and architects can only achieve their goals through the owner (RIBA 1993). No matter how impressive or

perfect the design can be, without the recognition and approval of the owner, who is ultimately responsible for financing projects, it is nothing more than ideas on paper (Boyd and Chinyio, 2006).

A construction project's success is dependent on a few criteria in the owner's organization: experience, nature, size, sophistication, emphasis on cost, time and quality, knowledge of the project through a well-defined scope, risk aversion and contribution to the project (Chan et al. 2004; Chan and Kumaraswamy 1997; Songer and Molenaar 1997; Dissanayaka and Kumaraswamy 1999) not to mention the impact the owner or his representative can make on the construction time performance (Walker 1995).

Understanding the owner's behavior and its impact on project delivery is a rising matter of interest (Siva and London 2011). The owner has a significant role in driving the project not only to success but also to development and innovation by showing these characteristics: proactive involvement, acting as a team player, management of his organizations' internal relationships, respect for people, competence, effective dissemination of information, value judgment, support to innovation, foresight and vision, demanding innovation, maintaining up-to-date knowledge about project development, flexibility and receptiveness to change extreme regulations, managing knowledge and information, giving consistent requirements and the ability to manage risk. Thus, the owner can take the initiative and ease the road for proper decision making, create a sense of motivation and joint responsibility, develop mutual trust, be a good listener to all his employees without any prejudice, clearly explain to the team the objectives of the project, look at innovation as an improvement in value rather than waste of resources, show good coordination skills, financially encourage investigative

actions on important issues related to innovative ideas, fight the stiffness of bureaucracy, have a clear vision and goals at an early stage of the project (Kulatunga et al. 2011).

Research shows that contractors prioritize meeting deadline and minimizing cost, while the owners emphasize more on the quality that satisfies the needs of other stakeholders (Bryde and Robinson 2005). For a successful project, the owner organization shall channel its efforts on understanding and satisfying the expectations of all stakeholders and other team members among them the contractor (Chan et al. 2003; Bryde and Robinson 2005). According to a survey, the commercial pressures imposing time and cost constraints, partially hinder the efforts towards a solid commitment in the owner-contractor relationship (Chan et al. 2003).

In the traditional project delivery method, the owner, known as the Employer in the FIDIC Red Book, has specific duties and obligations. They can be summarized as follows: Granting access and possession of the Site, making arrangements for interim payments, paying the Contract Price, disclosing relevant Site data and cooperating with the Contractor to the extent the Contract allows. The Employer is expected to bear a certain amount of risk under the contract and compensate the Contractor for additional cost and disruption whenever the case requires and the Contractor is found eligible (Jaeger and Hök 2010).

2.1.2.2. The Contractor

Normally, the contractor is directly concerned with problems and disputes arising within the construction project. A flexible contractor can overcome the complexity of his work and follow the engineer's instructions. Thus contribute towards a successful

construction project. Whereas a greedy contractor can hinder the progress of the project, always desperate to find loopholes in the contract documents with an eternal wish to maximize profit and minimize work. On the other side, encountering a flawless contract document and a perfect design is almost impossible. It is a fact that its negative echoes resonates in the execution phase. Thus, the contractor cannot be blamed for all design faults and cannot bear their financial consequences. In the end, he participated in the project with the intention to earn profit. The flexibility of the contractor is a must. But eventually, giving sufficient time for the proper completion of the design is the most critical success factor and any other factors are in the service of this design (Acharya and Lee 2005).

Under a DBB approach, when the project reaches the construction phase that the contractors and sub-contractors enter the scene. The success of their mission is dependent on: the contractor's experience, proper site management, supervision and involvement of subcontracting, contractor's cash flow, effective cost control system and speedy information flow (Chan and Kumaraswamy 1997; Dissanayaka and Kumaraswamy 1999; Chan et al. 2004). At the same time in the trip to success, the contractor's organization is expected to be customer-focused. The customer in this context is the owner. The contractor is expected to understand and fulfill the expectations of the owner (Winch et al. 1998; Egan 1998; Bryde and Robinson 2005).

The contractor's responsibilities during the project life cycle can be summarized as follows: production of the project budgets and project schedules before the actual execution of the project. Then later during the construction phase, monitoring and updating of these budgets and schedules which is considered as their main responsibility, along with delivering the project up to the client requirements and

satisfaction. And when the contractor is focused on pleasing the client, his tasks will also involve respecting the budget and deadlines of the project (Bryde and Robinson 2005).

Under the FIDIC Red Book, the obligations of the Contractor rotate around his duty to complete the Works in conformity with the Contract where his duty for quality is embedded within. The Contractor is subject to the Engineer's supervision and instructions. Thus, any rejected item during the course of the works is expected to undergo removal, replacement, adjustment and even reworks in order to comply with the Engineer's instructions and eventually with the Contract. Otherwise, the Contractor faces extra costs to compensate for the Employer whenever the law applies. Of course, the Contractor has the obligation to complete the whole or a section of the works within the Time for completion indicated in the Appendix to Tender; he should submit a programme of Works showing his method statement which should be in accordance with the Contract. The submitted programme of works legally binds the Contractor to follow it, respect the order of its activities and its critical deadlines, revise and update it whenever it does not reflect the actual progress of works (see Bunni 2005, p. 358). The latter submitted programme will serve as the reference to the Engineer and/or the Employer when monitoring the works and assessing any claimed compensation by the Contractor (Totterdill 2006; Jaeger and Hök 2010).

2.1.2.3. The Engineer

Differences in beliefs and values between individuals and groups have been noticed for over 30 years, especially when it comes to the perception of the built environment between the owner and the engineer. The success of the project is valued differently by

the owner than it is by his engineers (Siva and London 2012; Hershberger 1980; Wilson 1996). But to have a successful engineer-owner relationship, the concept of trust cannot be disregarded. In this context, the owner trusts the engineer (A/E) and relies on him to be his expert eyes throughout the project life cycle. He can also play the role of “tutor” whenever the owner is not sufficiently knowledgeable and sophisticated towards the project he is financing. Thus, the Engineer can help him adjust to new environments and prepare him to face and accept the challenges and uncertainties of the construction project. This kind of relationship will increase the owner’s knowledge and sophistication and eventually contribute to the success of the construction project (Siva and London 2012). “Complete confidence is necessary for a successful delegation of authority from the Employer to the Engineer related to monetary matters” (Bunni 1997).

Traditionally, the owner hires a consulting engineer and assigns to him all the authorities and obligations under the “Engineer” in the contract. Bunni (1997) has primarily defined the consulting engineer as “an individual member of a member association or a qualified practicing professional in private practice principally occupied as an advisor on engineering and related matters, with the responsibility for the management of member firms of a member association or a person who has recently held such positions before his professional retirement” (Bunni 1997). The consulting engineer is expected to be highly ethical in performing his job and to have suitably qualified assistants and associates. Three criteria can describe the consulting engineer: his professional status, independence and competence. His services can be summarized as follows: counseling and pre-project planning studies, design, and preparation of contract documents, supervision and inspection to check the conformity with the specifications, specialized design and development, project and programme

management. The delegation of the consulting engineer directly affects the price of the project. “Because, the better the engineer, the more realistic is the contractor’s price” (Bunni 1997; 2005).

Under a DBB approach, supervision of the construction works follows the detailed design and engineering phase. The same consulting engineer is normally in charge of both the design and supervision services which is considered as good practice for many reasons. The most important of which is that it chases away any ambiguities related to the responsibilities of these two interrelated roles (Bunni 1997).

The engineers (A/E) who are normally responsible for coordinating tasks between the different stakeholders in the project rarely follow a formal procedure or guidelines with proper management tools or techniques (Cuff 1991; London et al. 2005).

The owners of construction projects are becoming increasingly oriented towards a more value-based and operational management process (Ryd 2003). There is a need for professionals that can act as the owner’s connection between business development and technical design and supervise the execution process in a less traditional way (Lindahl and Ryd 2007). The consulting design engineers are no longer the owners’ first choice of advisers (RIBA, 1992; Nicol and Pilling, 2000). A dramatic change in the way they deal with their employers is expected for them to improve their position; there is a simple suggestion of changing the profession’s tradition of “protectionism” and “exclusivism” in order to deliver a higher quality in the construction project (Cuff, 1991; RIBA, 1993; Siva and London 2011).

2.2. Contract Administration in Construction projects

“Contract administration” is a basket of non technical functions, ranging from the usual to the first time encountered, that are performed at the construction phase of the project (Sherman 1996). Examples of the non technical functions are: payment certification, reports, change management, opposed to the technical functions like design, estimating, preparation of tender documents (Reynolds 2008). The contract administration is not simply limited to the enforcement of the contract between the owner and the contractor, but also involves achievable tasks with clearly defined and communicable goals when correctly monitored, they can ensure a successful outcome (Davidson and Sebastian 2009).

A contract administrator is compared to a “gatekeeper” linking the owner to the project process and best described as “conciierge de contrat”: he is in charge of something that he does not own, control, did not create nor is in the position to agree upon. His authority may include changes to the scope, schedule and cost of the project, but he does not have any authority to negotiate, terminate a contract or even change in the duties of the contracted parties. The financial authority stays in the hands of the owner through the project life cycle. Whenever the owner, assisted by a qualified contract administrator, is able to anticipate and study the contract related risks and includes them in the project cost before signing the contract, the choice of “contract administration” can contribute to the success of the project (Wearne 1992).

On small or simple projects, the job of the contract administrator can be assigned to any or a combination of the engineer (A/E) the designer, the project manager, general contractor, quantity surveyor, and other project participants. They all have good planning and organizing skills but on big projects of a certain complexity, the ability of

managing, predicting and innovating in the contract administration can present a great challenge. Too little interest is left to the non technical issues of the project but when it comes to the macro scale or a certain complexity, the adequate person to take over the job of contract administrator must have enough time, energy and skill. Thus, avoiding disasters and promoting project success. “Paperwork” is not the only aspect of the execution of a project but when this aspect is treated with the seriousness and proper organization that it needs, it will save a lot of unnecessary trouble and waste of time and energy. When a good business plan and a measurable and accessible process showing consistency and flexibility are implemented from initiation, the project will progress towards success (Reynolds 2008).

The contract administrator has defined responsibilities and liabilities under the agreement between him and his employer in compliance with the construction contract. The standard of care and Impartiality are the most emphasized duties of the contract administrator. The common law imposes the standard of care for the professional carrying out his work. When the owner assigns the contract administrator as his agent, he expects him to keep a close eye on the project progress in order to obtain the most efficient and economical results. Yet, the latter is threatened to face a lawsuit from his employer in case he fails to properly perform his duties. Not withdrawing the fact that these duties are expected to be performed in a fair and professional way (Hanlon 2009). “The case of Scheldebouw BV v St James Homes (2006) BLR 113: The employer, St James Homes, had removed Mace, their construction managers, and proposed themselves as the replacement” (Hanlon 2009). After the objection of the contractor, a court ruling was sought against the employer. Regarding the duties of a construction manager, there is a distinction between two functions: the Employer’s agent who acts

on the behalf of the engineer in tasks like variation orders and the Decision-maker who is expected to be independent from the owner answering the claims of money and time compensation. The concept of the employer taking over the role of the contract administrator and especially that of the independent decision-maker is so unusual and poses the question of conflict of interest that would require express words in the contract to make it legitimate. Although, the contract in question did not explicitly allow the owner to be his own contract administrator (Hanlon 2009).

Despite the fact that the contract administrator is expected to act impartially and fairly when playing the role of a decision maker, he is not obliged to apply the rules of natural justice. Any negligent act in performing this duty will expose him to liability to his employer in certain cases or even to third parties, like institutions lending money to the owner. Normally, the certifier cannot be liable to the contractor for the simple reason of the absence of contract between both parties. “However, if for example, he makes gratuitous representations to the contractor he may be found to have assumed a responsibility to him and be liable in negligence” (Hanlon2009). If the contract administrator is exposed to pressures from the owner when making a certification, his decision may be ignored and his certificate invalid. The employer can risk a breach of contract with the contractor if he was aware of a certain negligence or misconduct from the contract administrator and did not take the appropriate measures to fix the situation.

Theoretically, a contract administrator can be an employee of the owner and can be the owner himself if both parties explicitly agree on that in the contract. Even though the fact that the owner is his own contract administrator can be quite odd and presents certain difficulties (Hanlon 2009).

“These principles have long been applied to ‘traditional’ construction and engineering contracts. Recent attempts to argue that they do not apply to decision-makers under new forms of contract have been rejected by the courts “(Hanlon 2009).

2.3. The Engineer, through the Project Life cycle

2.3.1. *The Engineer, an assigned Design Professional*

The role of the professional designer is the first role that the engineer assumes at the start of any project (Bunni 1997, 2005). This work is primary and vital to the project from inception to completion(Chan et al. 2004). Because in order to minimize waste in time and energy and ensure better results, the design should be complete and correct at the time of invitation of bidders (Bunni 1997, 2005).A few criteria define the design team: experience, the complexity of the project in design, production of design documents with no or minimal errors (Chan and Kumaraswamy 1997).

Bunni (1997, 2005) has extensively explained the work of the design professional which can be observed as an identification of the project with the owner regarding its size, function, feasibility and safety. Thus, the designer first illustrates the owner’s requirements in a written scope of work. The quality is the main requirement of the owner, of course subject to the agreed financial investment, and the responsibility of the designer. This responsibility is manifested in the specifications document where the designer explains the required workmanship, materials and the level of quality that cannot be compromised during the execution. After the definition of the project and the production of the specifications documents, the designer can then deliver his design and drawings accordingly. The work of the designer does not stop at the production of the drawings but it continues to a detailed Bill of Quantities, an estimation of the required

budget, the cost of maintenance, a preliminary schedule of works and a work programme (Bunni 1997, 2005).

“There is no implied authority for the designer to delegate any of his duties to others... The Consultant retains design rights and other intellectual property rights and copyrights of all documents prepared by him. The Client shall be entitled to use them only for the Project and the purpose for which they are intended. The provisions need to be checked. Some employers do insist to be vested in the rights of the consultant such as public bodies. This may prove to be impossible subject to the intellectual property law which is applicable. According to German copyright law the author cannot assign the copyright but only grant licences on it” (Jaeger and Hök 2010).

The designer is the primary advisor of the owner before the execution of the construction project. The work of supervision of the works is expected to be carried out by the same design professional, to ensure that his design is being correctly implemented.

But, his job should not go beyond being a supportive monitoring role to the contractor’s responsibility of quality and safety and should in no way transform the engineer into a policeman (Bunni 1997,2005).

2.3.2. The Engineer, a Contract Administrator

The Engineer’s services during the construction phase includes quality inspection and supervision as well as contract administration services, the latter of which includes certifying payments to contractor and evaluating, making determinations, and assisting in other ways in the resolution of claims and disputes

involving requests for payment of additional expenses/costs and/or for award of extensions of time (FIDIC Geneva 2008).

“On one hand the Engineer has a number of functions in which he acts, either expressly or impliedly, as the agent of the Employer. On the other hand, both parties to the contract agree, at the time of entering into the contract, that the Engineer is to perform certain determination/certifier functions under the contract. The Engineer (or Employer’s Representative) is thus a very powerful person which is also referred to as a decision-maker, a function which requires a certain degree of impartiality and fairness from him.

In common law, generally, the role of the Engineer will be divided between actions taken as the employer’s agent and those involving a professional opinion” (Jaeger and Hök 2010).

“Some examples from the Red Book include the engineer's duty to eject unruly workers from the construction site,(15) to carry out initial protective measures in the event of a historical or archaeological discovery on-site,(16) and to monitor the need for and to secure remedial work "urgently necessary for the safety of the Works."” (Lyon 1994)

2.3.3. The Engineer, when it comes to Dispute Resolution

“The word ‘dispute’ means: a verbal controversy; an argument; a debate; a quarrel. A dispute can result only from a previous assertion made by one party which is rejected by another party, and the rejection is finally pronounced to be unacceptable by the asserting party. A dispute may emanate from an action or inaction by the engineer or the

employer in response to an assertion made by the contractor or vice versa” (Bunni 1997, 2005).

Under the FIDIC 1987 Red Book, the role of the Engineer has been regarded as controversial, in that he is required to be fair and impartial at all times, while the Engineer is hired and paid by the Employer and acts more like an advisor before being an independent decision maker. According to Clause 67, Engineer’s Decision, the Engineer is obliged under contract to play a quasi-judicial role in providing a decision (a ruling) on claims, where the Engineer’s produced design documents can be central to the reasons as why such claims are made (Stein and Hiss 2003). This duality problem has been partly resolved in the FIDIC 1999, where, according to Clause 20, the dispute resolution part is optionally left to a Dispute Adjudication Board (DAB) to decide upon. A typical feature of the FIDIC 1999 Red Book is the role of the Engineer; whether he has to act for the Employer or whether he has to make a fair determination depends on the matter in question (Hillig et al. 2010). Of course, the new situation does not allow the Engineer to be any less than the professional he is, but it took out a lot of burden of the superhuman powers the old Red Book implied. While the old book requires the Engineer to be fair and impartial, the new one requires the decision itself to be fair and impartial (Ndekugri et al. 2007).

When it comes to dispute resolution, even if the engineer is not required to be a “judge”, he can play the role of professional expert and give his pure technical opinion in the service of an arbitration or a court. He can also play a role of the mediator reconciling between the owner and the contractor before the resort to an adjudication or arbitration.

In whatever a job the engineer assumes from the inception to the completion of the construction project, he can always bear in mind to deliver a quality work that will avoid any waste or be the initiator of any dispute between the owner and the contractor. See (Genton and Schawb 2000) article about the role of the Engineer in Disputes.

2.4. Responsibility and Liability of the Engineer

2.4.1. Professional Liability

“The incidence of professional liability claims against engineers and architects serving the construction industry remains a serious problem. A disturbing fact that became manifest was the costly experience of design professionals associated with personal injury both during construction and after project completion. Only very rarely is a designer remotely responsible for accidents that occur” (Janney et al. 1996).

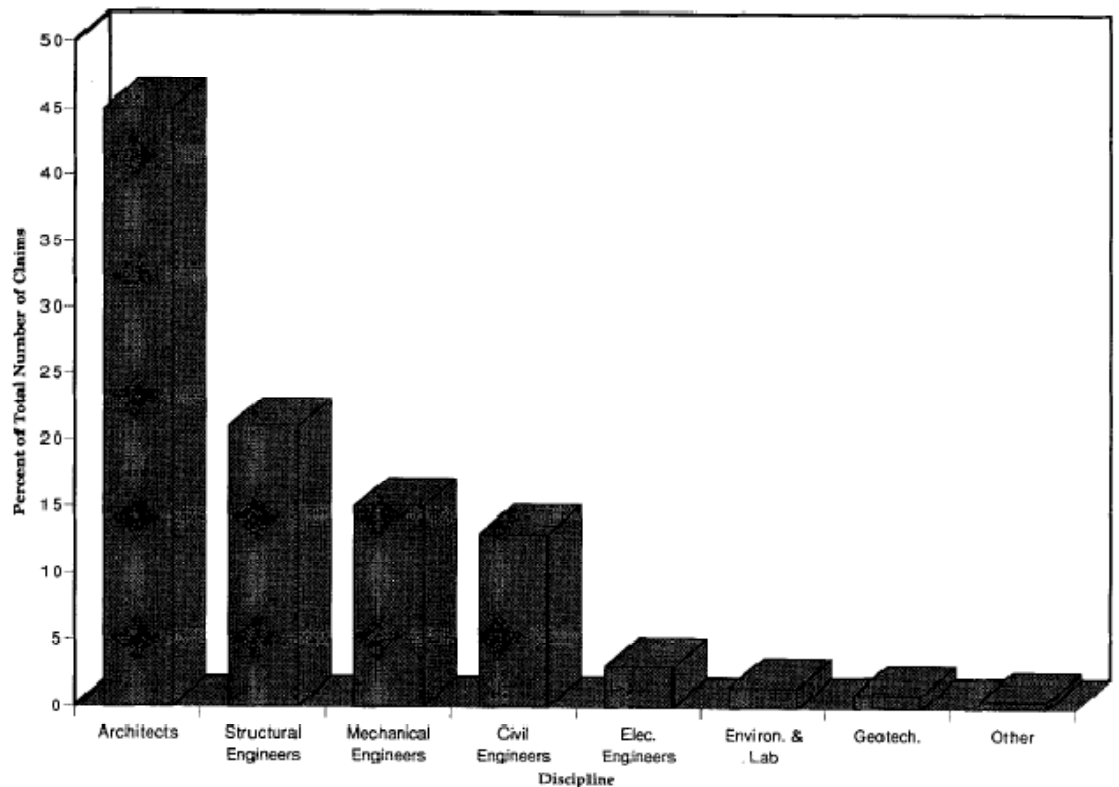


Figure 2. 4: Number of claims by discipline (Janney et al. 1996)

“The liability of the Engineer due to lack of skill or care is under the contract between the Employer and the Engineer” (Bunni 1997).

When it comes to determining a certain claim, the engineer is expected to consult both parties. But even after consultation is hindered, the engineer is obliged to issue the determination out of professional ethics. It is supposed to be done with proper documentation to protect the engineer. At this stage, a lawyer should be consulted after the engineer has failed (Bunni 2005).

“There is no express contract clause(FIDIC) ruling the impartiality of the contract administrator”(Bunni 1997). However,“there is implied impartiality in common law contracts” (Jaeger and Hök 2010).“As required by Sub-Clause 3.3.1 White Book the Consultant shall have no other responsibility than to exercise reasonable skill, care and diligence in the performance of his obligations under the Agreement. The standard of “reasonable skill, care and diligence” is conventional for professional consultant firms in common law countries and it is the standard against which the PI insurance industry within common law countries usually provides cover. In English law the designer’s design must be such that those who are responsible for implementing it, and those who are responsible for supervising that implementation, can do so by the exercise of the skill and care ordinarily to be expected of them” (Jaeger and Hök 2010).

2.4.2. Responsibility towards the Contractor

“Those unfamiliar to the Red Book find it peculiar that whilst not part of the contract between the Employer and the Contractor, the Engineer is empowered to do various action that are binding on both parties unless and until they subsequently

rescinded or varied by an arbitrator. As well as, because of the principle of privity of contract under common law system (on which the Red Book is based), the engineer's actions or inactions do not expose him to any liability under the contract between the Employer and Contractor" (Bunni 1997). If the Contractor suffers any losses due to Engineer's negligence, he should obtain remedy from the Employer. In such case, the Employer can file a claim against the Engineer (Bunni 1997).

There is no contract between the engineer and the contractor in the DBB method of construction; therefore, in a dispute, the engineer and the contractor cannot sue each other except, generally, in some particular situations such as: Most courts will allow the engineer and the contractor to sue each other if the other has been negligent; however, even when one of these parties has been negligent, they cannot be forced to join in an arbitration between the owner and one of these parties unless the owner and the other contracting parties have agreed to permit the jointer of the third-party to the proceeding (Berman 1999).

"Engineer's liability in front of the contractor under tort is known as wrongful interference with contract... There is therefore a strong contractual argument that if the Engineer does not act fairly towards the Contractor, this constitutes a breach of contract by the Employer. It is suggested that breach of contract can result either through an act or an omission of the Employer and that the Employer shall ensure that at all times there is an Engineer and that in the exercise of the functions of the Engineer under the Contract, the Engineer acts in a timely manner with due regard to all relevant circumstances and that he acts honestly and fairly" (Jaeger and Hök 2010).

"A contract administrator may in some circumstances be liable in tort to a contractor or others. In *Townsend's Ltd v Cinema News, etc. Ltd* [1959] 1 WLR 119

CA, there was a statutory duty upon the contractor to serve notice upon the sanitary authority before executing certain work, but there was proved to be a clear practice that the contractor “relies upon the architect to do all the work and give the notices and see that regulations are complied with”. The contractor relied in this case upon the architect serving the proper notice and seeing that the byelaws were complied with. The architect failed to carry out these tasks properly resulting in a breach of the byelaws causing loss to the employer, which he was entitled to recover from the contractor. In turn the contractor recovered this loss from the architect who, having undertaken a duty towards the contractor, was liable to him for its negligent performance although it was undertaken gratuitously. Consultants may also, in some circumstances, become liable to the contractor for loss caused by reliance on a negligent misstatement {Hedley Byrne v Heller & Partners [1964] AC 465, 503, 530 and 539 HL}, particularly in respect of an answer to some specific inquiry on a matter and in circumstances where the contractor reasonably relies upon the architect’s judgment or skill or his ability to make careful inquiry. But, the consultant would probably not be liable if he expresses his statement to be given “without responsibility” or otherwise in such a way as to show that he does not accept a duty of care towards the contractor” (Hanlon 2009).

2.4.3. Responsibility towards third parties other than the Contractor

The responsibility and liability of the engineer towards third parties other than the contractor is dictated by the law in practice and the case requires. When this liability arises from a breach of duties imposed by statutes. It can vary from civil to criminal liability requiring a certain fine or a number of years of imprisonment (Bunni 1997).

“The duty in tort for negligence maybe greater than for the breach of contract and it is imposed by general law, whereas the duty in contract comes about only the obligation assumed by the parties” (Bunni 1997).

2.4.4. Responsibility towards Society

“The engineer, as a designer and supervisor, owes duty to society in general in respect to the impact of his design on the environment surrounding him. A duty is also owed by the engineer towards employees under the applicable labour and employment laws. Last but not least, the engineer owes duty towards himself to maintain a high standard and a high reputation as a professional and at the same time remain in practice” (Bunni 1997).

CHAPTER 3

THE ROLE OF THE ENGINEER AS DESCRIBED IN THE 1999 FIDIC RED BOOK

3.1. Introduction to the 1999 FIDIC Red Book

FIDIC has contributed to the procurement of international projects since 1913 by providing standard forms of contract (Ndekugri et al. 2007; Lyon 1994). The FIDIC's Conditions of Contract often called the Red Book, is the standard document concerned with the traditional DBB project delivery approach. The FIDIC 1987 Red Book is based from the ICE form of contract (Bunni 1997; Ndekugri et al. 2007; Lyon 1994; Glover and Hughes 2006). Although it is still being widely used for execution of construction projects, the flaws and concerns in this version of the book have been extensively studied and are largely found in the literature (Bunni 1997, 2005; Ludlow et al. 1992; Ndekugri et al. 2007; Stein and Hiss 2003...). An attempt to fix these flaws gave birth to the new FIDIC 1999 Red Book.

The 1999 FIDIC Red Book is the standard Conditions of Contract between the owner contractually named the “Employer” and the “Contractor”. This document is structured under 20 headings summarizing all possible duties, roles and authorities of the three main participants in the project and compiling years of experience to what is defined as good practice in the construction industry.

3.2. A clause-by-clause reading of the different roles, duties and authorities required from the Engineer in the Standard document

An in-depth reading of the 1999 FIDIC Red Book is an essential milestone on the road of investigation towards a proper classification of the different roles of the Engineer. A clause-by-clause scan has been performed in order to depict all the Engineer's roles mentioned and required from the Standard document.

The word "Engineer" is mentioned in almost every clause in the new Red Book. It is cited in 99 out of 163 sub-clauses, representing 61% of the General Conditions. It can be said that "The Engineer" is a key element in this equation. In every matter described by a clause, it is referred to Clause 3 where the Engineer is defined and required to assume a number of duties and authorities within certain limitations, from delegation to replacement, to giving instructions and to, most importantly, making fair determinations. The results of the performed scan on the 1999 FIDIC Red Book are as follows:

3.2.1. Clause 1: General Provisions

Clause 1 entitled **GENERAL PROVISIONS** is an introductory clause. It consists of 14 sub-clauses defining the project's constituents and participants. Among them, 2 sub-sub-clauses under the sub-clause 1.1 **Definitions**, define the Engineer as the Employer's appointee and 5 sub-clauses assign a role or different roles to the Engineer. These roles are summarized in Table 3.1 below.

"Under sub-clause 1.1.1, the definitions are extensive compared with many Standard Forms. The definitions for the defined terms, which are identical across all the FIDIC forms, are grouped not alphabetically but in six different categories, the

contract, parties to the contract, dates, tests, periods and completion, money and payments, works and goods and other definitions...

1.3 Communications: Approvals, Certificates, Determination and the like shall be delivered as set out in the Appendix to Tender to the address as stated in the Appendix to Tender and they shall not be unreasonably withheld or delayed.

1.5 Priority of Documents: the Engineer shall be responsible for resolving any discrepancy.

1.8 Care and Supply of Documents: The Contractor must supply the Engineer with six copies of each of the Contractor’s Documents. The Employer’s Personnel shall have access to the documents kept on site at all reasonable times. If a party becomes aware of an error or defect of a technical nature in any of the documents prepared for the use in executing the works, they must promptly give notice of this to the other parties” (Glover and Hughes 2006).

Table 3. 1 Roles of the Engineer in Clause 1

Sub- Clause	Title	Described role of the Engineer
1.1	Definitions	
1.1.2	Parties and Persons	definition as Employer's appointee that has
1.1.2.4	“Engineer”	contract defined authorities
1.1.2.6	“Employer’s Personnel”	redefined as part of the Employer's Personnel
1.3	Communications	<ul style="list-style-type: none"> ➤ certifying and/or issuing a notice ➤ at the receiving end of a notice
1.5	Priority of Documents	interpreting Contract documents: <ul style="list-style-type: none"> ➤ issuing clarification ➤ giving instructions

1.8	Care and Supply of Documents	at the receiving end of copies of Contractor's documents
1.9	Delayed Drawings or Instructions	<ul style="list-style-type: none"> ➤ issuing a necessary drawing or instruction for the progress of the Works ➤ at the receiving end of a notice from the Contractor predicting delay or disruption of the Works ➤ at the receiving end of a claim under sub-clause 20.1 ➤ giving Determination under sub-clause 3.5
1.12	Confidential Details	requiring disclosure of confidential documents for compliance with the Contract purposes

3.2.2. Clause 2: The Employer

Clause 2 entitled **THE EMPLOYER** is concerned with the owner and financier of the project and his obligations then his rights towards the Contractor. This clause consists of 5 sub-clauses among which 2 mentioning the roles of the Engineer. In these 2 sub-clauses, the Engineer intervenes in the matter of claims and determinations either against the Employer under sub-clause 2.1 or against the Contractor under sub-clause 2.5. They are summarized in Table 3.2 below.

Table 3.2. Roles of the Engineer in Clause2

Sub-Clause	Title	Described role of the Engineer
2.1	Right of Access to the Site	<ul style="list-style-type: none"> ➤ at the receiving end of a claim under sub-clause 20.1 ➤ giving determination under sub-clause 3.5
2.5	Employer's	➤ giving notice and particulars to the Contractor asking

	Claims	for the Employer's Claims under sub-clause 2.5 excluding payments under sub-clause 4.19 & 4.20 (The Employer or the Engineer) ➤ giving determination under sub-clause 3.5
--	---------------	--

3.2.3. *Clause 3: The Engineer*

Clause 3 entitled **THE ENGINEER** is concerned with the Engineer, the contract administrator. It consists of 5 sub-clauses explaining the duties and authority of the Engineer, a right for delegation whenever the circumstances oblige him, the instructions that are supposed to be directed to the Contractor to insure the proper progress of the Works, the possibility of replacing the Engineer which was not an option in the 1987 FIDIC Red Book and last but most importantly, the determinations of the Engineer, the role of decision making on mainly the matters of extension of time or additional cost. Table 3.3 below summarizes these deduced roles.

Glover and Hughes (2006) in their book “Understanding the New FIDIC Red Book: A clause-by-clause commentary” and under the Clause 3 of the 1999 FIDIC Red Book, mentioned that the Engineer is clearly not a party to the Contract according to Sub-Clause 1.1.1. As it has been extensively explained, the traditional Engineer (1987 FIDIC Red Book) is supposed to be independent, impartial, fair and hold the balance between the Employer and the Contractor. This duality has been illustrated under Sub-Clause 2.6, where the Engineer is asked to act “impartially within the terms of the Contract and having a regard to all circumstances.” In the new Red Book the word “impartial” has disappeared. In fact, in Sub-Clause 3.1, the Engineer is explicitly defined as the “Employer’s agent”. Even though he has to take a decision, make a

determination for a certain extension of time or financial compensation allegedly claimed, he has to exercise his authority in complete fairness and professionalism. Sub-Clause 3.5 asks the Engineer when making a determination to refer to consultation of both parties in order to reach agreement. But when the determination is directly related to the Engineer’s work, an agreement is not expected to be reached and he has to proceed to a fair determination (Glover and Hughes 2006). It is to be noted that the role of the Engineer described in the Conditions of Contracts the general and particular, is further described in specific details according to the Works in other documents in the Contract, especially the Specifications and Bill of Quantities, mainly in the “General Requirements” part.

Table 3.3. Roles of the Engineer in Clause 3

Sub- Clause	Title	Described role of the Engineer
3.1	Engineer’s Duties and Authority	<ul style="list-style-type: none"> ➤ carrying out contractually assigned duties by the Employer ➤ showing competence and professionalism among his staff ➤ having no authority to amend the Contract ➤ having no authority to relieve any party from any responsibility or duty except when it comes to VOs and the multiple actions of the Engineer do not relieve the Contractor from any responsibility ➤ asking for Employer's approval when the authority or duty assigned requires so ➤ acting for the Employer when carrying out contract specified or implied duties and authorities
3.2	Delegation of	<ul style="list-style-type: none"> ➤ assigning duties and delegating authority to assistants

	the Engineer	<p>as well as revoking such assignment in writing and submitting copies to both parties</p> <ul style="list-style-type: none"> ➤ having no right to delegate the authority to determine any matter under sub-clause 3.5 ➤ rejecting or approving the work, Plant or Materials when the assistant has failed to disapprove such matter ➤ confirming, reversing or varying the determination or instruction given by the assistant and which the Contractor is questioning
3.3	Instructions of the Engineer	Giving instructions in writing or oral instructions with written confirmation from the Contractor under sub-clause 3.3
3.4	Replacement of the Engineer	The Employer has the right to replace the Engineer but also has a duty to notify the Contractor 42 days ahead. On the other hand, the Contractor has the right to object within the given period and if exceeded and still have objections can base his reasons on a breach of Sub-clause 3.1
3.5	Determinations:	<p>making determinations:</p> <ul style="list-style-type: none"> ➤ consulting with each party in an endeavor to reach agreement ➤ making fair and impartial determination even when agreement is not achieved ➤ giving notice to both parties of each agreement or determination

3.2.4. *Clause 4: The Contractor*

Clause 4 entitled **THE CONTRACTOR** is concerned with the third leg of the tripartite relationship and the contractually liable party towards the Employer under the

Red Book Contract. The Contractor is expected to execute, complete the project and “remedy any defects” in accordance with the Contract and with the Engineer’s instructions. This clause consists of 24 sub-clauses and the Engineer exists in 16 of them described in Table 3.4 below. They are no more than assurance of the influence of the duties and authority of the Engineer on the Contractor’s duties in quality and progress of the Works. This part of the document best describes and illustrates all the roles, duties and authorities of the Contract administrator, the Engineer.

Table 3.4. Roles of the Engineer in Clause 4

Sub- Clause	Title	Described role of the Engineer
4.1	Contractor's general obligations	<ul style="list-style-type: none"> ➤ giving instructions related to designing part of the Works as per Contract, executing or completing the Works and later remedying any defects ➤ requiring from the Contractor any details of arrangements and methods of the proposed execution ➤ at the receiving end of a notice of any significant alteration to the agreed arrangements and methods of execution ➤ at the receiving end of the Contractor's documents related to contractually required design of part of the Permanent Works ➤ requiring additional information to add to the Drawings for coordination of each Party’s designs ➤ at the receiving end of the “as-built” documents and operation and maintenance manuals in accordance with the Specification and in sufficient detail...
4.2	Performance Security	at the receiving end of a copy of the Performance Security

4.3	Contractor's Representative	<ul style="list-style-type: none"> ➤ at the receiving end of the name and particulars of the proposed Contractor's Representative ➤ giving consent on appointment or revocation of appointment of a Contractor's representative ➤ at the receiving end of a notice and Giving consent on a temporary replacement of the Contractor's Representative ➤ giving instructions under sub-clause 3.3
4.4	Subcontractors	<ul style="list-style-type: none"> ➤ giving consent to other proposed Subcontractors ➤ at the receiving end of a notice of the intended date of the commencement of each Subcontractor's work...
4.5	Assignment of Benefit of Subcontract	giving instruction on passing the benefit and obligations of a subcontracting contract beyond the expiry date of the defects notifications period to the Employer
4.6	Co-operation	<ul style="list-style-type: none"> ➤ giving instruction when not specified in the Contract about cooperation with the Employer's Personnel and other Contractors. ➤ access to required documents... ➤ at the receiving end of the Contractor's documents
4.7	Setting Out	<ul style="list-style-type: none"> ➤ giving notice of the points, lines and levels of reference ➤ at the receiving end of a claim under sub-clause 20.1 ➤ giving determination under sub-clause 3.5
4.9	Quality Assurance	<ul style="list-style-type: none"> ➤ auditing the quality assurance system ➤ at the receiving end of details of all procedures and compliance documents ➤ issuing documents of a technical nature
4.12	Unforeseeable physical conditions.	<ul style="list-style-type: none"> ➤ at the receiving end of a notice for alleged unforeseeable physical conditions ➤ inspecting and investigating the conditions ➤ giving instructions

		<ul style="list-style-type: none"> ➤ giving determination under sub-clause 3.5 ➤ reviewing other physical conditions in similar parts of the project and taking account of foreseen conditions during Tender submittal
4.16	Transport of Goods	<ul style="list-style-type: none"> ➤ at the receiving end of a notice ➤ giving consent for removal of any major items of the Contractor's Equipment
4.19	Electricity, Water and Gas	giving determinations under sub-clause 2.5&3.5
4.20	Employer's Equipment and Free-Issue Material	<ul style="list-style-type: none"> ➤ giving determinations under sub-clause 2.5&3.5 ➤ at the receiving end of a notice of any shortage or defect of the materials
4.21	Progress Report	at the receiving end of copies of the monthly progress reports
4.22	Security of the Site	authorizing persons on the Site
4.23	Contractor's Operations on Site	agreeing on the operations on the Site
4.24	Fossils	<ul style="list-style-type: none"> ➤ at the receiving end of a notice for Fossils findings on the Site ➤ issuing instructions to deal with the situation ➤ at the receiving end of a claim under sub-clause 20.1 ➤ giving Determination under sub-clause 3.5

3.2.5. Clause 5: Nominated Subcontractors

Clause 5 entitled **NOMINATED SUBCONTRACTORS** consists of 4 sub-clauses where the Engineer is involved in all of them which are summarized in Table 5 below.

The word “nominated” directly connects the Engineer to the matter. The definition of “Nominated Subcontractor” is someone who either is listed in the Contract or the Engineer has instructed the Contractor to employ. A sub-contractor is sometimes necessary whenever the complexity and size of the project or the capability of the Contractor require. A description of their relationship to the Contract is deemed important to mention. It is to be noticed that the Contractor was given the right of objection to the nomination of a certain sub-contractor based on solid grounds such as the sub-contractor’s competence, insufficient resources, the sub-contract does not specify an indemnification of the Contractor in case of negligence or failure to perform its obligations and discharge the Contractor of his sub-contracted obligations under the Contract or the Employer refuses such indemnification. The entitlement of payment of the sub-contractor is reserved under the Engineer’s instructions for purposes beyond this right concerning keeping accurate the records for the Employer and certification of payment for the Contractor.

Table 3.5. Roles of the Engineer in Clause 5

Sub- Clause	Title	Described role of the Engineer
5.1	Definition of “nominated Subcontractor”	giving instructions for employment of a subcontractor under Clause 13
5.2	Objection to Nomination	at the receiving end of a notice related to an objection to employ a nominated Subcontractor
5.3	Payments to nominated	certifying payments for the nominated Subcontractor

Subcontractors	
5.4	<p>Evidence of Payment</p> <ul style="list-style-type: none"> ➤ requesting evidence of receipt of payment from the Subcontractors ➤ at the receiving end of reasonable evidence of entitlement of withholding or refusing to pay for a subcontractor and that the Subcontractor has been notified

3.2.6. Clause 6: Staff and Labour

Clause 6 entitled **STAFF AND LABOUR** consists of 11 sub-clauses, 4 among which the Engineer has some roles to perform in issues of working hours outside the normal hours, accidents related to health and safety issues, and intervening in removing Contractor's personnel whenever the case requires. These roles are summarized in Table 3.6 below.

Table 3.6. Roles of the Engineer in Clause 6

Sub- Clause	Title	Described role of the Engineer
6.5	Working Hours	<ul style="list-style-type: none"> ➤ giving consent on working outside normal working hours ➤ at the receiving end of Contractor's advice to the necessity of the work in such unusual hours
6.7	Health and Safety	<ul style="list-style-type: none"> ➤ at the receiving end of any accident details ➤ requiring health and safety reports
6.9	Contractors Personnel	requiring to remove or causing to remove any of the Contractor's personnel including Contractor's Representative for the correct reasons

6.10	Records of Contractor's Personnel and Equipment	<ul style="list-style-type: none"> ➤ at the receiving end of the records of Contractor's personnel and Equipment ➤ approving a form of the monthly submitted details
-------------	---	--

3.2.7. Clause 7: Plant, Materials and Workmanship

Clause 7 entitled **PLANT, MATERIALS AND WORKMANSHIP** consists of 8 sub-clauses, among which 5 require the Engineer to perform his duties and they are described in Table 3.7 below. This clause is about quality assurance and compliance with the specifications: submittals of Samples, inspections, testing and either the approval or rejection of the Works which is normally followed by remedial Work.

Table 3.7. Roles of the Engineer in Clause 7

Sub- Clause	Title	Described role of the Engineer
7.2	Samples	<ul style="list-style-type: none"> ➤ giving consent to samples of Materials prior their use in or for the Works ➤ instructing additional samples as a Variation
7.3	Inspection	<ul style="list-style-type: none"> ➤ at the receiving end of a notice when any work is ready ➤ examining, inspecting, measuring, testing... ➤ promptly giving notice to the Contractor when not requiring such procedure ➤ requiring the Contractor to uncover the work to allow inspection and thereafter reinstate and make good if the Contractor fails to notify the Engineer before

7.4	Testing	<ul style="list-style-type: none"> ➤ agreeing with the Contractor on the time and place for the specified testing of any Plant, Materials and other parts of the Works ➤ varying the location of details of the specified tests or instructing for additional tests under Clause 13 ➤ giving the Contractor not less than 24hours' notice to confirm his attendance ➤ attending tests and giving instructions ➤ at the receiving end of a claim under sub-clause 20.1 ➤ agreeing or giving Determination under sub-clause 3.5 ➤ at the receiving end of duly certified reports of the tests from the Contractor ➤ endorsing the Contractor's test certificate, or issuing a certificate to him, to that effect ➤ being deemed to have accepted the readings as accurate whenever failing to attend a test
7.5	Rejection	<ul style="list-style-type: none"> ➤ rejecting after examination, inspection or testing any Plant, Materials or workmanship that is found defective or not in accordance with the Contract ➤ giving notice to the Contractor ➤ requiring a retest and giving notice of Employer's claims under Sub-Clause 2.5 when the Employer is affected by such procedure
7.6	Remedial Work	<ul style="list-style-type: none"> ➤ giving instructions for remedial Works ➤ giving notice for Employer's claims under Sub-clause 2.5 when the Contractor fails to abide with the instructions and is not entitled to a payment

3.2.8. Clause 8: Commencement, Delays and Suspension

Clause 8 entitled **COMMENCEMENT, DELAYS AND SUSPENSION** is a clause related to the factor of Time, schedule and programme of the Works and the pace and progress towards the agreed deadlines. Time is one of the corners of the Iron Triangle of success of the project which makes the dealing with this issue a matter of priority and high sensitivity. This clause consists of 12 sub-clauses among which 9 describe different roles of the Engineer, as shown in Table 3.8 below. Under the sub-clause 8.1 **Commencement of Work**, the Engineer is supposed to give not less than 7 days' notice of the Commencement Date.

Table 3.8. Roles of the Engineer in Clause 8

Sub-Clause	Title	Described role of the Engineer
8.1	Commencement of Work	giving notice of the Commencement Date
8.3	Programme	<ul style="list-style-type: none"> ➤ at the receiving end of a detailed time programme within 28 days of the Commencement date ➤ giving notice within 21 days after receiving a programme in case of non compliance with the Contract ➤ at the receiving end of a notice regarding any future events or circumstances that may increase the Contract Price or delay the completion of the Works ➤ requiring an estimate of changes due to VO's under Sub-Clause 13.3 ➤ giving notice of non compliance with the Contract or inconsistency with the actual progress and the Contractor's stated intentions

		➤ at the receiving end of a revised programme
8.4	Extension of Time for Completion	<ul style="list-style-type: none"> ➤ at the receiving end of a claim under sub-clause 20.1 ➤ reviewing previous determinations and giving a determination of increase not decrease of the total extension time
8.6	Rate of Progress	<ul style="list-style-type: none"> ➤ giving instructions to submit a revised programme with supporting report under Sub-clause 8.3 ➤ giving notice when the Contractor shall adopt methods different than the submitted ➤ giving notice for Employer's claims under Sub-clause 2.5 when the Contractor with his revised methods cause the Employer to incur additional costs, as well as under delay damages Sub-Clause 8.7
8.8	Suspension of Work	<ul style="list-style-type: none"> ➤ giving instructions to suspend progress of part or all of the Works at any time ➤ giving notice of the cause of suspension
8.9	Consequences of Suspension	<ul style="list-style-type: none"> ➤ at the receiving end of a claim under sub-clause 20.1 ➤ giving Determination under sub-clause 3.5
8.10	Payment for Plant and Materials in Event of Suspension	giving instructions to mark the Plant and/or Materials affected by the suspension of Works as Employer's property
8.11	Prolonged Suspension	<ul style="list-style-type: none"> ➤ at the receiving end of a request for permission to proceed after more than 84 days suspension ➤ giving permission to proceed within 28 days margin ➤ at the receiving end of a notice to omit the Works in question under Clause 13 ➤ at the receiving end of a notice to terminate the Contract under Sub-Clause 16.2

8.12	Resumption of Work	<ul style="list-style-type: none"> ➤ giving permission or instruction to proceed and resume the Works ➤ examining the Works and Plant and Material jointly
-------------	--------------------	--

3.2.9. Clause 9: Tests on Completion

Clause 9 entitled **TESTS ON COMPLETION** is concerned with the inspections and approvals of tests the Engineer is supposed to perform upon completion of the Works in order for the Employer to take over the project. This clause consists of 4 sub-clauses all related to the Engineer’s duties and authority and summarized in Table 3.9 below.

Table 3.9. Roles of the Engineer in Clause 9

Sub-Clause	Title	Described role of the Engineer
9.1	Contractor’s Obligations	<ul style="list-style-type: none"> ➤ at the receiving end of a not less than 21 days' notice of the date of Tests on Completion ➤ giving instructions on the day when the Tests on Completion shall be carried out ➤ considering the effect of the results of the Tests on Completion on the performance and other characteristics of the Works. ➤ at the receiving end of a certified report of the results of the tests
9.2	Delayed Tests	<ul style="list-style-type: none"> ➤ giving a notice to require carrying out the tests within 21 days ➤ at the receiving end of a notice of the tests are carried out

9.3	Retesting	requiring a retest of the failed one and related works
9.4	Failure to Pass Tests on Completion	<ul style="list-style-type: none"> ➤ ordering further repetition of Tests on Completion under Sub-Clause 9.32) ➤ rejecting the Works or section (as the case may be) ➤ issuing a Taking-Over Certificate, if the Employer so requests

3.2.10. Clause 10: Employer’s Taking Over

Clause 10 entitled **EMPLOYER’S TAKING OVER** consists of 4 sub-clauses where the Engineer is involved in 3 of them. This clause represents the last stage in the project deliverance where the Contractor is expected to deliver part or all of the Works after completion “in accordance with the Contract”. The Engineer is required to assess the Contractor’s notice and to judge his entitlement before approving and issuing the Taking-Over Certificate. These roles are further described in Table 3.10 below.

Table 3.10. Role of the Engineer in Clause 10

Sub- Clause	Title	Described role of the Engineer
10.1	Taking Over of the Works and Sections	<ul style="list-style-type: none"> ➤ at the receiving end of a notice for a Taking-Over Certificate ➤ issuing a Taking-Over Certificate ➤ rejecting the application for a Taking-Over Certificate ➤ giving reasons and instructions for the necessary work to be done before issuing a further notice
10.2	Taking Over of Parts of the	➤ issuing a Taking-Over Certificate for any part of the Permanent Works at the sole discretion of the

10.3	Works	Employer
		<ul style="list-style-type: none"> ➤ at the receiving end of a claim under sub-clause 20.1 ➤ giving Determination under sub-clause 3.5
	Interference with Tests on Completion	<ul style="list-style-type: none"> ➤ issuing a Taking-Over Certificate, if the Contractor is prevented, for more than 14 days, from carrying out the Tests on Completion by a cause for which the Employer is responsible ➤ requiring the tests on Completion ➤ at the receiving end of a claim under sub-clause 20.1 ➤ giving Determination under sub-clause 3.5

3.2.11. Clause 11: Defects Liability

Clause 11 entitled **DEFECTS LIABILITY** is concerned with the period after the completion of the Works and the issuance of the Taking-Over Certificate. It consists of 11 sub-clauses, 5 of which assign duties to the Engineer described in Table 3.11 below. It is to be noted that all outstanding work should have been completed by the end of the Defects Notification Period.

Table 3.11. Roles of the Engineer in Clause 11

Sub-Clause	Title	Described role of the Engineer
11.1	Completion of Outstanding Work and Remediating Defects	giving instructions to complete any outstanding work in the date stated in a Taking-Over Certificate
11.4	Failure to	<ul style="list-style-type: none"> ➤ giving notice of the date of Remediating defects

	Remedy Defects	<ul style="list-style-type: none"> ➤ giving notice asking for the Employer's Claims under sub-clause 2.5 when the Contractor has failed to remedy defects within the agreed date ➤ at the receiving end of the Employer requirement to agree or determine a reasonable reduction in the Contract Price under Sub-clause 3.5 ➤ giving Determination under sub-clause 3.5
11.6	Further Tests	requiring the repetition of any tests of the Works suspected to be affected by the remedying of Defects
11.8	Contractor to Search	<ul style="list-style-type: none"> ➤ requiring the Contractor to search for the cause of any defect ➤ giving directions ➤ agreeing on the cost of the search plus reasonable profit if the defect is to be remedied at the cost of the Contractor ➤ giving Determination under sub-clause 3.5
11.9	Performance Certificate	issuing the Performance certificate and a copy to the Employer

3.2.12. Clause 12: Measurement and Evaluation

Clause 12 entitled **MEASUREMENT AND EVALUATION**. It consists of 4 sub-clauses, 3 of which assign duties to the Engineer, as shown in Table 3.12. As it is mainly the job of the Engineer to perform measurement and evaluation of the Works to ascertain that the quantity and measurements submitted by the contractor comply with the executed reality. This procedure is of high importance to both the Employer and the Contractor in the certification of payments.

Table 3.12. Roles of the Engineer in Clause 12

Sub- Clause	Title	Described role of the Engineer
12.1	Works to be Measured	<ul style="list-style-type: none"> ➤ measuring any part of the Works for valuation for payment ➤ giving notice to the Contractor's Representative whenever requiring any part of the Works to be measured ➤ at the receiving end of an assistance from the Contractor's Representative ➤ requesting particulars ➤ preparing records of measurements ➤ requesting the Contractor to attend to examine and agree the records ➤ at the receiving end of a notice of the respects in which the records are asserted to be inaccurate ➤ reviewing the records and either confirming or varying them
12.3	Evaluation	<ul style="list-style-type: none"> ➤ giving Determination under sub-clause 3.5 evaluating each item of work ➤ applying the measurement agreed or determined in accordance with the above Sub-Clauses 12.1 and 12.2 and the appropriate rate or price for the item ➤ determining a provisional rate or price for the purposes of Interim Payment Certificates.
12.4	Omissions	<ul style="list-style-type: none"> ➤ at the receiving end of a notice and particulars for a compensation on Omissions ➤ giving Determination under sub-clause 3.5

3.2.13. Clause 13: Variation and Adjustments

Clause 13 entitled **VARIATION AND ADJUSTMENTS** is concerned with changes made to the scope of the project like : changes to quantities, quality, levels, positions, dimensions, additional works and their related tests or to the sequence or timing of the Works. It consists of 8 sub-clauses, 7 of which appoint the Engineer to do different roles because he has the authority of such initiation. In addition, this particular authority is legally binding the Contractor. These deduced roles are summarized in Table 3.13 below.

Table 3.13. Roles of the Engineer in Clause 13

Sub- Clause	Title	Described role of the Engineer
13.1	Right to Vary	<ul style="list-style-type: none"> ➤ giving instruction or requesting for the Contractor to submit a proposal ➤ initiating Variations at anytime prior to issuing the Taking-Over Certificate for the Works ➤ at the receiving end of a notice with particulars stating that the Contractor cannot readily obtain the Goods required for the Variation ➤ cancelling, confirming or varying the instruction ➤ instructing or approving a Variation
13.2	Value Engineering	<ul style="list-style-type: none"> ➤ at the receiving end of a written proposal ➤ approving the proposal ➤ giving Determination under sub-clause 3.5 as a result of the reduction in the contract value
13.3	Variation Procedure this Clause.	<ul style="list-style-type: none"> ➤ requesting a proposal, prior to instructing a Variation ➤ at the receiving end of a response in writing with reasons for not complying or by submitting the

		<p>proposal</p> <ul style="list-style-type: none"> ➤ giving and approval or disapproval or comments ➤ issuing instruction to execute a Variation, with any requirements for the recording of Costs ➤ evaluating a Variation under Clause 12 or instructing or approving otherwise
13.5	Provisional Sums	<ul style="list-style-type: none"> ➤ giving instructions on usage of the whole or the part of the Provisional Sum ➤ giving instructions on the work, supplies or services related to the Provisional Sum ➤ requiring quotations, invoices, vouchers and accounts or receipts in substantiation.
13.6	Daywork	<ul style="list-style-type: none"> ➤ giving instructions that a Variation shall be executed on a daywork basis ➤ at the receiving end of quotations before ordering Goods ➤ at the receiving end of accurate statements in duplicate which shall include the specified details of the resources used in executing the previous day's work ➤ signing and returning one copy of each statement, if correct ,or when agreed to the Contractor ➤ at the receiving end of priced statements of the resources prior to their inclusion in the next Statement under Sub-Clause 14.3
13.7	Adjustment for Changes in Legislation	<ul style="list-style-type: none"> ➤ at the receiving end of a claim under sub-clause 20.1 ➤ giving Determination under sub-clause 3.5
13.8	Adjustment for Changes in Cost	<ul style="list-style-type: none"> ➤ determining and clarifying the cost indices or reference prices when there is doubt of the ones stated in the table of adjustment data ➤ determining a provisional index for the issue of

	<p>Interim Payment Certificates, as each current cost index is available</p> <ul style="list-style-type: none"> ➤ recalculating the adjustment according to the availability of a current cost index
--	---

3.2.14. Clause 14: Contract Price and Payment

Clause 14 entitled **CONTRACT PRICE AND PAYMENT** consists of 16 sub-clauses among which the Engineer is part of 11 that are described in Table 3.14 below. The Contract Price is the core of the agreement between the Employer and the Contractor. The Engineer plays a very important role in evaluating approving and certifying all kinds of payments during the execution of the project.

Table 3.14. Roles of the Engineer in Clause 14

Sub- Clause	Title	Described role of the Engineer
14.1	The Contract Price	<ul style="list-style-type: none"> ➤ at the receiving end of a proposed breakdown of each lump sum price in the Schedules within 28 days after the Commencement Date ➤ taking account of the breakdown when preparing Payment Certificate
14.2	Advance Payment	Issuing an Interim Payment Certificate for the first instalment after receiving a Statement under Sub-Clause 14.3
14.3	Application for Interim Payment Certificates	<ul style="list-style-type: none"> ➤ at the receiving end of six copies of a Statement after the end of each month showing in detail the alleged amounts with supporting particulars ➤ approving of the form which the Contractor will use

		for his statement
14.4	Schedule of Payments	giving determinations under sub-clause 3.5 to agree or determine revised instalments, which shall take account of the extent to which progress is less than that on which the instalments were previously based
14.5	Plant and Materials Intended for the Works	<ul style="list-style-type: none"> ➤ giving determination and certifying the additional amount of the Plant and Materials to the interim payment under specified conditions ➤ at the receiving end of clean shipped bill of lading or other evidence of shipment together with evidence of payment of freight and insurance, any other documents reasonably required, and a bank guarantee in a form and issued by an entity approved by the Employer ...
14.6	Issue of Interim Payment Certificates	<ul style="list-style-type: none"> ➤ receiving a Statement and supporting documents ➤ fairly determining the amount to be due ➤ issuing within 28 days to the Employer an Interim Payment Certificate which shall state the amount which the Engineer fairly determines to be due, with supporting particulars. ➤ giving notice of having the last Interim Payment before Taking-Over Certificate which is after retention and deductions less than the minimum stated in the Appendix to tender ➤ giving notice of the withheld value from the interim payment in case of Contractor was failing to perform any work or obligation until he fulfills his part of the Contract ➤ making any correction or modification in any payment that should properly be made to any previous Payment Certificate.
14.7	Payment	➤ receiving a Statement and supporting documents

		<ul style="list-style-type: none"> ➤ certifying an amount in each Interim Payment Certificate within 56 days
14.9	Payment of Retention Money	<ul style="list-style-type: none"> ➤ certifying the first half of the Retention Money when issuing the Taking-Over Certificate for the works, for payment to the Contractor ➤ certifying the outstanding balance of the Retention Money promptly after the latest of the expiry dates of the Defects Notification Periods ➤ withholding certification of the estimated cost of this work until it has been executed under Clause 11
14.10	Statement at Completion	<ul style="list-style-type: none"> ➤ at the receiving end of six copies of a Statement at completion with supporting documents, in accordance with Sub-Clause 14.3 ➤ certifying and issuing the Interim Payment Certificate under Sub-Clause 14.6
14.11	Application for Final Payment Certificate	<ul style="list-style-type: none"> ➤ issuing the Performance Certificate ➤ at the receiving end of six copies of a draft final statement with supporting detailed documents ➤ approving the form of the final draft Statement ➤ requiring further information and changes in the draft in case of disagreement or a no possible verification of any part of the draft final statement ➤ at the receiving end of further information ➤ delivering to the Employer (with a copy to the Contractor) an Interim Payment Certificate for the agreed parts of the draft final statement ➤ at the receiving end of the Final Statement
14.13	Issue of Final Payment Certificate	<ul style="list-style-type: none"> ➤ issuing to the Employer the Final Payment Certificate ➤ requesting the Contractor to apply for the Final Payment Certificate in case he didn't do so in the first place

- fairly determining the amount due in the Final Payment Certificate if the Contractor fails to submit an application within 28 days

3.2.15. Clause 15: Termination by Employer

Clause 15 entitled **TERMINATION BY THE EMPLOYER** is concerned with the issue of the Contractor not being able to abide by the Contract anymore at any time during execution and committing an act that can breach it. The Employer is then entitled of terminating the Contract. It consists of 6 sub-clauses that the Engineer plays a role in 3 of them, as shown in Table 3.15 below.

Table 3.15. Roles of the Engineer in Clause 15

Sub-Clause	Title	Described role of the Engineer
15.1	Notice to Correct	Giving notice and requiring the Contractor to make good the failure and to remedy it within a specified reasonable time.
15.2	Termination by the Employer	At the receiving end of any required Goods, all Contractor's Documents, and other design documents made by or for him
15.3	Valuation at Date of Termination	Giving Determination under sub-clause 3.5 to agree or determine the value of the Works, Goods and Contractor's Documents, and any other sums due to the Contractor for work executed in accordance with the Contract.

3.2.16. Clause 16: Suspension and Termination by Contractor

Clause 16 entitled **SUSPENSION AND TERMINATION BY THE CONTRACTOR** is for the purpose of fairness, a right given to the Contractor to suspend and terminate the Contract whenever entitled. 3 out of its 4 sub-clauses describe the Engineer's duties, as shown in Table 3.16 below.

Table 3.16. Roles of the Engineer in Clause 16

Sub-Clause	Title	Described role of the Engineer
16.1	Contractor's Entitlement to Suspend Work	<ul style="list-style-type: none">➤ at the receiving end of a claim under sub-clause 20.1➤ giving Determination under sub-clause 3.5
16.2	Termination by Contractor	Issuing the relevant Payment Certificate (failure)
16.3	Cessation of Work and Removal of Contractor's Equipment	Giving instructions not to cease the Work for the protection of life or property or for the safety of the Works

3.2.17. Clause 17: Risk and Responsibility

Clause 17 entitled **RISK AND RESPONSIBILITY** is a description of the relationship between the Contractor and the Employer and the share of risk and responsibility of each party. It consists of 7 sub-clauses and the Engineer is only

involved in performing his duties under sub-clause 17.4 **Consequences of the Employer's Risks**, as shown in Table 3.17 below.

Table 3.17. Roles of the Engineer in Clause 17

Sub- Clause	Title	Described role of the Engineer
17.4	Consequences of Employer's Risks	<ul style="list-style-type: none"> ➤ at the receiving end of notice of risk or damage to the Works, Goods or Contractor's Documents ➤ requiring to rectify the loss or damage ➤ at the receiving end of a claim under sub-clause 20.1 ➤ giving Determination under sub-clause 3.5

3.2.18. Clause 18: Insurance

Clause 18 entitled **INSURANCE** consists of 4 sub-clauses and the Engineer is only required to receive the related documents from the insurance company under sub-clause 18.1 **General Requirements for Insurances**, as shown in Table 3.18. This clause is a way of dealing with the different and sometimes unbearable risks that lie on the Parties signing the construction Contract. And it should be explicitly mentioned in the Particular Conditions and agreed by both sides.

Table 3.18. Roles of the Engineer

Sub- Clause	Title	Described role of the Engineer
18.1	General Requirements for Insurances	At the receiving end of submitted evidence or policies from the insuring Party

3.2.19. Clause 19: Force Majeure

Clause 19 entitled **FORCE MAJEURE** is concerned with exceptional events and circumstances that are unpredictable before the engagement in the Contract and beyond the control of the concerned party hindering the progress of the Works. It consists of 7 sub-clause, 2 among them assign duties to the Engineer and are described in Table 3.19 below. The Engineer is required for an assessment, determination and Payment Certificate.

Table 3.19. Roles of the Engineer in Clause 19

Sub-Clause	Title	Described role of the Engineer
19.4	Consequences of Force Majeure	Giving Determination under sub-clause 3.5
19.6	Optional Termination, Payment and Release	<ul style="list-style-type: none">➤ determining the value of the work➤ issuing a Payment Certificate

3.2.20. Claim, Disputes and Arbitration

Clause 20 entitled **CLAIM, DISPUTE AND ARBITRATION** is mainly the right of the Contractor to raise a claim to the Employer and a procedure of the new suggested Dispute Resolution by appointing an independent Dispute Adjudication Board away from the old Red Book's clause 67 Engineer's **decision**. 3 out of 8 sub-clauses concern the Engineer, as shown in Table 3.20 below. He is mainly required to deal with the **Contractor's Claims** through a sequence of duties and authority. It is to mention that sub-clause 20.4 **Obtaining Dispute Adjudication Board's decision**, the

Engineer is explicitly pointed at as one of the initiators of dispute between the Employer and the Contractor while performing his roles as contract administrator throughout the construction phase.

Table 3.20. Roles of the Engineer in Clause 20

Sub- Clause	Title	Described role of the Engineer
20.1	Contractor's Claims	<ul style="list-style-type: none"> ➤ at the receiving end of a notice of Contractor's entitlement to any extension of the Time for Completion and/or any additional payment and receiving a Claim ➤ approving a Site or location to keep records to substantiate a Claim ➤ monitoring the record-keeping and/or instructing the Contractor to keep further contemporary records ➤ asking permission to inspect all the records ➤ at the receiving end of six copies of the records ➤ approving a period for the Contractor to become aware of the circumstances giving rise to a Claim if different than 28 days ➤ at the receiving end of a fully detailed claim which includes full supporting particulars of the basis of the claim and of the extension of time and/or additional payment claimed ➤ requiring further particulars ➤ approving a proposed period other than the described Sub-Clause 20.1 (c) ➤ proposing a period after submitting the Claim ➤ responding with approval, or with disapproval and detailed comments

		➤ giving Determination under sub-clause 3.5
20.4	Obtaining Dispute Adjudication's Board decision	➤ causing dispute through certificate, determination, instruction, opinion or valuation of the Engineer ➤ at the receiving end of copies of referral of the dispute in writing to the DAB
20.6	Arbitration:	➤ being witness and giving evidence before the arbitrator(s) on any matter whatsoever relevant to the dispute ➤ no alteration of the Engineer's obligations by reason of any arbitration being conducted during the progress of the Works

3.3. Summary

After scrutinizing every clause in the 1999 FIDIC Red Book, the depicted roles were presented in 20 tables including a description of the duties assigned to the Engineer. Besides having the explicitly stated roles of the Engineer, many situations described in the clauses contextually implied an important number of these duties. It is to be noted that the scanning of the Engineer's different roles was limited to clauses uniquely citing the word "**Engineer**" and did not include the roles assigned to the Employer's Personnel.

The depicted roles of the Engineer presented in the tables above, show verbs of action like certifying and/or issuing a notice, a clarification, interpreting, giving instructions, consent, approval, determination, requiring, rejecting, consulting...and on the other hand, show the Engineer "at the receiving end" of notices, copies, documents and claims...

When the Engineer is "at receiving end" of a document, claim, notice..., his other roles that come after the act of receiving are only implied. They can represent no action

from the Engineer when he is supposed to be just informed or followed by a reaction and this reaction can be bound by a defined time bar ... Further detailed observations will be discussed in Chapter 4.

CHAPTER 4

SCREENING OF THE ENGINEER'S ROLES AS DEDUCED FROM THE 1999 FIDIC RED BOOK

4.1. Preamble

After deducing the different roles assigned to the Engineer in Chapter 3, Chapter 4 deals with the screening of these roles into different types of action. Sub-clauses 1.3 **Communications** and 3.1 **Engineer's Duties and Authority** listed the majority of these duties.

The complete scanning of all clauses resulted in the following types of action required from the Engineer as a contract administrator:

clarifying, consenting, consulting with both parties, determining, giving a notice, acknowledging the receipt of a notice, requesting or requiring, approving, certifying, asking for employer's approval, checking, inspecting, examining, proposing, assigning assistants, rejecting, instructing, assessing, auditing the QA, agreeing, reviewing, authorizing to the site, testing, measuring, authorizing variation, giving permission, assessing value, confirming, evaluating, commenting, signing, record-keeping, witnessing.

A closer look at these roles and their occurrence in the New Red Book will help the investigation go deeper and further towards a well-defined classification.

4.2. The different types of actions and their occurrence in the Standard Document

Table 4.1 below represents the different types of action depicted from the sub-clauses of the 1999 FIDIC Red Book. 96 sub-clauses express 33 roles for the Engineer. Only the actual roles that each sub-clause requires from the Engineer were considered. The roles cited in definitions, listings or carrying the same name as their sub-clause were not considered in this screening.

When reading sub-clause 1.3 **Communications**, only the role of “giving notice” was considered. The sub-clause 3.1 **Engineer’s Duties and Authority** is not more than introduction and listing of the different roles, duties and authority of the Engineer, but it was not completely deleted from the table. The duties of “asking the Employer for approval” which is important to show the limitations that can be imposed on the Engineer’s authority and “checking” that do not exist anywhere else in the Contract, were featured in the table. The sub-clause 3.3 **Instructions of the Engineer** was deleted from the table even though the act of “Instructing” is present all over the document. In the sub-clause 3.5 **Determinations**, for example, the act of “determining” was not considered, just the other cited roles: “agreeing”, “assessing”, “consulting with both parties in an endeavour to reach agreement”, “giving notice”.

Some sub-clauses are fat with roles imposed on the Engineer. The reason that these sub-clauses require more than 4 roles from the contract administrator is that they represent a certain complexity and require a series of procedural actions to be followed.

The sub-clause 20.1 **Contractor’s Claims** contains the highest number of roles with 8 duties required from the Engineer. That only reveals the importance of this sub-clause to the progress of the Works and eventually the success of the project.

The Contractor's claims involve a certain alleged right to compensation from the Employer either in extension of time or additional payment. This compensation can only reflect negatively on the Employer's date of Completion and/or budget. Thus containing and controlling such claims is a primary concern under the contract.

The sub-clauses requiring 6 roles from the Engineer are: 1.9 **Delayed Drawings or Instructions**, 3.2 **Delegation of the Engineer**, 7.4 **Testing**, 12.1 **Works to be measured**, and 13.3 **Variation Procedure**.

The sub-clauses imposing 5 roles on the Engineer are: 4.12 **Unforeseeable Physical Conditions**, 7.2 **Samples**, 10.3 **Interference with Test on Completion**, and 13.6 **Daywork**.

Another 3 sub-clauses represent 4 roles of the Engineer and 21 represent 3 roles, 25 represent 2 and 34 represent only 1 role each.

The most frequent role presented in the Standard Document, is the act of "Determining" which appeared in 33 sub-clauses excluding sub-clause 3.5 **Determinations**. This particular role is indeed of great importance since it puts the Engineer in the shoes of the decision-maker and at 33 different situations, the Engineer is required to defend his identity of independent professional and decision maker.

The role of "Instructing" comes second in importance, being cited in 27 sub-clauses. "Agreeing" ranks 3rd with 23 sub-clauses, "Requiring/Requesting" comes 4th with 22 sub-clauses. Then "Giving notice" with 19 sub-clauses, is in the 5th place.

"Giving notice" is part of the communications between the different parties in the Construction phase of the project. The Engineer is subject to giving and receiving notices from the Contractor through the lifecycle of the project. Only one sub-clause, which is **1.9 Delayed Drawings or Instruction**, asks the Engineer to acknowledge

receiving a notice from the Contractor due to its importance on the progress of the Works.

“Consenting” and “Certifying” come in the 6th place with each 17 sub-clauses. From the above, the most important FIDIC New Red Book roles required from the Engineer are: “Determining”, “Instructing”, “Agreeing”, “Requiring/Requesting”, “Giving notice”, “Consenting” and “Certifying”.

Table 4. 1 Types of actions and their related sub-clauses

#	Sub-Clause	Acknowledging receiving Notice	Agreeing	Approving	Asking for Employer's approval	Assessing	Assessing Value	Assigning Assistants	Auditing the QA	Authorizing to the Site	Authorizing Variation	Certifying	Checking	Clarifying	Confirming	Consenting	Consulting	Commenting	Determining	Evaluating	Examining	Giving Notice	Giving Permission	Inspecting	Instructing	Measuring	Proposing	Record-Keeping	Rejecting	Requesting	Reviewing	Signing	Testing	Witnessing		
1.3	Communications																					✓														
1.5	Priority of Documents													✓												✓										
1.8	Care and Supply of Documents															✓																				
1.9	Delayed Drawings or Instructions	✓	✓			✓												✓	✓						✓											
1.12	Confidential Details																													✓						
2.1	Right of Access to the Site		✓																✓																	
2.5	Employer's Claims		✓																✓			✓														
3.1	Engineer's Duties and Authority				✓								✓																							
3.2	Delegation of the Engineer			✓				✓							✓			✓							✓				✓							
3.5	Determinations		✓			✓											✓					✓														
4.1	Contractor's general obligations																							✓						✓						

#	Sub-Clause	Acknowledging receiving Notice	Agreeing	Approving	Asking for Employer's approval	Assessing	Assessing Value	Assigning Assistants	Auditing the QA	Authorizing to the Site	Authorizing Variation	Certifying	Checking	Clarifying	Confirming	Consenting	Consulting	Commenting	Determining	Evaluating	Examining	Giving Notice	Giving Permission	Inspecting	Instructing	Measuring	Proposing	Record-Keeping	Rejecting	Requesting	Reviewing	Signing	Testing	Witnessing		
4.2	Performance Security															✓																				
4.3	Contractor's Representative															✓									✓											
4.4	Subcontractors															✓																				
4.5	Assignment of Benefit of Subcontract																								✓											
4.6	Co-operation															✓									✓											
4.7	Setting Out		✓																✓			✓														
4.9	Quality Assurance								✓							✓																				
4.12	Unforeseeable physical conditions		✓																✓					✓	✓							✓				
4.16	Transport of Goods															✓																				
4.19	Electricity, Water and Gas		✓																✓																	
4.20	Employer's Equipment and Free-Issue Material																		✓																	
4.21	Progress Report															✓																				

#	Sub-Clause	Acknowledging receiving Notice	Agreeing	Approving	Asking for Employer's approval	Assessing	Assessing Value	Assigning Assistants	Auditing the QA	Authorizing to the Site	Authorizing Variation	Certifying	Checking	Clarifying	Confirming	Consenting	Consulting	Commenting	Determining	Evaluating	Examining	Giving Notice	Giving Permission	Inspecting	Instructing	Measuring	Proposing	Record-Keeping	Rejecting	Requesting	Reviewing	Signing	Testing	Witnessing			
4.22	Security of the Site									✓																											
4.23	Contractor's Operations on Site		✓																																		
4.24	Fossils		✓																✓						✓												
5.1	Definition of "nominated Subcontractor"																								✓												
5.2	Objection to Nomination															✓																					
5.3	Payments to nominated Subcontractors											✓																									
5.4	Evidence of Payments											✓																									
6.5	Working Hours															✓																					
6.7	Health and Safety															✓									✓												
6.9	Contractors Personnel																																				
6.10	Records of Contractor's Personnel and Equipment			✓												✓																					
7.2	Samples										✓					✓									✓												
7.3	Inspection																				✓	✓				✓									✓		

#	Sub-Clause	Acknowledging receiving Notice	Agreeing	Approving	Asking for Employer's approval	Assessing	Assessing Value	Assigning Assistants	Auditing the QA	Authorizing to the Site	Authorizing Variation	Certifying	Checking	Clarifying	Confirming	Consenting	Consulting	Commenting	Determining	Evaluating	Examining	Giving Notice	Giving Permission	Inspecting	Instructing	Measuring	Proposing	Record-Keeping	Rejecting	Requesting	Reviewing	Signing	Testing	Witnessing				
7.4	Testing		✓								✓	✓							✓			✓			✓													
7.5	Rejection																		✓			✓								✓								
7.6	Remedial Work																		✓			✓		✓														
8.1	Commencement of Work																					✓																
8.3	Programme															✓						✓								✓								
8.4	Extension of Time for Completion																		✓												✓							
8.5	Delays Caused by Authorities																		✓																			
8.6	Rate of Progress																		✓			✓			✓													
8.8	Suspension of Work																					✓			✓													
8.9	Consequences of Suspension		✓																✓			✓																
8.10	Payment for Plant and Materials in Event of Suspension																								✓													
8.11	Prolonged Suspension										✓													✓														
8.12	Resumption of Work																				✓		✓		✓													
9.1	Contractor's Obligations			✓		✓																		✓														
9.2	Delayed Tests																					✓									✓							

#	Sub-Clause	Acknowledging receiving Notice	Agreeing	Approving	Asking for Employer's approval	Assessing	Assessing Value	Assigning Assistants	Auditing the QA	Authorizing to the Site	Authorizing Variation	Certifying	Checking	Clarifying	Confirming	Consenting	Consulting	Commenting	Determining	Evaluating	Examining	Giving Notice	Giving Permission	Inspecting	Instructing	Measuring	Proposing	Record-Keeping	Rejecting	Requesting	Reviewing	Signing	Testing	Witnessing
9.3	Retesting																					✓												
9.4	Failure to Pass Tests on Completion											✓																	✓	✓				
10.1	Taking Over of the Works and Sections											✓										✓			✓				✓					
10.2	Taking Over of Parts of the Works		✓									✓								✓														
10.3	Interference with Tests on Completion		✓									✓								✓		✓							✓					
11.1	Completion of Outstanding Work and Remedying Defects																								✓									
11.4	Failure to Remedy Defects																			✓		✓												
11.6	Further Tests																																	
11.8	Contractor to Search																			✓					✓					✓				
11.9	Performance Certificate											✓																						
12.1	Works to be Measured										✓					✓										✓		✓	✓	✓				
12.3	Evaluation						✓													✓						✓								

#	Sub-Clause	Acknowledging receiving Notice	Agreeing	Approving	Asking for Employer's approval	Assessing	Assessing Value	Assigning Assistants	Auditing the QA	Authorizing to the Site	Authorizing Variation	Certifying	Checking	Clarifying	Confirming	Consenting	Consulting	Commenting	Determining	Evaluating	Examining	Giving Notice	Giving Permission	Inspecting	Instructing	Measuring	Proposing	Record-Keeping	Rejecting	Requesting	Reviewing	Signing	Testing	Witnessing	
12.4	Omissions		✓																✓																
13.1	Right to Vary			✓											✓										✓				✓						
13.2	Value Engineering		✓	✓															✓																
13.3	Variation Procedure			✓			✓											✓		✓					✓				✓						
13.5	Provisional Sums																								✓				✓						
13.6	Daywork			✓			✓			✓														✓								✓			
13.7	Adjustment for Changes in Legislation		✓																✓																
13.8	Adjustment for Changes in Cost																		✓																
14.1	The Contract Price															✓																			
14.2	Advance Payment											✓																							
14.3	Application for Interim Payment Certificates			✓																															
14.4	Schedule of Payments		✓																✓																
14.5	Plant and Materials Intended for the Works											✓							✓																

#	Sub-Clause	Acknowledging receiving Notice	Agreeing	Approving	Asking for Employer's approval	Assessing	Assessing Value	Assigning Assistants	Auditing the QA	Authorizing to the Site	Authorizing Variation	Certifying	Checking	Clarifying	Confirming	Consenting	Consulting	Commenting	Determining	Evaluating	Examining	Giving Notice	Giving Permission	Inspecting	Instructing	Measuring	Proposing	Record-Keeping	Rejecting	Requesting	Reviewing	Signing	Testing	Witnessing			
14.6	Issue of Interim Payment Certificate											✓							✓		✓																
14.9	Payment of Retention Money											✓																									
14.10	Statement at Completion											✓																									
14.11	Application for Final Payment Certificate		✓	✓								✓																									
14.13	Issue of Final Payment Certificate											✓							✓											✓							
15.1	Notice to Correct																																				
15.2	Termination by the Employer															✓																					
15.3	Valuation at Date of Termination		✓																✓																		
16.1	Contractor's Entitlement to Suspend Work		✓																✓																		
16.2	Termination by Contractor											✓																									

#	Sub-Clause	Acknowledging receiving Notice	Agreeing	Approving	Asking for Employer's approval	Assessing	Assessing Value	Assigning Assistants	Auditing the QA	Authorizing to the Site	Authorizing Variation	Certifying	Checking	Clarifying	Confirming	Consenting	Consulting	Commenting	Determining	Evaluating	Examining	Giving Notice	Giving Permission	Inspecting	Instructing	Measuring	Proposing	Record-Keeping	Rejecting	Requesting	Reviewing	Signing	Testing	Witnessing		
16.3	Cessation of Work and Removal of Contractor's Equipment																								✓											
16.4	Payment on Termination																		✓																	
17.4	Consequences of Employer's Risks		✓																✓										✓							
18.1	General Requirements for Insurances															✓			✓																	
19.4	Consequences of Force Majeure		✓																✓																	
19.6	Optional Termination, Payment and Release						✓					✓																								
20.1	Contractor's Claims		✓	✓														✓	✓					✓		✓	✓		✓							
20.6	Arbitration																																		✓	

4.3. A Zoom in to possible interrelationships among the different types of action

Other observations could be made from the above table: Four possible groupings of the different types of the roles and their possible interpretations are presented in the following:

4.3.1. “Up to the Engineer’s satisfaction”

“Consenting”, “agreeing”, “approving”, “giving permission” and “confirming” have the same literal meaning or they all spell a certain expression of satisfaction from the Engineer at some point in the Contract. In a standard document with a legislative aspect like the FIDIC, each word might present a distinct significance behind its use. Reading their contextual meaning is the only resort to discover this distinction.

“Giving Permission” is the authority given to the Engineer to allow the Contractor to resume the Work after more than 84 days of suspension and the Contractor sent a request to proceed. While, “Confirming” is used only in 3 sub-clauses related to accepting an objection with particulars from the Contractor either for the Engineer’s measurements and records of the Works or for a Variation Order initiated by the Engineer and the Contractor cannot abide and “obtain the Goods readily”. As for the “Agreeing”, it is an action that the Engineer is asked to do whenever faced by certain conditions or situations on the site and/or followed by a Contractor’s notice or claim. But, it has been noticed during the reading of the clauses that whenever the Engineer is required to proceed under sub-clause 3.5 **Determinations**, he is asked to “agree or determine”. The role of “agreeing” is left to section 4.3.2 for a fair comparison with the act of “determining”.

At last, the difference between giving a "Consent" and giving an "Approval" is: the liability of the Engineer as a professional expert when giving an "Approval"; whereas "Consent" is an acceptance, a permission that the Engineer gives upon a certain issue without any professional liability or responsibility. "Consent" is more like a procedural administrative act than a technical professional one. The Engineer is asked to "approve": Plants and Equipment when his assistant fails to clearly disapprove the work, the form of the records submitted, a variation order, quotations, Interim and final Payment and finally a Contractor's claim. The duty of "approving" is deduced to be purely technical. But, when the Engineer is asked to give "Consent" to accept things as they are or his consent is implied after receiving copies of the Contractor's Documents, copy of the Performance Security, "other proposed Subcontractors", copies of the monthly progress report, objection to Subcontractors' nomination, working outside the normal hours, details of an accident on Site, Records of the Contractor's Personnel and Equipment, Samples of the Materials, detailed time Programme, Breakdown of prices, submitted evidence or policies for insuring parties, he is doing an administrative duty.

4.3.2. "To Agree and Determine"

Giving "Determination" is by far the most important role that the Engineer can play throughout the execution of the project. Since the Contractor is entitled at any time during construction to raise an alleged claim for time and/or money compensation under sub-clause **20.1 Contractor's Claims**, the Engineer is required to reply by a fair and impartial decision under sub-clause **3.5 Determinations**.

This process is preceded by a proper assessment that the Engineer is required to make of the situation and composed of three steps:

- 1) Consulting with each Party in an endeavour to reach agreement,
- 2) Making the fair determination even if an agreement was not achieved and finally
- 3) Giving notice to both parties of the agreement or determination.

Table below serves as a comparison between the acts of “Agreeing”, “Assessing” and “Determining”. It can be noticed that the sub-clause **3.5 Determinations** has been referred to in all the clauses from 1 to 20 except 5 and 6, counting 36 sub-clauses as mentioned previously. The acts of “Agreeing” and “Assessing” are in the definition of “Determining” under sub-clause 3.5 **Determinations**. Thus, the sub-clauses requiring “Assessing” and “Agreeing” are included in the list of sub-clauses asking for Determination except sub-clause 9.1 **Contractor’s Obligations**.

Table 4.2 Assessing, Agreeing and Determining

Assessing	Agreeing	Determining
1.9 Delayed Drawings or Instruction	1.9 Delayed Drawings or Instruction	1.9 Delayed Drawings or Instruction
		2.1 Right of Access to the Site
		2.5 Employer's Claims
		3.2 Delegation of the Engineer
3.5 Determinations	3.5 Determinations	
	4.7 Setting Out	4.7 Setting Out
	4.12 Unforeseeable physical conditions	4.12 Unforeseeable physical condition
	4.19 Electricity, Water and Gas	4.19 Electricity, Water and Gas
	4.23 Contractor’s Operations on Site	

Assessing	Agreeing	Determining
		4.20 Employer's Equipment and Free-Issue Material
	4.24 Fossils	4.24 Fossils
	7.4 Testing	7.4 Testing
		7.5 Rejection
		7.6 Remedial Works
		8.4 Extension of Time for Completion
		8.5 Delays Caused by the Authorities
		8.6 Rate of Progress
	8.9 Consequences of Suspension	8.9 Consequences of Suspension
9.1 Contractor's Obligations	9.1 Contractor's Obligations	
	10.2 Taking Over of Parts of the Works	10.2 Taking Over of Parts of the Works
	10.3 Interference with Tests on Completion	10.3 Interference with Tests on Completion
		11.4 Failure to Remedy Defects
		11.8 Contractor to Search
		12.3 Evaluation
	12.4 Omissions	12.4 Omissions
	13.2 Value Engineering	13.2 Value Engineering
	13.7 Adjustment for Changes in Legislation	13.7 Adjustment for Changes in Legislation
		13.8 Adjustment for Changes in Cost
	14.4 Schedule of Payments	14.4 Schedule of Payments
		14.5 Plant and Materials Intended for the Works
		14.6 Issue of Interim Payment Certificates
		14.8 Delayed Payment
	14.11 Application for Final Payment Certificate	14.13 Issue of Final Payment Certificate

Assessing	Agreeing	Determining
	15.3 Valuation at Date of Termination	15.3 Valuation at Date of Termination
		15.4 Payment after Termination
	16.1 Contractor's Entitlement to Suspend Work	16.1 Contractor's Entitlement to Suspend Work
		16.4 Payment on Termination
	17.4 Consequences of Employer's Risks	17.4 Consequences of Employer's Risks
		18.1 General Requirements for Insurances
	19.4 Consequences of Force Majeure	19.4 Consequences of Force Majeure
	20.1 Contractor's Claims	20.1 Contractor's Claims

4.3.3. Under the Engineer's direction...

The Engineer, as part of his duties as a supervising professional, has many authorities that help him ensure the quality of the executed work. This authority can be limited if the Employer requires so and the Contractor agrees when the Engineer is asked to seek the Employer's approval on certain issues. The 1999 FIDIC Red Book advised in sub-clause 3.1 **Engineer's Duties and Authority**: "The Employer undertakes not to impose further constraints on the Engineer's authority". Showing that suffocation of the Engineer's authority is not considered a good practice nor in the benefit of the Employer.

The Engineer has also many duties as a supervisor: auditing a QA, authorizing to the Site Materials and Personnel, giving clarifications, giving permission....requiring/requesting certain particulars or documents and giving instructions.

A closer look at the last two roles is illustrated in the table below. As it is shown, The Engineer is playing a proactive administrative role when requesting certain particulars from the Contractor. When he is giving instructions, he is playing a reactive technical role whenever an incident or certain conditions occur on the Site.

Table 4. 3 Requesting/Requiring and Instructing

Requesting/Requiring	Instructing
1.12 Confidential Details	1.5 Priority of Documents
4.1 Contractor's General Obligations	1.9 Delayed Drawings or Instructions
5.4 Evidence of Payments	3.2 Delegation of the Engineer
6.7 Health and Safety	4.1 Contractor's General Obligations
6.9 Contractors Personnel	4.3 Contractor's Representative
7.2 Samples	4.5 Assignment of Benefit of Subcontract
7.3 Inspection	4.6 Co-operation
7.5 Rejection	4.12 Unforeseeable physical condition
8.3 Programme	4.24 Fossils
9.2 Delayed Tests	5.1 Definition of "nominated Subcontractor"
9.3 Retesting	6.7 Health and Safety
9.4 Failure to Pass Tests on Completion	7.4 Testing
10.3 Interference with Tests on Completion	7.6 Remedial Work
11.6 Further Tests	8.6 Rate of Progress
11.8 Contractor to Search	8.8 Suspension of Work
12.1 Works to be Measured	8.10 Payment for Plant and Materials in Event of Suspension
13.1 Right to Vary	8.12 Resumption of Work
13.3 Variation Procedure	9.1 Contractor's Obligations
13.5 Provisional Sums	10.1 Taking Over of the Works and Sections
14.13 Issue of Final Payment Certificate	11.1 Completion of Outstanding Work and Remedying Defects

Requesting/Requiring	Instructing
15.1 Notice to Correct	11.8 Contractor to Search
17.4 Consequences of Employer's Risks	13.1 Right to Vary
20.1 Contractor's Claims	13.3 Variation Procedure
	13.5 Provisional Sums
	13.6 Daywork
	16.3 Cessation of Work and Removal of Contractor's Equipment

4.3.4. After the Completion of the Works...

After the Completion of the Works and towards issuing a Taking Over Certificate, the Engineer has a duty to make sure that the delivered work was executed up to the specifications and the required standards. He is required to go through “Inspection”, “Examination”, “Testing”, retesting and if the Works failed, “Rejection”.

4.4. Summary

Screening the different roles of the Engineer under different types of action and the attempt to find different observations, interpretations and relationships opens the door to a number of other parameters that can classify and evaluate these roles. Nature of the duties (proactive, reactive, passive), type of action (as shown in this chapter), type of role (administrative, technical, managerial), capacity in which the Engineer is supposed to act (employer's agent or independent), the timing and frequency and the time baring of each role, are among the parameters that can be found.

These different parameters are to be further studied and developed in Chapter 5.

CHAPTER 5

IN DEPTH ANALYSIS AND CLASSIFICATION OF THE ROLES OF THE ENGINEER

5.1. Preamble

After reading closely the 1999 FIDIC Red Book, extracting the different roles of the Engineer in Chapter 3 and later performing a screening on these roles according to their type of action in Chapter 4, Chapter 5 studies these roles through different lenses of the magnifier. The important observations that could be considered are:

- The roles show different types of action (refer to Chapter 4).
- Some of these roles have a certain time constraint that the Engineer is required to act within its deadline.
- Some roles are frequent throughout the lifecycle of the project and each role has a specific timing .
- Some roles require a certain independence from the Engineer as a decision maker and experienced professional, others require him to act on the behalf of the Employer.
- The roles can be labeled as technical, administrative or managerial.
- The roles have a proactive, reactive or passive nature.

5.2. Design of a system of classification for the extracted and analyzed roles

Based on the above observations, a table presenting the six classifications of the extracted roles was created:

Table 5. 1 Classifications of the roles

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Constraints)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
1.3	Communications	Giving Notice	shall not be unreasonably withheld or delayed	At any time during the Construction phase/Regular	Administrative	Depending on the communication and case in question	Active/Reactive or Passive behaviour is dependent on the case of the communication
1.5	Priority of Documents	Clarifying Instructing	N/A	Mostly at the Bidding phase but also can apply at any time during the Construction phase/Once	Technical (Design professional)	Employer's agent According to the principle of "the Employer's documents should have priority over the Contractor's documents"	Reactive Authority to an ambiguity or discrepancy in the Contract
1.8	Care and Supply of Documents	Consenting	N/A	At the completion of the project unless otherwise stated in the Contract. Contractor's Documents are thus taken over on dates other than those which are to be stated in Taking-Over Certificates, issued under the procedure specified in Clause 10/Once	Administrative	Employer's agent when receiving the documents on his behalf	Passive when the Engineer can receive the documents and do nothing or use them later when the conditions require. Reactive when the receipt of the Contractor's documents could require a direct reaction as the case may be. Notify the other Party when detecting any error or defect in the documents

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Constraints)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
1.9	Delayed Drawings or Instructions	Issuing an Instruction or Drawing Acknowledging receipt of a notice Assessing Agreeing Determining	N/A	Issuing an instruction or drawing within a reasonable time and directly related to the execution and progress of works The action or reaction of the Engineer is not related to the macro timeline of the whole project , it is more related to the notice or claim of the Contractor/Once for each case	Managerial as related to choosing the time of issuing a document Administrative as to following the procedure of reception/reply to notices. Technical [designer & Time/cost] as related to assessment and issuing of a document or instruction	This case requires Impartiality in determination	Proactive: Issuing the necessary document for the progress of Works Reactive: Upon receiving a notice, the Engineer should immediately acknowledge having received it, comment upon the extent (if any) to which it does not include the details specified in the second sentence of this Sub-Clause, and indicate the actions which he intends to take Upon receiving the alleged Claim, the Engineer's reaction should be an assessment for a determination or no entitlement for the Contractor due to an error or delay from his part leading to an Engineer's failure.
1.12	Confidential Details	Requiring/ Requesting	N/A	At any time during the Construction phase/Once whenever the case requires	Technical to check compliance	Independent professional	Proactive
2.1	Right of Access to the Site	Agreeing/Determining	N/A	At any time during the Construction phase/Once whenever the case requires	Technical concerning the case	Independent professional	Reactive to alleged Claim, an assessment for a determination
2.5	Employer's Claims	Giving Notice Agreeing Determining	N/A	The notice shall be given as soon as practicable after the Employer became aware of the event or circumstances giving rise to the claim. A notice relating to any extension of the Defects Notification Period shall be given before the expiry of such period. Determination is related to the time of the claim/Once whenever the case requires	Administrative when submitting a notice and receiving a claim Technical when giving determination	Employer's agent when giving notice and particulars on his behalf Independent when it comes to determinations	Proactive when giving notice and particulars on the behalf of the Employer Reactive when receiving the alleged Claim under Sub-clause 3.5, the Engineer should agree and settle the claim, failing which he is required to make a fair determination

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
3.1	Engineer's Duties and Authority	Checking Asking for Employer's approval when the contract requires (acting without approval is a breach of consultancy contract)	N/A	Assignment and definition of duties and authorities should be when drafting the contract before the construction phase....As for the duties and authorities, they exist at any time during the construction phase/Frequency depending on the case in question	Administrative	Employer's appointee: The Engineer is not wholly an impartial intermediary Independent: The Engineer does not represent the Employer for all purposes	Reactive authority to the Contractual Assignment Passive authority to amending the contract (drafter of the contract can be different than the administrator) or relieving any party from any responsibility
3.2	Delegation of the Engineer	Assigning/ Revoking assignment of assistants Rejecting/ Approving the work, Plant or Materials Confirming, reversing or varying the determination or instruction given by the assistant and which the Contractor is questioning	N/A	At any time during the Construction phase/Frequency depending on the case in question	Administrative for the procedure of assigning and revoking Technical for checking the competence of the assistants Managerial when designing a strategy for saving time/cost or improving quality and choosing a suitable delegate for a certain task in a particular time	Independent professional	Proactive when assigning an assistant with determined authorities and duties limited when it comes to determinations and Engineer's approval Reactive to failure of the assistant to disapprove any work/plant/materials And to the Contractor's concerns regarding the assistants actions
3.5	Determinations	Consulting to obtain an agreement Assessing Agreeing/Giving Notice	Limited when the case is transferred to clause 20	At any time during the Construction phase/Once whenever the case requires	Administrative (when consulting to obtain agreement) Technical (when determining a the case)	Independent professional	Reactive to a specific claim from the Contractor

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
4.1	Contractor's general obligations	Instructing Requiring/Request ing	N/A	At any time during the Construction phase/Regular	Technical	Employer's agent when requesting alterations the Employer asked for Independent when it comes to professional integrity when giving instructions and receiving notices	Proactive when giving instructions, requiring details, additional info, Reactive when assessing and studying and checking in accordance with the specs, the received alteration "as-built" documents and operation and maintenance manuals , to give approval
4.2	Performance Security	Consenting or No Reaction	N/A	Within 28 days after receiving the Letter of Acceptance/Once	Administrative	Employer's agent	Passive for receiving the document to use it later
4.3	Contractor's Representative	Consenting Instructing	N/A	Prior to the Commencement Date/Once when the case requires	Administrative Technical for the instructions part	Employer's agent	Reactive to the appointment or revocation of the proposed Contractor's Representative with a consent Proactive when giving instructions
4.4	Subcontractors	Consenting	28 days before the commencement of each Subcontractor's work on the Site;	28 days before the intended date of commencement of each Subcontractor's work, and of the commencement of such work on the Site/Once for each subcontractor	Managerial	Employer's agent	Reactive to the notice of the other proposed subcontractors
4.5	Assignment of Benefit of Subcontract	Instructing	Ends with the Expiry date of the relevant Defects Notification Period	Before the expiry date of the relevant Defects Notification Period /Once	Managerial	Employer's agent	Proactive to asking the Contractor to transfer benefit of a Subcontract to the Employer
4.6	Co-operation	Instructing Consenting	N/A	Prior to the Commencement Date/Once	Technical	Employer's agent	Proactive when giving instructions Reactive when receiving Contractor's documents

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
4.7	Setting Out	Giving Notice Agreeing Determining	N/A	Setting out is at the beginning and before the execution of works [Commencement Date]At any time during the Construction phase/ Once whenever the case requires	Technical	Independent professional	Proactive when giving notice of the original points, lines and levels of reference for the Setting out of the project Reactive to a specific claim from the Contractor to give agreement or determination under sub-clause 3.5
4.9	Quality Assurance	Auditing the QA Consenting	N/A	Preferably before the Construction Phase /Regular	Technical	Independent when it comes to pure professional technical aspect Employer's agent when it comes to the quality level	Proactive when auditing the QA system and issuing technical documents Passive when receiving documents ...for info
4.12	Unforeseeable physical conditions	Inspecting/ Investigating Instructing Reviewing other conditions Agreeing Determining	N/A	At any time during Construction phase/Once whenever the case requires	Technical	Independent professional	Reactive to the Contractor's notice of unforeseeable physical condition, by inspecting investigating and giving instructions, to give agreement or determination under sub-clause 3.5, review other physical conditions more favorable to be unforeseen
4.16	Transport of Good	Consenting	21 days of the date on which any Plant or a major item of other Goods will be delivered to the Site	21 days of the date on which any Plant or a major item of other Goods will be delivered to the Site/Once whenever the case requires	Administrative	Employer's agent	Passive or Reactive: May do nothing or give consent to the notice of delivery of Goods
4.19	Electricity, Water and Gas	Agreeing Determining	N/A	At every Interim Payment Before issuing a Payment Certificate/Regular	Technical	Independent Professional	Reactive to Employer's claim to give agreement or determination under sub-clause 3.5
4.20	Employer's Equipment and Free-Issue Material	Determining	N/A	At every Interim Payment Before issuing a Payment Certificate/Regular	Technical	Independent Professional	Reactive to Employer's claim to give agreement or determination under sub-clause 3.5

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
4.21	Progress Report	Consenting	1 month	Every month during construction phase/Regular	Administrative	Employer's agent	Passive : The Engineer can receive the documents and do nothing or use them later when the conditions require.
4.22	Security of the Site	Authorizing to the Site	N/A	At any time during the Construction phase/Once whenever the case requires	Administrative	Employer's agent	Proactive : Giving notice of authorized personnel
4.23	Contractor`s Operations on Site	Agreeing	N/A	At any time during the Construction phase/Once whenever the case requires	Administrative	Employer's agent	Reactive to agreeing on working areas
4.24	Fossils	Instructing Agreeing Determining	N/A	During excavation phase/Once	Managerial	Independent professional	Reactive to notice of discovery of Fossils, by Instructions and to a notice of claim from the Contractor, by agreement and Determinations
5.1	Definition of “nominated Subcontractor”	Instructing	N/A	At any time during the Construction phase/Once whenever the case requires	Technical (quality wise)	Employer's agent	Proactive : Giving instructions for employment of Subcontractors
5.2	Objection to Nomination	Consenting	N/A	At any time during or before the Construction phase	Administrative	Employer's agent	Passive : The Engineer can receive an objection and do nothing or react directly as the case requires
5.3	Payments to nominated Subcontractors	Certifying a payment	N/A	At every Interim Payment Before issuing a Payment Certificate/Regular	Technical	Independent professional	Reactive when certifying a payment in accordance with the Subcontract
5.4	Evidence of Payments	Requiring/ Requesting Certifying	N/A	At every Interim Payment Before issuing a Payment Certificate/Regular for certification of payment and Once wherer the case requires for asking for proof	Administrative	Independent Professional	Proactive requesting evidence Reactive certifying a payment in accordance with the Subcontract
6.5	Working Hours	Consenting	N/A	At any time during the Construction phase/Once whenever the case requires	Administrative	Employer's agent	Reactive to the necessity of the work in unconventional hours
6.7	Health and Safety	Consenting and (a certain action like proper instructions?) Requiring/ Requesting	N/A	At any time during the Construction phase/Once whenever the case requires	Administrative	Employer's agent	Passive or Reactive to the report of an accident Proactive when requiring such report

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
6.9	Contractors Personnel	Requiring/ Requesting	N/A	At any time during the Construction phase/Once whenever the case requires	Administrative	Employer's agent	Proactive when requiring such removal of the Contractor's personnel
6.10	Records of Contractor's Personnel and Equipment	Consenting Approving	1 month	Monthly during construction phase/Regular	Administrative	Employer's agent	Passive or Reactive to the records of Contractor's personnel and Equipment Reactive when approving the form of records submitted
7.2	Samples	Consenting Instructing Authorizing Variations	N/A	At any time during the Construction phase/Once whenever the case requires	Technical	Independent professional	Reactive to the samples of materials by giving consent Proactive when requiring additional samples
7.3	Inspection	Examining Measuring or Testing Giving Notice for no intention of inspection Requiring/Request ing for uncovering the work...	N/A	At any time during the Construction phase/Once whenever the case requires	Technical	Independent professional	Reactive to the notice of the Contractor of the readiness of the work by doing an inspection or declaring no action Proactive for requiring an uncover for inspection whenever the Contractor fails to notify the Engineer
7.4	Testing	Agreeing on conditions Authorizing Variations Giving Notice Instructions Agreeing on a claim Determining Certifying a test, Accepting readings as accurate	24hours notice to confirm attendance otherwise N/A	Tests may be required at many stages of manufacture, construction, erection and commissioning, and could be significant in terms of verifying that Plant and Materials are fit for their intended purposes/ Once whenever the case requires	Technical	Independent professional	Reactive when agreeing on the conditions, time and place of a testing, giving notice of confirmation of attendance, attending, giving instructions, reacting to a claim from the Contractor giving agreement or determination under sub-clause 3.5, endorsing or giving certificate of a test Proactive when giving a variation order of a change in location or details of a test Passive when not attending a certain test

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
7.5	Rejection	Rejecting Giving notice Requiring /Requesting retest Giving notice of Employer's claims Determining	N/A	After a Testing examination, inspection/Once whenever the case requires	Technical	Independent professional and Employer's agent	Reactive to negative results of examination, Measurement or testing of Plant, Materials or defective workmanship, by rejecting with a notice to the Contractor and/or requiring a retest
7.6	Remedial Work	Instructing Giving Notice Determining	N/A	At any time during Construction phase/Once whenever the case requires	Technical	Independent professional	Proactive as well as Reactive when giving instructions for Remedial Works for not compliance with the contract
8.1	Commencement of Work	Giving Notice	at least 7 days before Commencement of Works	within 42 days after the Contractor receives the Letter of Acceptance/Once	Managerial	Employer's agent	Proactive as well as Reactive when giving notice of the Commencement Date
8.3	Programme	Consenting Giving Notice Requiring/ Requesting	21 days after receiving a programme	within 28 days after receiving the notice under Sub-Clause 8.1 [Commencement of Works]and then 21 days after receiving a programme and then at any time during construction phase/Once and the revision is whenever the case requires	Administrative and technical	Employer's agent	Passive when the Engineer receives the programme and does nothing Reactive within 21 days after receiving a programme, by giving notice for non compliance with the Contract, requiring an estimate of the changes due to VO's, giving notice of the programme failure and requiring a revised one
8.4	Extension of Time for Completion	Reviewing Determining	N/A	At any time during Construction phase/Once whenever the case requires	Technical	Independent professional	Reactive to receiving the alleged Claim for extension of time under Sub-clause 3.5, by reviewing previous determinations and giving an increase but not decrease the total extension time as the case requires

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
8.6	Rate of Progress	Instructing Giving Notice Determining	N/A	At any time during Construction phase/Once whenever the case requires	Technical	Independent professional but Employer's agent when submitting Employer's claim	Reactive to slow progress.., by giving instructions and requesting revised programme and new methods, giving notice when requiring different methods to be adopted, giving notice for Employer's claims Passive when receiving the revised programme and the new methods and doing nothing (which is considered as approval)
8.8	Suspension of Work	Instructing Giving Notice	N/A	At any time during Construction phase/Once whenever the case requires	Administrative	Employer's agent	Proactive when giving instructions to suspend the Works and giving notice of the cause of this suspension
8.9	Consequences of Suspension	Agreeing Determining	Limited when the case is transferred to clause 20	At any time during Construction phase/Once whenever the case requires	Administrative(when consulting to obtain agreement) Technical (when determining a the case)	Independent professional	Reactive when receiving the alleged Claim under Sub-clause 3.5, the Engineer should agree and settle the claim, failing which he is required to make a fair determination
8.10	Payment for Plant and Materials in Event of Suspension	Instructing	N/A	At any time during Construction phase/Once whenever the case requires	Administrative	Employer's agent	Proactive when giving instructions to mark the Plant and/or Materials affected by the suspension of Works as Employer's property
8.11	Prolonged Suspension	Giving permission Authorizing Variations	21 days after receiving a notice from the Contractor asking for permission to proceed after more than 84 days of suspension of Works	More than 84 days after suspension with a 21 day period for response/Once	Administrative	Employer's agent	Passive or Reactive to the notice asking for permission to proceed with the Works with a no response, disapproval or approval
8.12	Resumption of Work	Giving permission Instructing Examining	N/A	After giving permission to proceed with the Works/Once	Technical	Independent professional	Proactive when examining the Works and the Plants and Materials jointly with the Contractor

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
9.1	Contractor's Obligations	Instructing Assessing and analyzing Consenting Approving	21 days before the Contractor will be ready to carry out each of the Tests on Completion and within 14 days from this date	21 days before the Contractor will be ready to carry out each of the Tests on Completion/Once whenever the case requires	Managerial and technical in what concerns the results of the tests	Employer's agent	Reactive when receiving a notice for the date when each of the Tests on Completion shall be carried out, by instructing the exact dates within a 14 day margin, to the results of the tests by considering their effects on the Employer, performance... Passive when just receiving the certified report with the results and doing nothing
9.2	Delayed Tests	Giving notice Requiring/ Requesting	N/A	After unduly delay of the Tests from the Contractor/Once whenever the case requires	Administrative	Employer's agent	Proactive by giving notice and requiring carrying out Tests after delays Passive or Reactive to the notice of the fixed dates of the Tests
9.3	Retesting	Giving notice Requiring/ Requesting	N/A	After rejection and failure of the test in question/Once whenever the case requires	Administrative	Employer's agent	Reactive by giving notice and requiring retest of the failed Works
9.4	Failure to Pass Tests on Completion	Ordering Rejecting of the Works or section (as the case may be) Issuing Taking- Over Certificate	N/A	After rejection and failure of the retest in question/Once whenever the case requires	Administrative	Employer's agent	Reactive to further failure to pass the Tests
10.1	Taking Over of the Works and Sections	Issuing Taking - Over Certificate Rejecting the application, Giving Reasons Instructing Giving Notice	28 days after receiving the Contractor's	14 days before the Works will, in the Contractor's opinion, be complete and ready for taking over/Once (whenever the case requires)	Administrative	Employer's agent	Reactive to the application for a Taking -Over Certificate

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
10.2	Taking Over of Parts of the Works	Issuing Taking- Over Certificate for part of Works Agreeing Determining	N/A	At any time during the Construction phase when the conditions apply/Once whenever the case requires	Administrative(when giving Taking-Over Certificate for part of the Works, consulting to obtain agreement)Technical (when determining a the case)	Independent professional	Reactive when issuing a Taking- Over Certificate for part of Works which the Employer started using, after request from the Contractor,to an alleged claim for damages for early usage of part of the Works by assessing and giving determination
10.3	Interference with Tests on Completion	Issuing Taking- Over Certificate Agreeing Determining Giving notice Requiring/ Requesting	N/A	After more than 14 days of prevention of the Contractor from carrying out the Tests on Completion by a cause for which the Employer is responsible	Administrative (when giving Taking-Over Certificate, consulting to obtain agreement) Technical (when determining a the case)	Independent professional	Reactive by issuing a Taking-Over Certificate after interference and delay caused by the Employer for carrying out test on Completion,to an alleged claim from the Contractor, by assessing and giving determination under Sub-clause 3.5
11.1	Completion of Outstanding Work and Remedying Defects	Instructing	N/A	At the Taking-Over period and before the expiry date of the relevant Defects Notification Period/Once whenever the case requires	Managerial	Independent professional	Proactive by giving instructions for the time of the completion of any outstanding work
11.4	Failure to Remedy Defects	Giving Notice Determining	N/A	After failure to remedying the defects/Once	Administration for following the procedure and Technical when it comes to determinations	Employer's agent when asking for a claim or for a Contract Price reduction and Independent when giving determinations	Proactive by giving notice of the date of Remedying defects, asking for compensation after failure of remedying defects under Sub- Clause 2.5, determining a reduction on the Contact Price as the Employer requires under Sub- clause 3.5
11.6	Further Tests:	Requiring/ Requesting	N/A	28 days after the defect or damage is remedied/Once whenever the case requires	Managerial	Independent professional	Proactive when asking for further tests
11.8	Contractor to Search	Requiring /Requesting Instructing Determining	N/A	In the period of Remedying the defects before the expiry of Defects Notification Period/Once whenever the case requires	Technical	Employer's agent	Proactive when requesting a search for the cause of the defect and agreeing and determining the cost +reasonable profit

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
11.9	Performance Certificate	Issuing Performance certificate	within 28 days after the latest of the expiry dates of the Defects Notification Periods, or as soon thereafter as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects	After the latest of the expiry dates of the Defects Notification Periods, or as soon thereafter as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects/Once	Technical	Employer's agent	Proactive when issuing the Performance Certificate after Completion of Works
12.1	Works to be Measured	Requiring/ Requesting Measuring Record-Keeping Reviewing Confirming Authorizing Variations	N/A	At any time during Construction phase/Once whenever the case requires	Technical	Independent professional	Proactive when requiring a measurement of any part of the Works and requesting particulars, preparing the records and requesting the Contractor to attend examine and agree Reactive to a notice of disagreement with the records by reviewing, confirming or varying
12.3	Evaluation	Determining Assessing Value Applying of agreed measurement	N/A	At every Interim Payment Before issuing a Payment Certificate/Regular for certification of payment and Once wherever the case requires for asking for proof	Technical	Independent professional	Reactive when evaluating and agreeing and determining the Contract Price Proactive when determining a provisional rate or price
12.4	Omissions	Agreeing Determining	N/A	At any time during the Construction phase/Once whenever the case requires	Administrative(when consulting to obtain agreement) Technical (when determining a the case)	Independent professional	Reactive to Contractor's claim of a cost incurred and can not be compensated due to a certain VO omission

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
13.1	Right to Vary	Instructing Requiring/ Requesting Cancelling Confirming Approving	N/A	At any time prior to issuing the Taking-Over Certificate for the Works/Once whenever the case requires	Technical	Employer's agent	Proactive when initiating a Variation, giving notice and requesting a proposal Reactive to a notice with the particulars from the Contractor stating unreadiness of the Goods required, by cancelling, confirming or varying and to a modification of the Permanent Works by instructing or approving
13.2	Value Engineering	Approving Agreeing Determining	N/A	At any time during Construction phase prior to issuing the Taking-Over Certificate for the Works/Once whenever the case requires	Technical	Employer's agent	Reactive to the Contractor's notice of variation to reduce cost, improve efficiency and value of be of any benefit to the Employer by assessing analyzing and approving , then give agreement or determination under sub-clause 3.5 of the fee of the introduced adjustments
13.3	Variation Procedure	Requiring/ Requesting Approving Commenting Instructing for Variation Assessing Value Evaluating	N/A	At any time during Construction phase prior to issuing the Taking-Over Certificate for the Works/Once whenever the case requires	Administrative for the procedure	Employer's agent	Proactive when requesting a proposal from the Contractor before issuing a Variation Reactive to the response of the Contractor by giving approval, disapproval, comments,issuing a Variation, evaluating a Variation
13.5	Provisional Sums	Instructing Requiring/ Requesting	N/A	Provisional Sums are set at the time of preparation of the Tender Documents by the Engineer and/or the Employer and dealt with at the time of execution of the related works/Once whenever the case requires	Technical	Employer's agent	Proactive when giving instructions on the usage of the Provisional Sum and its related work, supplies or services as well when requesting quotations. Invoices, vouchers, accounts or receipts from the Contractor

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
13.6	Daywork	Instructing Approving Signing Assessing Value Evaluating	N/A	At any time during Construction phase/Once whenever the case requires	Technical	Employer's agent	Proactive when giving instructions that a Variation shall be on the daywork basis Reactive to receiving quotations, accurate statements, by signing and returning 1 copy of each, if correct or when agreed with the Contractor, then when receiving the priced statement including them later in the next Statement under Sub- clause 14.3
13.7	Adjustment for Changes in Legislation	Agreeing Determining	Limited when the case is transferred to clause 20	At any time during the Construction phase/Once whenever the case requires	Administrative(when consulting to obtain agreement) Technical (when determining a the case)	Independent professional	Reactive to a claim from the Contractor due to a change in Laws after the award of the Contract, by consulting, assessing and giving determination
13.8	Adjustment for Changes in Cost	Determining	Limited to the time of issue of the Interim Payment	At any time during Construction phase /Once whenever the case requires	Technical	Independent professional	Proactive when dealing with adjustments for cost indices
14.1	The Contract Price	Consenting	N/A	Within 28 days of the Commencement date/Once	Administrative	Employer's agent	Passive when receiving the breakdown of the lump sum price in the Schedules, by doing nothing or later taking account of it when preparing Payment Certificates
14.2	Advance Payment	Certifying Advance Payment	N/A	After the Commencement date and receiving the Performance Security and Guarantee/Once	Administrative	Employer's agent	Reactive when issuing the first Interim Payment related to the Advance Payment after the Employer has received Performance Security and Advance Payment Guarantee
14.3	Application for Interim Payment Certificates	Approving	N/A	After the end of each month/Regular	Administrative	Employer's agent	Reactive to receiving a Statement of the amounts alleged by the Contractor, with details including report of progress, approving the form

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
14.4	Schedule of Payments	Agreeing Determining	28 days after receiving a Statement and supporting documents	After the end of each month/Once whenever the case requires	Technical	Independent professional	Reactive to the fact that the instalments are in non compliance with the actual progress of the Works by assessing, agreeing and giving determination
14.5	Plant and Materials Intended for the Works	Determining Certifying	28 days after receiving a Statement and supporting documents	After the end of each month/Once whenever the case requires	Technical	Independent professional	Reactive to the addition of the Plants and Materials intended for Permanent Works with a proper documentation, statements and bills, by Determining and Certifying such amounts
14.6	Issue of Interim Payment Certificates	Determining Certifying of an Interim Payment Giving notice Correcting Modifying	28 days after receiving a Statement and supporting documents	At the end of every month/Regular	Technical	Independent professional	Reactive to receiving a Statement of the amounts alleged by the Contractor, with details including report of progress, by determining fairly the amount due, issuing within 28 days the Interim Payment Certificate Proactive when giving notice of last Interim Payment before taking over, giving notice of the amounts withheld as the case may be, making correction or modification made to any previous Payment Certificate

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
14.9	Payment of Retention Money	Certifying Retention Money payment	N/A	After the issue of Taking-Over Certificate and later Promptly after the latest of the expiry dates of the Defects Notification Periods /Once	Administrative and Managerial for withholding a payment	Employer's agent	Proactive when certifying the first half of the Retention Money for payment after the issue of the Taking-Over Certificate, and later for the outstanding amount promptly after the latest of the expiry dates of the Defects Notification Periods, and by withholding certification for the proper reason
14.10	Statement at Completion	Certifying	28 days after receiving a Statement and supporting documents	Within 84 days after receiving the Taking-Over Certificate for the Works,	Technical	Independent professional	Reactive to the Statement at completion, by issuing an Interim Payment Certificate under Sub-clause 14.6
14.11	Application for Final Payment Certificate	Issuing Performance Certificate Approving Changes or Disagreement, Drafting Final Payment Certificate	N/A	Within 56 days after receiving the Performance Certificate/Once	Technical	Independent professional	Proactive when issuing the Performance Certificate after Completion of Works Reactive to receiving the final draft statement, by approving the form requiring further information and changes in the draft, to receiving the info, by delivering the Interim Payment Certificate to the Employer and a copy to the Contractor
14.13	Issue of Final Payment Certificate	Issuing Final Payment Certificate Requiring/ Requesting Determining	Within 28 days after receiving the Final Statement and written discharge	Within 28 days after receiving the Final Statement and written discharge/Once	Technical	Independent professional	Reactive to receiving the Final Statement and written discharge, by issuing the Final Payment Certificate Proactive when the Contractor does not apply for Final Payment Certificate under Sub-clauses 14.11, 14.12, by requesting him to do so, if failed, by issuing a Final Payment Certificate with fairly determined amount

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
15.1	Notice to Correct	Requiring/ Requesting	N/A	At any time during Construction phase/Once whenever the case requires	Technical	Employer's agent	Proactive when requiring a correction
15.2	Termination by the Employer	Consenting	N/A	At any time during Construction phase/Once whenever the case requires	Administrative	Employer's agent	Passive
15.3	Valuation at Date of Termination:	Agreeing Determining	N/A	After Termination by the Employer/Once	Technical	Employer's agent	Proactive when giving determination of the amounts due to the Contractor after Termination by the Employer
16.1	Contractor's Entitlement to Suspend Work	Determining Giving notice	At least 21 days	At any time during Construction phase/Once whenever the case requires	Technical	Independent agent	Reactive to a specific claim from the Contractor
16.2	Termination by Contractor	Issuing payment certificate	within 56 days after receiving a Statement and supporting documents	At any time during Construction phase/Once whenever the case requires	Technical	Independent agent	Passive by doing nothing Reactive by issuing the relevant Payment Certificate
16.3	Cessation of Work and Removal of Contractor's Equipment	Instructing	N/A	After the a notice of any termination/Once	Managerial	Independent professional	Proactive when instructing works in case of Cessation of Work for protection of life or property

#	Sub-Clause	Classification 1 (Type of action)	Classification 2 (Time Baring)	Classification 3 (Timing & Frequency of the role)	Classification 4 (Type of role)	Classification 5 (Capacity)	Classification 6 (Nature of duties & authorities)
17.4	Consequences of Employer's Risk	Agreeing Determining Requiring/ Requesting	N/A	At any time during Construction phase/Once whenever the case requires	Technical	Employer's agent	Reactive to a notice from the Contractor of loss and damage to the Works due to Employer's risks, by Request of rectification, assessment and determination under Sub-clause 3.5
18.1	General Requirements for Insurances	Consenting	N/A	Before the Commencement of Works/Once	Administrative	Employer's agent	Passive
19.4	Consequences of Force Majeure	Agreeing Determining	N/A	At any time during Construction phase/Once whenever the case requires	Technical	Independent professional	Reactive to Force Majeure consequences
19.6	Optional Termination, Payment and Release	Assessing Value Issuing Payment Certificate	N/A	At any time during Construction phase/Once whenever the case requires	Technical	Independent professional	Proactive when evaluating the work then issuing a Payment Certificate
20.1	Contractor's Claims	Approving Record-keeping Inspecting Requiring/ Requesting Proposing Commenting Agreeing Determining	Within 42 days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the Engineer and approved by the Contractor	Notice not later than 28 days after the Contractor became aware, or should have become aware, of the event or circumstance, Fully detailed claim Within 42 days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim	Technical and Administrative for following the procedure	Independent professional	Reactive to Contractor's claim
20.6	Arbitration	Witnessing	N/A	After the Completion of works and rise to a dispute/Once	Administrative	Independent professional	Reactive by being a witness in a dispute resolution process

5.2.1. Interpretations and Analysis

The created system of classification above entails a number of observations:

- Classification1: Type of action (extensively discussed in Chapter 4).
- Classification2: Time Baring and Classification 3: Timing and frequency.

indicate if the role in question has a time constraint or not, when it is required from the Engineer and how frequent is he required to perform such duty.

- Classification 4: The type of the role in question is of high importance. Whether it is technical, managerial or administrative, it can imply the type of Engineer required for the duty in question.

- Classification 5: The capacity in which the Engineer acts and the fairness and impartiality that certain roles impose on him.

This feature is important due to extensive discussions and controversy of the “impartiality” that the 1987 FIDIC imposed on the Engineer at all time, while originally being the Employer’s agent. Since the 1999 FIDIC is the born improvement and implementation of the comments and critiques, it is only fair to determine the roles that it required the impartiality of the Engineer. The above system shows only about 64% of the roles where the Engineer is supposed to act as an independent professional.

- Classification 6: Nature of the Duties. It was noticed from the clause-by-clause reading of Chapter3, that either the Engineer was an initiator of a request or instruction or he was at the receiving end of documents, claims... from the Contractor. His duties could be proactive, passive or reactive.

Most of the roles are a reaction to the situation in question during the project lifecycle, counting about 66% against 28% of them where the Engineer is the initiator and only 6% present passive or no response from him.

5.3. Creating a matrix of roles of the Engineer, having the Consulting engineer as axis of reference

In order to answer the problem statement and fulfill the research objectives, a matrix of the roles of the Engineer in each clause of the FIDIC was created. Three parameters defined this matrix:

- The roles that should be exclusive to the Consulting engineer, “Designer”, in good practice.
- The roles that can be assigned to different stakeholders, including the “Designer”.
- The roles that should not be assigned to the Consulting engineer, “Designer”, in good practice.

About 68% of the roles can be assigned to different stakeholders without excluding the “Designer”. Whereas, almost 27% of them should not be assigned to the “Designer” and only 4% are roles exclusive for the “Designer”.

Table 5. 2 Matrix of the roles

#	Sub-Clause	Roles	Candidates excluding the Designer	Candidates including the Designer	Exclusively the Designer
1.5	Priority of Documents	Clarifying Instructing		✓	
1.8	Care and Supply of Documents	Receiving documents or notice		✓	
1.9	Delayed Drawings or Instructions	Issuing an Instruction or Drawing			✓
		Receiving and Acknowledging receipt of a notice			✓
		Agreeing	✓		
		Determining	✓		
1.12	Confidential Details	Requiring for compliance			✓
2.1	Right of Access to the Site	Agreeing Determining		✓	
2.5	Employer's Claims	Giving Notice		✓	
		Agreeing Determining		✓	
3.1	Engineer's Duties and Authority	Asking for Employer's approval when the contract requires		✓	
3.2	Delegation of the Engineer	Assigning/ Revoking assignment of assistants		✓	
		Rejecting/ Approving the work, Plant or Materials		✓	

#	Sub-Clause	Roles	Candidates excluding the Designer	Candidates including the Designer	Exclusively the Designer
3.5	Determinations	Consulting with both parties to obtain an agreement Giving Notice		✓	
		Assessing Agreeing		✓	
4.1	Contractor's General Obligations	Instructing			✓
		Requiring			✓
4.2	Performance Security	Consenting or No Reaction		✓	
4.3	Contractor's Representative	Consenting		✓	
		Instructing		✓	
4.4	Subcontractors	Consenting		✓	
4.5	Assignment of Benefit of Subcontract	Instructing		✓	
4.6	Co-operation	Instructing		✓	
		Consenting		✓	
4.7	Setting Out	Giving Notice Agreeing Determining		✓	
		Agreeing Determining		✓	
4.9	Quality Assurance	Auditing the QA			✓
		Consenting			✓
		Issuing documents			
					✓

#	Sub-Clause	Roles	Candidates excluding the Designer	Candidates including the Designer	Exclusively the Designer
4.12	Unforeseeable physical conditions	Inspecting/ Investigating			✓
		Instructing			✓
		Reviewing other conditions Agreeing Determining		✓	
4.16	Transport of Goods	Consenting		✓	
4.19	Electricity, Water and Gas	Agreeing Determining			✓
4.20	Employer's Equipment and Free-Issue Material	Determining			✓
4.21	Progress Report	Consenting		✓	
4.22	Security of the Site	Authorizing to the Site		✓	
4.23	Contractor's Operations on Site	Agreeing		✓	
4.24	Fossils	Instructing		✓	
		Agreeing Determining		✓	
5.1	Definition of "nominated Subcontractor"	Instructing		✓	
5.2	Objection to Nomination	Consenting		✓	
5.3	Payments to nominated Subcontractors	Certifying a payment		✓	
5.4	Evidence of Payments	Requiring		✓	
		Consenting		✓	

#	Sub-Clause	Roles	Candidates excluding the Designer	Candidates including the Designer	Exclusively the Designer
6.5	Working Hours	Consenting		✓	
6.7	Health and Safety	Consenting and Requiring		✓	
		Requiring		✓	
6.9	Contractors Personnel	Requiring		✓	
6.10	Records of Contractor's Personnel and Equipment	Consenting Approving		✓	
7.2	Samples	Consenting			✓
		Instructing additional samples			✓
7.3	Inspection	Examining			✓
		Measuring		✓	
		Testing			✓
		Giving Notice for no intention of inspection			✓
		Requiring for uncovering the work			✓
7.4	Testing	Agreeing on conditions Varying location			✓
		Giving Notice			✓
		Instructing			✓
		Agreeing on a claim Determining		✓	
		Certifying a test, Accepting readings as accurate			✓

#	Sub-Clause	Roles	Candidates excluding the Designer	Candidates including the Designer	Exclusively the Designer
7.5	Rejection	Rejecting			✓
		Giving notice			✓
		Requiring retest			✓
		Giving notice of Employer's claims		✓	
		Determining	✓		
7.6	Remedial Work	Instructing			✓
		Giving Notice			✓
		Determining	✓		
8.1	Commencement of Work	Giving Notice		✓	
8.3	Programme	Consenting		✓	
		Giving Notice of non compliance		✓	
		Requiring		✓	
8.4	Extension of Time for Completion	Reviewing Determining	✓		
8.6	Rate of Progress	Instructing		✓	
		Giving Notice		✓	
		Determining	✓		
8.8	Suspension of Work	Instructing Giving Notice		✓	
8.9	Consequences of Suspension	Agreeing Determining	✓		
8.10	Payment for Plant and Materials in Event of Suspension	Instructing		✓	
8.11	Prolonged Suspension	Giving permission		✓	
		Authorizing Variations		✓	

#	Sub-Clause	Roles	Candidates excluding the Designer	Candidates including the Designer	Exclusively the Designer
8.12	Resumption of Work	Giving permission		✓	
		Examining		✓	
9.1	Contractor's Obligations	Instructing			✓
		Assessing and analyzing			✓
		Approving			✓
9.2	Delayed Tests	Giving notice			✓
		Requiring			✓
9.3	Retesting	Giving notice Requiring			✓
9.4	Failure to Pass Tests on Completion	Ordering further tests Rejecting of the Works or section (as the case may be)			✓
		Issuing Taking-Over Certificate			✓
10.1	Taking Over of the Works and Sections	Issuing Taking-Over Certificate			✓
		Rejecting the application, Giving Reasons			✓
		Instructing			✓
		Receiving Notice			✓
10.2	Taking Over of Parts of the Works	Issuing Taking-Over Certificate for part of Works		✓	
		Agreeing Determining		✓	

#	Sub-Clause	Roles	Candidates excluding the Designer	Candidates including the Designer	Exclusively the Designer
10.3	Interference with Tests on Completion	Issuing Taking-Over Certificate			✓
		Agreeing Determining		✓	
		Requiring			✓
11.1	Completion of Outstanding Work and Remedying Defects	Instructing			✓
11.4	Failure to Remedy Defects	Giving Notice		✓	
		Determining		✓	
11.6	Further Tests	Requiring			✓
11.8	Contractor to Search	Requiring			✓
		Instructing			✓
		Determining		✓	
11.9	Performance Certificate	Issuing Performance certificate		✓	
13.1	Works to be Measured	Giving Notice		✓	
		Measuring		✓	
		Record-Keeping		✓	
		Reviewing, confirming, varying		✓	
12.3	Evaluation	Determining		✓	
		Assessing Value Applying of agreed measurement		✓	
12.4	Omissions	Agreeing Determining		✓	
13.1	Right to Vary	Instructing		✓	
		Requiring		✓	
		Cancelling, Confirming, Approving		✓	

#	Sub-Clause	Roles	Candidates excluding the Designer	Candidates including the Designer	Exclusively the Designer
13.2	Value Engineering	Approving		✓	
		Agreeing Determining		✓	
13.3	Variation Procedure	Requiring		✓	
		Approving Commenting Instructing for Variation Evaluating Assessing Value		✓	
13.5	Provisional Sums	Instructing		✓	
		Requiring		✓	
13.6	Daywork	Instructing		✓	
		Approving Evaluating Assessing Value		✓	
		Receiving and Signing off		✓	
13.7	Adjustment for Changes in Legislation	Agreeing Determining		✓	
13.8	Adjustment for Changes in Cost	Determining		✓	
14.1	The Contract Price	Consenting		✓	
14.2	Advance Payment	Certifying Advance Payment		✓	
14.3	Application for Interim Payment Certificates	Approving		✓	
14.4	Schedule of Payments	Agreeing Determining		✓	
14.5	Plant and Materials Intended for the Works	Determining Certifying		✓	

#	Sub-Clause	Roles	Candidates excluding the Designer	Candidates including the Designer	Exclusively the Designer
14.6	Issue of Interim Payment Certificate	Determining		✓	
		Certifying of an Interim Payment Correcting Modifying		✓	
		Giving notice		✓	
14.9	Payment of Retention Money	Certifying Retention Money payment		✓	
14.10	Statement at Completion	Certifying		✓	
14.11	Application for Final Payment Certificate	Issuing Performance Certificate		✓	
		Approving Changes or Disagreement,		✓	
		Drafting Final Payment Certificate		✓	
14.13	Issue of Final Payment Certificate	Issuing Final Payment Certificate		✓	
		Requiring		✓	
		Determining		✓	
15.1	Notice to Correct	Requiring		✓	
15.2	Termination by the Employer	Consenting		✓	
15.3	Valuation at Date of Termination	Agreeing Determining		✓	
16.1	Contractor's Entitlement to Suspend Work	Determining		✓	
16.2	Termination by Contractor	Issuing payment certificate		✓	

#	Sub-Clause	Roles	Candidates excluding the Designer	Candidates including the Designer	Exclusively the Designer
16.3	Cessation of Work and Removal of Contractor's Equipment	Instructing		✓	
16.4	Payment on Termination	Determining		✓	
17.4	Consequences of Employer's Risks	Requiring		✓	
		Agreeing Determining		✓	
18.1	General Requirements for Insurances	Consenting		✓	
19.4	Consequences of Force Majeure	Agreeing Determining		✓	
19.6	Optional Termination, Payment and Release	Assessing Value		✓	
		Issuing Payment Certificate		✓	
20.1	Contractor's Claims	Monitoring record-keeping		✓	
		Requesting further particulars		✓	
		Approving/ Proposing time bars		✓	
		Agreeing Determining		✓	
20.6	Arbitration	Witnessing		✓	

5.4. Recommendations to practitioners

It is highly important to note that the above classifications and all the interpretations and analysis that followed are more of a guide and suggestion, rather than cast in stone facts. The percentages and numbers are more of indicators of minority and majority of the roles in certain classifications and should not, under any circumstances be used as accurate numbers.

57 % of the roles are technical versus 29% of them administrative and 14% managerial. The latter distribution of roles could send a misleading message that the designer firm should take the lead when it comes to administrating the contract rather than a Project Management company. The practitioner should take in account that the roles of giving determination are technical. Yet, the majority of the determinations exclude the “Designer” and that alone can revoke the misconception.

The managerial roles are usually preceded or followed by an equal number of administrative procedures that the Engineer follows.

After the former classification and the deduced matrix, it is noticed that the majority of the roles are:

1. Reactive (66%), meaning that the Engineer is at the receiving end of requests and claims from the Contractor most of his time as a contract administrator under the 1999 FIDIC Red Book.

2. Technical (57%), this percentage shows that the role of the Engineer is not technical at all time. 43% of the roles are non-technical. Thus, someone else other than the technical professional (the “Designer”) can do them.

3. Intended to be for an independent professional (64%). This percentage shows that the Engineer, “independent professional” is not 100% required to be impartial.

4. Intended for candidates including but not exclusive to the “Designer” (69%). This percentage shows that the roles are not exclusive to the Designer but can also be alternatively replaced by another professional equally or better qualified for the role.

In an attempt to follow a good practice towards a successful project, it is highly recommended that the Employer decides on the identity or identities of the Engineer at the pre-project planning phase.

CHAPTER 6

CONCLUSION

Going through the literature review, the careful and intelligent reading of the 1999 FIDIC Red Book and the different steps of this study were to be able to clarify the different nature and types of the Engineer's roles and classify them, presenting the above-suggested matrix. This matrix can only serve as a guide and help to the decision makers in every project; to get acquainted with every single role of the Engineer they are allocating whether to the design professional or to a different equally or better qualified entity.

The professional practitioners using the FIDIC 1999 Red Book that can benefit from the study are not limited to the Employers seeking a simplified intelligent guidance to the different roles of the Engineer, but also the Contractors that are about to enter in the contract. Since the majority of these roles are of a reactive nature, they are concerned with the rights of the Contractors of claims and requests where they will be able to know the obligations and duties asked from the Engineer to serve their rights.

Entering a contract with well-defined duties and rights from all concerned parties is a step towards successful projects with the minimum amount of claims and wastes and maximum amount of satisfaction from all stakeholders.

The limitations of this study stand at its contextual and theoretical nature. And, it was mentioned before, this study is not an exact science with accurate numbers and results. Yet, it opens the doors to further discussions and studies.

Case Studies and appropriate on site surveys are expected to enrich and support this particular work in the future.

REFERENCES

- Acharya, Nirmal Kumar & Lee, Young-Dai (2005), "Discussion of "Factors Affecting the Success of a Construction Project" by Albert P. C. Chan, David Scott, and Ada P. L. Chan January/February 2004, 130(1), 153-155".
- Atkinson, R. (1999), "Project Management: Cost, Time and Quality, Two Best Guesses and a Phenomenon; It's Time to Accept Other Success Criteria", *International Journal of Project Management*, 17(6), 337-42.
- Berman, Harvey W. (1999), "Understanding project delivery methods", *The Practical Real Estate Lawyer*; 15, 2; ProQuest Central pg. 17.
- Bertelsen, S., Fuhr Petersen, K. and Davidsen, H. (2002), "Bygherren som forandringsagent – pa'vej mod en ny byggekultur" ("The Client as Agent for Changes – Towards a New Culture in Building"), *Bygherreforeningen i Danmark, Fonden Realdania, Byggecentrum, Ballerup* (in Danish).
- Boyd, D. and Chinyio, E. (2006), *Understanding the Construction Client*, Blackwell, Oxford.
- Bryde, David James and Robinson, Lynne (2005), "Client versus contractor perspectives on project success criteria", *International Journal of Project Management*, 23(8), 622-629.
- Bunni, Nael G. (2005), *FIDIC forms of contract, 3rd edn.* Blackwell, Oxford.
- Bunni, Nael G. (1997), *The FIDIC forms of Contract: The Fourth Edition of the Red Book.* Blackwell Publishing Ltd.
- ByggherreForum (2006), "The Role and Mission of the Construction Client", *Swedish Construction Clients Forum*, Stockholm.
- Chan, A. C., Scott, D. and Chan, A. L. (2004), "Factors Affecting the Success of a Construction Project", *Journal of Construction Engineering & Management*, 130(1), 153-155.
- Chan, APC, Chan, DWM and Ho, KSK (2003), "Partnering in construction: critical study of problems for implementation", *J Manage Eng*, 19(3):126-35.
- Chan, D. W. M. and Kumaraswamy, M. M. (1997), "A comparative study of causes of time overruns in Hong Kong construction projects", *Int. J. Proj. Manage*, 15(1), 55-63.
- Cuff, D. (1991), *Architecture: The Story of Practice*, MIT Press, Cambridge, MA.
- Davison, Bill, and Sebastian, Richard J. (2009), "An analysis of the consequences of contract administration problems for contract types", *Journal of Management Research 1.2 Expanded Academic ASAP*.

- Danish Government (2003), “Staten som bygherre – vækst og effektivisering i byggeriet” (“The government as client – expansion and effectiveness in construction”), available at: www.oem.dk (in Danish).
- Denton, Pierre M. and Schwab, Yves A. (2000), “The role of the Engineer in Disputes Related More Specifically to Industrial Projects”, *Journal of International Arbitration*, 17(4), 1-17.
- Dolan, Thomas G. (2003), “Project delivery methods”, *School Planning & Management*, 42(5), ProQuest Central,33.
- Dissanayaka, S.M., and Kumaraswamy, M. M. (1999), “Evaluation of factors affecting time and cost performance in Hong Kong building projects” , *Eng., Constr. Archit. Manage.*, 6(3), 287–298.
- Egan J. (1998), *Rethinking construction*, London: Department of the Environments Transport and the Regions, HMSO.
- FIDIC, International Federation of Consulting Engineers. (1999). *Conditions of Contracts for Construction*.
- FIDIC Geneva (2008). “The Role of Construction Managers, Notes on the use of FIDIC in the Middle East”.
- Glover, Jeremy and Hughes, Simon (2006), *Understanding the new FIDIC red book: a clause-by-clause commentary*, Sweet & Maxwell.
- Hanlon, Madelaine (2009). “The role of the contract administrator – which hat are you wearing?”, *Construction News Update Journal*.
- Hassan, A. Q. (1995), “Don’t burn that bridge”, *J. Manage. Eng.*, 11(6), 22.
- Hershberger, R. (1980), “A study of meaning and architecture”, in Broadbent, G., Bunt, R. and Llorens, T. (Eds), *Meaning and Behaviour in the Built Environment: Proceedings of the First Annual Environmental Design Research Association Conference*, Wiley, Chichester.
- Hillig, J.-B., Dan-Asabe,D., Donyavi S., Dursun O. and Thampuratty, A. (2010). “FIDIC’s Red Book 1999 edition: a study review” *Management, Procurement and Law Journal*, 163(MP3), 129-133.
- Jaeger, Axel-Volkmar and Hök, Götz-Sebastian (2010), *FIDIC - A Guide for Practitioners*.
- Janney, Jack R., Vince, Roy and Madsen Jack D. (1996), “Claims Analysis from Risk-Retention Liability Professional Group”, *Journal of Performance of Constructed Facilities*, 10(3), 115 – 122.

- Kamara, J.M., Amumba, C.J. and Evbuomwan, N.F.O. (2002), “Capturing Client Requirements in Construction Projects”, *Thomas Telford*, London.
- Kloppenborg, Timothy J., Tesch, Debbie and Manolis, Chris (2011), “Investigation of the sponsor’s role in project planning”, *Management Research Review*, 34(4), 400-416.
- Kulatunga, Kushan, Kulatunga, Udayangani, Amaratunga, Dilanthi, Haigh, Richard (2011), “Client's championing characteristics that promote construction innovation”, *Construction Innovation: Information, Process, Management*, 11(4), 380 – 398.
- Lindahl, Göran and Ryd, Nina (2007), “Clients’ goals and the construction project management process”, *Construction project management*, 25(3),147- 15.
- London, K., Chen, J. and Bavinton, N. (2005), “Adopting reflexive capability on international briefing”, *Facilities*, 23(7/8), 295-318.
- Ludlow, Micheal R. and Rees, J Gordon (1992). “Engineer’s Role under FIDIC Standard Conditions of Contract”, *International Business Lawyer*, 525-527.
- Lyon, M. Beth (1994) "The role of the consulting engineer in developing country construction under the FIDIC form contract," *Law and Policy in International Business*, 273-294, *Business Insights: Essentials*.
- National Commission of Construction (2002), *SOU 2002:115: Ska’rpnig gubbar! Om konkurrensen, kvaliteten, kostnaderna och kompetensen i byggsektorn*, National Commission of Construction, Stockholm (in Swedish).
- Ndekugri, I., Smith, N., Hughes, W. (2007). “The Engineer under FIDIC’s Conditions of Contract For Construction” *Construction Management and Economics*, 25(7), 791-799.
- Nicol, D., Pilling, S. (2000), *Changing Architectural Education: Towards a New Professionalism*, E & F Spon, London.
- Project Management Institute (2004), “A Guide to the Project Management Body of Knowledge” (PMBOKw Guide), 3rd ed., *Project Management Institute, Newtown Square, PA*, p 26.
- Reynolds, N. (2008), “Managing international contract administration”, *AACE International Transactions*, 41-IN49,IN410,Retrieved from <http://search.proquest.com/docview/208169412?accountid=8555>.
- Ryd, N. (2003), *Exploring construction briefing – from document to process, doctoral thesis*, Chalmers University of Technology, Gothenburg.
- Rose, Timothy and Manley, Karen (2010), "Client recommendations for financial incentives on construction projects", *Engineering, Construction and Architectural Management*, 17(3), 252 – 267.

- Royal Institute of British Architects (RIBA), 1993, *Strategic Study of the Profession: Phase 2: Clients and Architects*, RIBA Publications, London.
- Royal Institute of British Architects (RIBA), 1992, *Strategic Study of the Profession: Phase 1: Strategic Overview*, RIBA Publications, London.
- Sherman, S. N. (1996), *Government Procurement Management*, Germantown, MD: Wordcrafters Publications.
- Siva, Jessica and London, Kerry (2012), "Client learning for successful architect-client relationships", *Engineering, Construction and Architectural Management*, 19 (3), 253 – 268.
- Siva, J. P. S. and London, K. (2011), "Investigating the role of client learning for successful architect-client relationships on private single dwelling projects", *Architectural Engineering and Design Management*, 7(3), 177-189.
- Songer, A. D., and Molenaar, K. R. (1997), "Project characteristics for successful public-sector design-build", *J. Constr. Eng. Manage.*, 123(1), 34–40.
- Spencer, N. and Winch, G. (2002), "How Buildings Add Value for Clients", *Construction Industry Council/Thomas Telford*, London.
- Stein, Steven G. M. and Hiss, Ryan (2003). "Here Comes the Judge—Duties and Responsibilities of Design Professionals When Deciding Disputes" *Journal of Professional Issues in Engineering Education and Practice*, , ASCE , 129(3), 177-183.
- Sweet, Justin (1959) "Owner-Architect-Contractor: Another Eternal Triangle", *California Law Review, Inc.*, 47(4), 645-688.
- Toor, S.R., Ogunlana, S.O. (2010), "Beyond the 'iron triangle': Stakeholder perception of key performance indicators (KPIs) for large-scale public sector development project", *International Journal of Project Management*, 28(3), 228 – 236.
- Toor, S.R., Ogunlana, S.O. (2008), "Critical COMs of success in large-scale construction projects: evidence from Thailand construction industry", *International Journal of Project Management*, 26 (4), 420–430.
- Totterdill BW (2006), *FIDIC user's guide, 2nd edition*, Thomas Telford, London.
- Tyson Building Corporation 7250 West Vickery Blvd., Fort Worth, TX 76116 IBSS Marketing (2005), "Design-Build, Design-Bid-Build and Contract Management, How to select the one that is right for you".
- Walker, D.H.T. (1995), "An investigation into construction time performance", *Constr. Manage. Econom.* , 13(3), 263–274.
- Wearne, S.H. (1992), "Contract administration and project risks", *International Journal of Project Management*, 10(1), 39-41.

Wilson, M. (1996), "The socialization of architectural preference", *Journal of Environmental Psychology*, 16, 33-44.

Winch G, Usmani A, Edkins A. (1998), "Towards total project quality: agap analysis approach", *Constr Manage Econ*, 16(2),193–207.