

Research Thesis

Construction Contracts. An Evaluation of the Effectiveness of Fidic Conditions and Nec Contract in Reducing Construction Disputes within the Middle East

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Abstract

This research was set out to evaluate the effectiveness of FIDIC conditions and NEC contract in reducing construction disputes within the Middle East. The reason for selecting this topic was the desire to know why the NEC contract is not used in this region, where FIDIC dominates the construction market — knowing that the Gulf region holds the highest value of construction disputes in the world. NEC adopts a proactive approach in the construction process, it contributes to collaborative risk management, and it was recommended by Sir Michael Latham in his report. However, still, NEC did not find its way in this region.

This Study was based on the hypothesis that both contracts can be used anywhere. However, the greater emphasis on risk management in the NEC form would lead to reducing disputes in the construction process. The research mainly concentrates on NEC4 ECC and FIDIC Red Book 2017.

The research was prepared using the qualitative strategy. The used methods are Desk research and Case study. FIDIC and NEC were evaluated by conducting a comparison between them, besides considering a case study to assess the performance of NEC outside the UK.

The main findings suggest that the research hypothesis appears to be true. Despite the significant changes that were incorporated in the FIDIC 2017 edition, NEC still has more advantages in terms of clarity, flexibility, partnering, risk management, and change management.

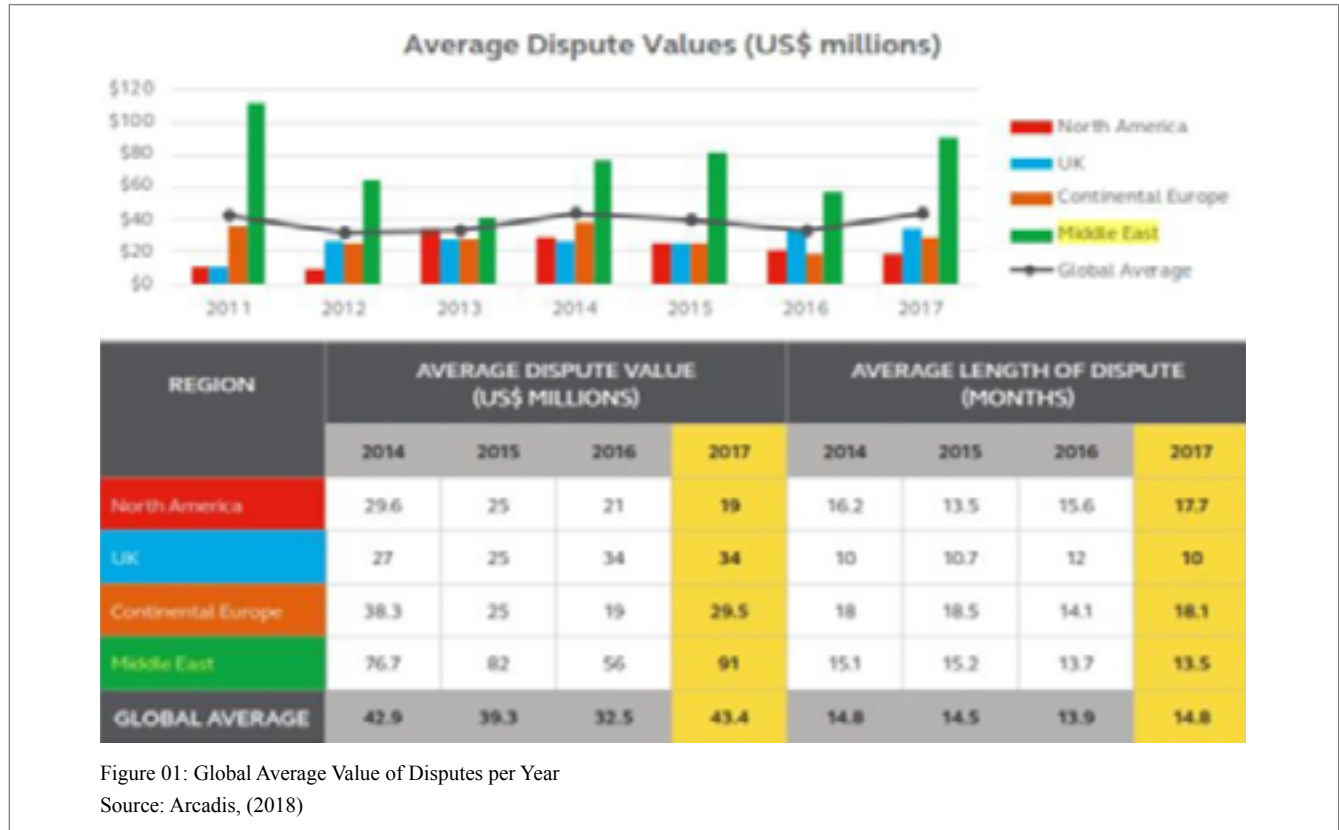
The research recommends further researches on the nature of amendments that usually made to FIDIC conditions by the parties in the Gulf region, and how the practitioners in this region have received the latest edition of FIDIC 2017.

Abbreviations: **BIM:** Building Information Modelling; **BOQ:** Bill of Quantity; **CE:** Compensation Events; **DAB:** Dispute Adjudication Board; **DAAB:** Dispute Adjudication/Avoidance Board; **ECI:** Early Contractor Involvement; **FEIC:** European International Federation of Construction; **FIDIC:** English name: International Federation of Consulting Engineers; French name: Fédération Internationale Des Ingénieurs-Conseils; **ICE:** Institution of Civil Engineers; **MDBs:** Multilateral Development Banks; **NEC:** New Engineering Contract; **NEC ECC:** New Engineering Contract Engineering and Construction Contract; **NOD:** Notice of Dissatisfaction; **SFCs:** Standard Forms of Contracts; **UAE:** United Arab Emirates **UK:** United Kingdom

Introduction

Construction projects are naturally prone to disputes. A dispute is usually a disagreement or a conflict between two parties which cannot be resolved within the contract by the contract administrator. Disputes are often referred to as claims. A claim is a sum of money claimed by one party from the other. It is the assertion of the rights of that party, where a dispute is the rejection of that claim and the declaration of a counter-claim. The fact here is that whenever a dispute arises, it is unlikely for the parties to resolve their

disagreement without third-party assistance [1]. Construction is usually a complicated process. It includes onerous obligations, high risks, and it requires competitive tendering procedures. These characteristics are responsible for the growing of adversarial relationship between the contract parties. Latham [2] proposed a solution for this problem by introducing a set of principles that should be included in the forms of contracts. He also advised the use of the New Engineering Contract as it fulfils many of these principles (Figure 01).



Arcadis [3] reported that the highest amount of disputes were recorded in the Middle East, where FIDIC dominate the construction market. The report also showed an increase in dispute value in the UK, although NEC is widely used. However, the situation in the UK is different from the Gulf region. Construction in the UK is facing some challenges recently, such as the severe skills shortage, the collapse of one of the biggest tier-one contractors (Carillion plc) and the countdown to Brexit. These challenges might be the primary driver for disputes in the UK.

FIDIC and NEC are the two most popular international forms of contract. FIDIC conditions were first published in August 1957. The fourth and final edition was published in 1987. In 1999 FIDIC launched the first edition of the rainbow suite. On the other hand, the NEC form was first published in March 1993 followed by the second edition in 1995. The contract was renamed to Engineering and construction contract (ECC) retaining the term NEC as a brand name for the suite of contracts. The third edition was published in 2005.

The year 2017 has introduced new versions of FIDIC and NEC forms, where FIDIC launched the second edition of their rainbow suite, and NEC4 was revealed. Sarie-Eldin [4] argues that FIDIC conditions are the predominant standard in the majority of the Arab Middle Eastern countries, despite that these forms were primarily based on English common law principles, while the source of law for the majority of the Middle Eastern countries is a mixture between civil and Shariah law. On the other hand, the NEC contract was rarely used in this region. There are no apparent reasons for that except lacking knowledge about the NEC and the routine consideration in using FIDIC. This point will be investigated later in this research.

This research aims to evaluate the effectiveness of FIDIC conditions and NEC contract in reducing disputes in construction within the Middle East. The evaluation would be based on a comparison between both contracts. The research will concentrate mostly on the NEC4 ECC contract and FIDIC Red Book 2017.

Reasons for Selecting this Topic for Research

NEC Contract takes a proactive approach in the construction process, unlike other forms which are reactive in their standard clauses. NEC has introduced the early warning feature, which is a big step towards collaborative risk management by the parties. NEC has fulfilled most of the basic principles which were set by Sir Michael Latham in his report. However, the NEC contract was rarely used in the Middle East.

Research Objectives

To identify the role of standard forms of contracts in the construction industry.

To determine the sources of disputes in construction within the Middle East, and the most common dispute resolution methods used.

To critically evaluate both contracts.

To assess the performance of the NEC contract outside the UK.

To identify the reasons for the limited usage of the NEC contract in the Middle East.

Research Hypothesis

Both NEC contract and FIDIC conditions could be used in construction anywhere. However, the greater emphasis on risk management in NEC ECC form would lead to reducing disputes in the construction process.

Literature Review

A dispute is an endemic disease in construction. It arises for several reasons with different ways by which it can be resolved. Most standard forms of contracts (SFCs) have procedures for dispute resolution. Other forms also have systems to avoid dispute from the first place. The primary purpose of this literature is to explore the role of SFCs in construction, determine the sources of dispute in construction within the Middle East, and to identify the existing theory about the performance of FIDIC and NEC contract based on past researches.

Standard Forms of Contracts: The Benefits and Challenges

SFCs were designed to provide formal predetermined arrangements and mechanisms to deal with any situation that may arise during the construction process. They define obligations, liabilities, and allocate risks to the parties [5]. SFCs were drafted by professionals, and agreed by various industry bodies. They are tested, tried, flexible, and provides consistency in the procedures [6].

SFCs are economical, in which it saves expenses of preparation of bespoke contracts for each project. It enables complex contractual arrangements to be accomplished with certainty. Also, SFCs are familiar to most practitioners. However, familiarity has a potential danger where clients may choose a particular SFC because they are familiar with and not because it best suited for their project requirements [1].

Although SFCs are used to allocate risks fairly between the parties, the allocation of risks in many circumstances may be made implicit rather than explicit, which make it difficult for the clients to assess the suitability of the standard form. Also, SFCs may lose their benefits because practitioners are always amending the printed form by striking out and adding other clauses to suit their particular requirements [7].

Sources of Disputes in Construction within the Middle East

Daoud and Azzam [8] concluded that there are six sources of disputes in construction within the Middle East, these are;

Construction contract: Since FIDIC is the most common form used, so there might be a possible discrepancy when applying FIDIC conditions within boundaries of a local civil law, where FIDIC is based mostly on English common law principles.

Clients: They usually make modifications to relax their responsibilities and increase the contractor's risk

Misunderstanding of contractual obligations: It often results from lacking contractual knowledge, language barrier, and using non-formal means of communication.

Frequently changes in the laws and regulations: Sudden change in the local laws, especially in taxation may results in high risks to contractors, causing disturbance to the construction market.

Design documents: Where there is a common trend in the Middle East to underrate the specifications as it usually lacks modifications to suit the local environment. In return, employer and contractors are concerned primarily with the bills of quantities (BOQ). So it is common that contractors bids for projects using only BOQ which may not reflect the exact requirements of the employers.

Local culture and social environment: Usually, family ties and political connections can be more potent than contract conditions. In addition to the lacking of a swift legal system for resolving disputes results in resolving disputes outside the court.

A recent report showed that the most common causes of disputes are; a failure in awarding extensions of time and compensation (ranked first), failure to properly administer the contract (ranked second) and owner directed changes (ranked third). The report also showed that the most common methods of dispute resolution are negotiation, dispute adjudication board (DAB), and arbitration [9].

FIDIC Conditions & NEC Contract

FIDIC conditions and NEC contract are the most popular SFCs in the world. The evaluation between these two forms was an aim for many researchers to investigate and explore. After careful study of past researches, it can be said that the existing theory is that both forms are suitable to be used for any construction type and in any geographical location. However, FIDIC conditions were given the familiarity and certainty in the outcome. In return, NEC was given the collaborative and proactive approach. Also, most researches have categorised FIDIC as an adversarial contract.

Broome and Hayes [10] have concluded from his primary research that NEC took a significant step forward in terms of clarity compared with traditional contracts such as FIDIC. He explained that FIDIC relies on two arguments in facing criticisms related to the clarity of its conditions. These are Familiarity and Precedent, where the familiarity has made most practitioners aware of both strengths and weakness of the contract. As for precedent, it meant that judges must follow previous decisions, where this can be useful in providing certainty in the outcome. However, the majority of the research has been carried out within the UK, where FIDIC is rarely used, which might affect the results.

Heaphy [11] has conducted a comparison between FIDIC 1999 and NEC3 ECC from different aspects. He summarised his findings that both contracts have many similarities, but there are some critical differences in the style and content between both forms.

However, the key determining factor on deciding which contract to be used is the attitude of the parties and whether they prefer the perceived familiarity and certainty of FIDIC conditions or wish to move to the collaborative and proactive approach of the NEC.

Besaiso, et al. [12] conducted research to find out which of these forms are the most suitable to be used in Palestine. His research was about comparing both contracts based on secondary resources. His finding was that both forms have commendable and desirable features and can be used successfully anywhere. However, he concluded that NEC seems to have many advantages over FIDIC, particular in terms of clarity, risk management, objective measurements of weather and ground conditions risks, and variations. Also, the role of the project manager was found to be more sensible than the engineer due to the adversarial relationship and lack of trust between contractors and engineers. The author argues that these advantages are for all parties where disputes minimisation is a matter of mutual interest. However, he acknowledges that there is a gap between the academics and practitioners who seems to be disbelievers in this argument, where they usually get involved in amending the standard forms to shift the risks down the supply chain. On the other hand, FIDIC has the familiarity and precedence, and endorsement by many development banks.

Rasslan and Nassar [13] conducted research to determine which form of contract among NEC and FIDIC is more suitable to be used in construction within Egypt. The research methodology was based on a questionnaire and interviews. The conclusion was that both forms are well-designed, and their success was proved in many projects. However, NEC has more advantages over FIDIC. NEC has a proactive approach to managing time and cost. Also, it is more understandable than FIDIC, where 72% of the FIDIC users have experienced problems in understanding its language due to the inclusion of many legal terminologies and much cross-referencing in the clauses. Also, NEC was more flexible, and it handles the programme more effectively than FIDIC. NEC has the early warning system which encourages the collaboration between the parties to identify risks as soon as possible. Although the results seem to be similar to the other researches, it was surprising that the results were for the favour of NEC in a country that never experienced the use of such contract.

It seems that the previous researches have shared a common view in which NEC has more advantages over FIDIC conditions. However, these researches were conducted on an older version of these contracts. In 2017, NEC4 and the 2nd edition of FIDIC rainbow suite 2017 were released. The latest version of these forms has seen significant changes, especially for FIDIC in terms of the programme and the inclusion of the advance warning system.

Therefore this research will consider the latest edition of these forms. The research will critically assess both contracts based on secondary resources by conducting a comparison between both of them. Due to lack of awareness of the NEC, the research will not use other methods such as questionnaires and interviews to avoid bias in the evaluation. The research will consider an NEC case study to assess the performance of the NEC outside the UK.

Methodology

The purpose of this chapter is to define the research methodology and methods that have been used, outlining the most common research methodologies, justifying the selected methods for collecting and analysing data, and highlighting the strengths and weakness of the chosen strategy.

Methodology and Method

Methodology and method are usually used interchangeably. However, both are not the same thing. A methodology is the design, strategy, or plan of action required to gather and analyse data. The methodology suggests the ways for selecting data and setting criteria for judging these data. On the other hand, a method is how the methodology is carried out. It is the technique and strategy that enables researchers to collect data. Each methodology has preferred methods [14].

Research Strategy

A research strategy is a way in which the research objectives can be questioned. There are two types of strategies; quantitative and qualitative strategy. Choosing the appropriate strategy would depend on the purpose of the study and the type and availability of the required information [15].

Qualitative research

Qualitative research is ‘subjective’ in nature. It is used to achieve an understanding of underlying reasons, opinions, and motivations. It provides insights into the problem or helps to develop ideas or hypotheses for potential quantitative research. Qualitative research is also used to uncover trends in thought and opinions and dive deeper into the problem.

Quantitative research

Quantitative research is ‘objective’ in nature. It is used to quantify the problem by way of generating numerical data or data that can be transformed into useful statistics. It is used to quantify attitudes, opinions, behaviours, and other defined variables – and generalize results from a larger sample population. Quantitative research uses measurable data to formulate facts and uncover patterns in researches. Quantitative data collection methods are much more structured than Qualitative data collection methods (Table 01).

S.No		Quantitative	Qualitative
1	Role	Fact-find based on evidence or records	Attitude measurement based on opinions, views and perceptions measurement
2	Relationship between researcher and subject	Distant	Close
3	Scope of findings	Nomothetic	Idiographic
4	Relationship between theory/concepts and research	Testing/Confirmation	Emergent/development
5	Nature of data	Hard and reliable	Rich and deep

Table 1: The difference between quantitative and qualitative research Source: Naoum, (2007).

This research will follow the qualitative approach. It will use qualitative methods for collecting data which is based on descriptive and commentary papers and articles. The descriptive texts will define the structure, Characteristics, and principles of the contracts, while commentary texts will critically analyse and evaluate the effectiveness and performance of these forms.

The qualitative approach was selected since this research is mainly depending on people's subjective experiences and opinions towards the use of both forms of contracts. This approach is illustrated in chapter four through the comparison between FIDIC conditions and NEC contract.

Research Methods

The adopted approach for conducting the research depends on the nature of the investigation, the data type, and the required and available information [15]. The research will use the following methods:

Secondary research/desk research:

It is a common research method. It involves using information that others have gathered through primary research. These information called secondary data. It can be stored either in a statistical or descriptive format [15]. Using this method involves identifying the subject and look at various sources of information such as books, journals, reports, websites, Government statistics & information, case studies, and articles. The next step is to start gathering the existing data.

Care should be taken regarding the credibility of this information by checking the references, where generally the more detailed the references, the more reliable the data. A critical review will be performed on the collected data by comparing and analyzing.

Through this method the following objectives will be achieved

- Provide a comprehensive grasp to the role the standard forms of contract in construction.
- Explore different sources of construction disputes in the Middle East.
- Critically evaluate both contracts.
- Identify the reasons for the limited usage of NEC forms in the Middle East.

The advantages of this method are mostly related to time and cost. In general, the use of secondary data is much less costly than conducting primary research investigation, even if there is an associated cost with obtaining these data. Also, secondary data are much quicker to be achieved, and it is readily available, rather than it may be the only available source for specific information (i.e., government data), beside it also provides a useful comparative tool [15].

The weakness of this method is that secondary data may be of low quality and outdated, or it does not precisely address the question of concern. Also, information might not exist, especially in developing countries, where the lack of conducting primary researches in these countries, or governments restriction on the media.

Case study: For a further in-depth review of the performance of NEC outside the UK, a case study would be an appropriate method to achieve that objective. Al-Raha Beach development flexibility, emphasising on in-depth content to get a complete picture, often shed new light on an established theory that results in further exploration.

The weakness of this method is that it involves some level of subjectivity that may lead to bias in conclusion. Also, there are concerns about the reliability, validity, and generalizability of the results.

Reasons for Not Conducting Questionnaires and Interviews

It is believed that NEC was only used one time in the Middle East, and that was in the UAE (Raha Beach project). As a result, there will be a possible lack of awareness by most practitioners to the NEC contract. Therefore the research will not use methods such as questionnaires and interviews in an attempt to avoid bias in the evaluation between the two forms, as most of the participants or even all of them would probably have quite preconceived ideas and decisions.

Research Ethics

There will be no ethical impediment to research since the research do not require conducting any questionnaires or interviews surveys for data collection. Therefore there will be no requirement to use the UCEM Research Ethics Information sheet and a Standard Consent Form.

Analysis of Secondary Data

Comparison between NEC contract & FIDIC Conditions

Overview, philosophy, and suite of contracts:

FIDIC and NEC forms were both designed for international use. They provide choice in setting the governing law and language. Both forms have their roots in common law jurisdictions. FIDIC was formed by the International Federation of Consulting Engineers (French acronym FIDIC) in association with the European International Federation of Construction (FEIC). It was first published in 1957. The NEC was first published by the Institution of Civil Engineers (ICE) in 1993 in response to the growing discontent with existing adversarial attitudes in the construction industry.

FIDIC conditions enjoy the acceptance of the World Bank and Multilateral Development Banks (MDBs). FIDIC has been extensively used in the Middle East, Southeast Asia, and Eastern Europe. The red Book particular was widely used in Africa. However, there has been a limited usage within countries that have their standard domestic forms of contracts, such as the US, UK, Australia, Malaysia and Germany [16]. On the other hand, NEC became the public sector contract of choice in the UK, and increasingly be used throughout Australia, Hong Kong, and South Africa (NEC.2019). However, in the Middle East, NEC has rarely been used.

The philosophy of FIDIC is to provide a framework to help in identifying and resolving problems. Also, to keep evidence recorded if the problem developed to dispute [17]. FIDIC focuses on liabilities and risk in the manner of Traditional contracts. However, the 2017 edition includes provisions that emphasise on the proactive approach by issuing notices throughout the contract to ensure certainty [18]. As for NEC, the philosophy is that proper management can improve the situation resulting in a greater buy-in from all the concerned. NEC contract is more about the proactive

and collaborative approach in managing projects. The principles of NEC is clarity & simplicity, flexibility, and proper project management.

FIDIC forms which known as “rainbow suite of contracts” were issued to match different procurement routes, each type has a different specific colour. The most popular is the Red As for the NEC, the most popular form is ECC option C, where this option uses the target cost mechanism through sharing the pain/gain between the contractor and employer (Table 02).

NEC	FIDIC
Professional Services	
NEC4: Professional Service Contract	Client/Consultant model services agreement 5th Edition. (2017 White Book)
Model Representative Agreement 1 st Edition (2013) purple Book	
NEC4: Professional Service Subcontract	
NEC4: Professional Service Short Contract	
Works	
NEC4: Engineering & Construction Contract	Conditions of Contract for Construction, Second Edition 2017 (the “Red Book”)
	Multilateral Development Banks (MBD) Harmonised Edition. 2010
	Conditions of Contract for Plant & Design Build, Second Edition 2017 (the “Yellow Book”)
	Conditions of Contract for EPC/ Turnkey Projects, Second Edition 2017 (the “Silver Book”)
NEC4: Engineering and Construction Short Contract	The Short Form of Contract (Green Book) 9999)
NEC4: Engineering & Construction Subcontract	Conditions of Subcontract for Construction (1 st Edition., 2011)
NEC4: Engineering and Construction Short Subcontract	Conditions of Subcontract for Construction (1 st Edition., 2011)
Has no equivalent	Dredges contract 214 Edition (2016 Blue-Green book)
Design, build and operate	
NEC4: Design Build and Operate Contract	Conditions of Contract for Design, Build and Operate Projects (Gold Book) (2011)
Operational/Maintenance Works	
NEC4: Term Service Contract	Has no equivalent
NEC4: Term Service Subcontract	Has no equivalent
NEC4: Term Service Short Contract (TSSC)	Has no equivalent
Supply	
NEC4: Supply Contract	Has no equivalent
NEC4: Supply Short Contract	Has no equivalent
Others	
NEC4: Dispute Resolution Service Contract	I Part of the works contracts
NEC4: Framework Contract	I Has no equivalent
NEC4: Alliance Contract	Has no equivalent

Table 02: FIDIC & NEC suite of contract reflecting latest editions.
Source: Heaphy, (2012)

6.1.2. Clarity, structure, and flexibility: FIDIC uses legal English, which is a professional language used to achieve certainty of the meaning. Understanding FIDIC clauses require the use of legal dictionaries since simple translation would be misleading. FIDIC clauses were written using the “shall do” terminology. The clauses are comprehensive; it contains a high level of detail with a substantial number of cross-referencing. It would take some time to link various section together to form a complete process and to fully understand the clauses [19,20].

As for NEC contract, it is characterised by its plain language, simple structure, and the short sentences with bullet points written in present tense style. It includes repeated identical phrases if possible. It avoids cross-referencing between clauses. NEC sets the duties using common terminologies to all disciplines. The aim in drafting NEC was to avoid legal jargon and attempts to paraphrase the existing law to make the form much easier to be read, understand and operate [20-22]. However, NEC was criticised for sacrificing clear litigation routes by using plain English.

Also, the management approach of the NEC form may preclude its use as an effective means of applying sanctions to non-performers [7]. Moreover, the writing style was criticised by the Hon Mr Justice Edwards-Stuart in the case of *Anglian Water Services Ltd v Laing O'Rourke Utilities Ltd* [2010] EWHC 1529 (TCC), stating that using this style represents a triumph of form over the substance.

In terms of structure. Both forms aimed for standardisation. FIDIC 2017 forms consist of 21 clauses. It works by having standard clauses known by "general conditions," which applied to all projects. The parties then have the option to introduce "particular conditions" which shall suite the specific project requirements.

Similarly, NEC has nine core clauses. The parties have to select the appropriate main option clauses depending on the chosen procurement route. Also, there are a series of secondary option clauses (X-clauses), in addition to additional conditions know as Zclauses, where the parties can tailor their contract to suit their project by selecting the optional provisions.

As for flexibility, both contracts have published a suite of contracts which apply to any work. However, the main difference can be seen in the pricing options. FIDIC has limited pricing options. It is either a lump sum or re-measurement. NEC has a range of pricing options which give the user more flexibility. It includes a lump sum option (A), remeasurable option (B), target cost option (C&D), and reimbursable option (E).

Project Manager (PM) under NEC vs Engineer under FIDIC

Under FIDIC, the engineer has two roles, the first as an employer's agent, and the second as an independent decision maker, also, he acts as a determiner in claim settlement. In return, the role of the PM is to manage all the main administration and duties for the employer under the contract except for those covered by the supervisor. Unlike FIDIC, NEC does not restrict the PM to be a named individual. It can also be a multi-disciplinary team, usually with a leader.

The role of the engineer has been under continues criticisms concerning duality. FIDIC responded to these criticisms by evolving the engineer's role through the various editions. In the 1987 edition, the engineer was under a duty to act impartially when taking decisions, expressing approvals, or making determinations. In the 1999 edition, FIDIC gave up the "impartiality" provision in an attempt to abandon the concept of "independent engineer" and clearly expressing that the engineer "shall be deemed to act for the employer" when exercising his duties and to make "fair determination." Also, FIDIC introduces the Dispute Adjudication Board (DAB), which is a way for challenging the engineer's determination. In the 2017 edition, FIDIC addressed the duality issue by defining the engineer as "Employer's Personnel" in Sub-Clause 1.1.33, and "shall be deemed to act for the Employer" (Sub-Clause 3.2). Sub-clause 3.7 states that when the engineer makes determination he "shall not be deemed to act for the employer," but "neutrally" and to make "fair determination" without the need for obtaining employer's consent. It seems that the amendments in the 2017 edition have made a clear distinction between the roles of the engineer as an "agent" to the employer and as a "quasiadjudicator" between the parties [23].

Under NEC, there is no express requirement for the PM to be impartial, but the PM has a duty to act fairly and "in a spirit of mutual trust and co-operation." Failure of the PM to act justly when exercising his power as a certifier would put the employer in a breach, and it might expose the PM to an action in tort by the contractor. The question of impartiality was settled in the case of *Sutcliffe v. Thackrah* (1974) and *Others v. Bechtel Ltd* (2005).

Under FIDIC sub-clause 3.2, the employer does have the right to impose an obligation on the engineer to gain approval before exercising decisions except when making determinations under sub-clause 3.7. As for NEC, it is assumed by implication that the PM has the employer's authority to make all the decisions required within the contract.

In both forms, the employer may replace the PM or the engineer after giving notice to the contractor. However under FIDIC sub-clause 3.6, the employer must provide that notice at least 42 days before the intended date of replacement, and the employer cannot replace the engineer with a person against whom the contractor has a reasonable objection. Both the engineer and the PM can delegate any or all of their functions, except for the engineer in case of the power to make determinations.

Partnering and early contractor involvement (ECI)

Partnering is the commitment of the project parties to work together cooperatively, rather than competitively and adversarially. It is a relationship that is bound by a set of behaviours. A contract alone cannot create these behaviours. Therefore, it cannot create a partnering environment.

It is fair to say that NEC forms encourage collaborative working between the parties. This encouragement appeared clearly through sub-clause 10.2 of NEC4 and the early warning system. As for the question regarding the enforceability and legal obligation of this clause. It can be said that the parties' behaviour will influence the outcome of any dispute. Also, in practice, the adjudicator will not only follow the terms and conditions of the contract but also take significant account of the parties' behaviour [18,20,24].

As for the ECI, NEC4 provide a new secondary option X22. It works only under option C and Option E. The provision allows the contractor to enter into two-tender stages. The contractor gets paid his costs plus a fee for his works during the ECI duration, with no obligation upon the employer to proceed beyond this phase. The provision allows the client to make an informed decision when deciding to proceed with the construction phase (NEC, 2019).

On the other hand, FIDIC does not include any of the partnering or the ECI provisions. However, lacking these provisions do not make FIDIC an adversarial contract, but it gives the NEC the advantage to be more collaborative in its approach than FIDIC.

The Tamar Bridge Strengthening and Widening project is an example for partnering and ECI using NEC form. NEC was chosen because it best reflected the spirit in which the client wanted the contract to run

There were also other reasons;

- The requirement of the NEC for a regular update programme reflecting any changes.
- Incentive scheme as in option C
- The focus of NEC on problem solving and compensation.

The outcome is that the project was delivered six weeks later than planned and with only 10% higher than the original budget. Strengthening and widening an existing suspension bridge is a complex operation, a one which could have been subject to significant cost and time over-runs [25] (Figure 02, Figure 03).

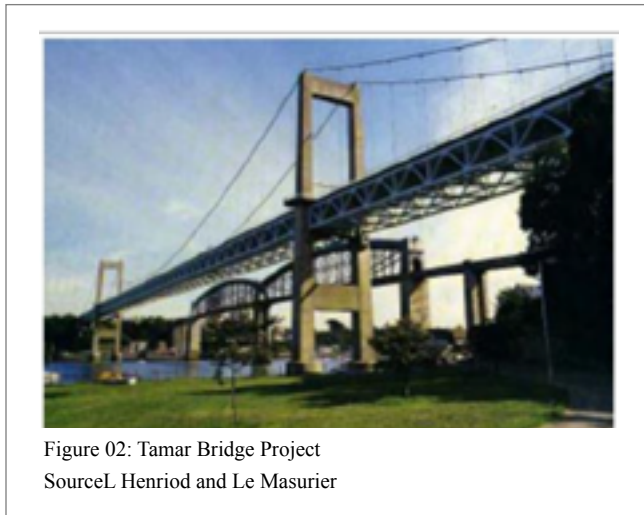


Figure 02: Tamar Bridge Project
Source: L Henriod and Le Masurier

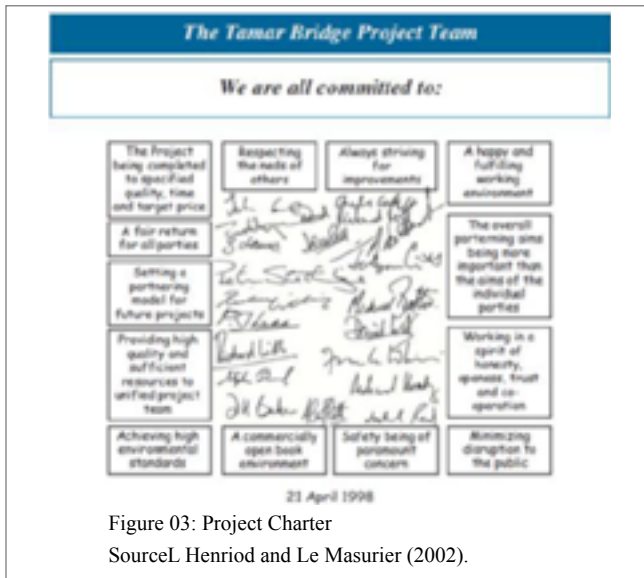


Figure 03: Project Charter
Source: L Henriod and Le Masurier (2002).

Design Responsibility

Under FIDIC conditions, the contractor will find himself subject to a fitness for purpose obligation regarding anything he designs in accordance to sub-clause 4.1(e). This obligation is far beyond the duty of the regular exercising reasonable skill and care in carrying out the works. It imposes an absolute obligation to produce a result, which seems to be an onerous obligation and one that is uninsurable. On the other hand, the NEC was not clear, where the design responsibility was not mentioned in the core clauses.

However, it was addressed through the secondary option X15.1, that the contractor will not be liable for design defects unless he failed in carrying out the design using ordinary skill and care.

It worth mentioning that the Gulf region imposes an additional liability called “decennial liability.” Such a responsibility cannot be excluded from the contract. The contractor and the engineer jointly guarantee all damages occurring with a period of ten years from the date of delivery. The contractor would be liable for any defects even if it were in the design, which was designed by the engineer [4].

Payments

FIDIC is essentially a re-measured contract. The measurement method is based on BOQ or other applicable schedules. For cost-plus and lump sum contract, guidance is given for their preparation. For NEC, it provides other alternative payment options such as target and cost reimbursable contract. NEC puts the responsibility of assessing the amount due to the PM, although the contractor has to submit a payment application. FIDIC requires the contractor to submit a payment application with a valuation of the amount to be paid.

The Payment mechanism under FIDIC and NEC (option A & B) are similar by paying the contractor in arrears. Where options (C to F), the payment is equal to the total defined cost which the PM forecasts that will have been paid by the contractor plus a fee. The PM will likely require the contractor assistance in assessing the amount due. Any wrong assessment can be corrected in the next payment. NEC gives a quicker payment than FIDIC; this can be for the benefit of the contractor. However, it might not be applicable for an international employer who relies on payment from international finance institution. Also, NEC is different from FIDIC in dealing with retention, since it is an optional choice as in option X16 not included in the core clauses (Figure 04).

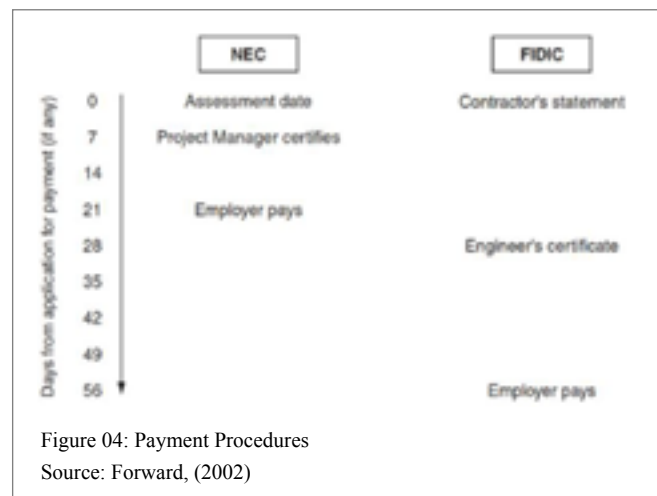


Figure 04: Payment Procedures
Source: Forward, (2002)

Contract Programme

A contract programme is a management tool. It indicates the sequence and timing of work activities. The activities are to be linked together based on dependencies between them. The programme may be a contract document, but it need not be [26].

The programme under FIDIC 1999 edition was under continuous criticisms due to the ambiguity. The term “detailed programme” was not defined, and there was no guidance on how detailed it should be. It was left to the contractor to decide. The ambiguity of the programme may generate an air of mistrust between the employer and the contractor [16]. FIDIC responded to these criticisms by making some changes in the 2017 edition. The term “detailed programme” was changed to “initial programme,” the programme requirements were increased by numerous additional matters that are required to be shown. Also, programming software is specified in which to be acceptable to the engineer [27]. However, the engineer under FIDIC is still not empowered to approve the programme. Also, there are no specific consequences or no express sanction for non-compliance with this sub-clause upon the contractor.

As for NEC forms, the programme is an active part of the management process and a central feature. It is the key distinguishing feature between the NEC and other standard forms. NEC forms impose a rigid regime for submission, acceptance, and revision of this tool to maintain its worth within the overall project management procedure [24]. Unlike FIDIC, NEC forms impose a sanction under clause 50.5 of the NEC4 if the contractor does not submit a programme. Where twenty-five percent of the “price for work done to date” is retained until the contractor submits the programme. Another sanction is imposed under clause 64.2 if the programme was not accepted or has not been revised in accordance to the contract, then the PM makes his assessment of the programme when judging compensation events [28].

NEC includes deeming provisions in case that the PM failed to respond to the submitted programme by the contractor. The contractor will have to notify the PM of his failure, and in case the PM’s failure continues further one more week, the programme deemed to be accepted. The treated acceptance is helpful to avoid confusion as to what is the currently accepted programme as it is essential in assessing compensation events [29].

Early Warnings

One of the principles of the NEC contract is “Foresight applied collaboratively mitigates problems and shrinks risk.” Foresight in NEC forms takes place through early warning and compensation event procedures [7]. Early warning process considered to be an essential feature of NEC forms and an innovative feature for standard forms of contract. It is a first big step towards collaborative risk management by the contract parties [29].

Under sub-clause 15.1 of NEC4, there is an obligation on the contractor and the PM to give an early warning by notifying each other as soon as either becomes aware of any potential risks. NEC applies sanction on the contractor if he fails to provide an early warning of an event which an experienced contractor could have given under sub-clause 61.5 & 63.7. The sanction is that the assessment of the compensation event cannot be higher than the evaluation, which would have followed the notice. Also, under options C, D, and E, failure of giving an early warning can be considered as a disallowed cost.

Eggleston [30] criticised the NEC for its ambiguity in sub-clause 16.1 in NEC3 (15.1 in NEC4) regarding the extent of the rigid mandatory part of the sub-clause. Since if the sub-clause be applied literally, so every trivial matter meets the criteria of this clause will be an early warning, leading to an increase in the administrative burden. Also, he added that the contractor

remains under the continuous risk of reduced assessment for not giving the notice earlier, although he may have given the notice as soon as he became aware. On the other hand, there is no express sanction on the PM for not giving an early warning, but it can entitle the contractor to damages for breach against the employer or payment under compensation event.

FIDIC agreed that an early warning system is a handy tool in minimising and mitigating claims and disputes [31]. Therefore FIDIC added a new sub-clause 8.4 “advance warning” to its suite of contracts 2017 edition, knowing that there was already similar clause in the Gold Book. The objective of this clause is emphasising on dispute avoidance and complying with the prevailing trend in construction contracts like clause 16 in the NEC. It should be noted that there is no reference in the sub-clause to formal claims notice under sub-clause 20.2. The primary purpose of the warning was to flag up any potential issues which it may or may not turn out to be a claim. Unlike NEC, there is no apparent sanction in FIDIC for failing to give an early warning. Sub-clauses 8.4, 8.5 and 20.2.7 are silent in this regard. Therefore, for a contractor who fails to provide an early warning of potential risk and then provides notice of compensation event. The compensation event will be assessed on the basis that an early warning had been given [32].

Change Management

The only constant in construction is change. Change is almost inevitable on any construction project irrespective of its size. Variations usually generate disputes and may have an acute impact of the project performance. Contractors have to be aware of the different procedure in which variations are dealt with under different SFCs during the bidding stage.

FIDIC differs from NEC in dealing with variations and the contractor’s claim. FIDIC uses different contractual machinery; this means that the burden of proof is likely less onerous than in the NEC. Variations are covered under Clause 13, where claims are covered under sub-clause 20.1. As for NEC, it uses the same contractual machinery for both variations and claims under clause six compensation events [33].

Variations and Claims under FIDIC

Under FIDIC 2017, variations can take place either through instructions by the engineer or requesting a proposal from the contractor. Either way, the contractor shall proceed with the execution of the variation. Valuation of variations is dealt with under clause 12 by considering rates and prices sets out in the contract or rates of “similar works.” In case neither of the two are available, new rates are permitted at a reasonable cost plus reasonable profit. FIDIC 2017 limits the variations to 10% of the quantity under clause 12.3. sub-clause 13.3.1(C) entitles the contractor to seek compensation for any loss caused due to variations within his proposal. However, there is no obligation on the engineer to consider the contractor’s proposal in the valuation, as well as the valuation methods available to the engineer, are very restrictive and it may not allow any price escalation [34].

As for claims, FIDIC 2017 emphasised on resolving disputes promptly, for this objective, new time limits and deeming provisions have been added. Besides unifying claims procedures for both contractor and employer. Clause 20 imposes two obligations for seeking compensation. First is to provide notice within 28 days, and the second is submitting a fully detailed claim within 84 days. However, before any rights are lost there is an obligation on

the engineer for serving notices to the claiming party, failure of the engineer in providing these notices will lead to deeming the claiming party's notice to be valid.

Sub-clause 3.7 have put an end to the delay tactics in responding to claims by setting a 42 days' time limit for the engineer to make his determination and in case of no response, it is deemed that the claim is rejected. Therefore the claim turns to a dispute and will be subject to DAAB decision under sub-clause 21 [23] (Figure 06).

Compensation Events (CE) under NEC: Under the NEC, contractors get compensated whenever any event affect their prices, their completion dates, and any key dates. CEs are the employer's risks. It gives the contractor time and money. It's a single process for assessing additional costs and extensions to completion dates. CEs comprises notification, quotation, assessment and implementation [28] (Figure 05).



Figure 05: Compensation of Events Process
Source: Powell, (2016)

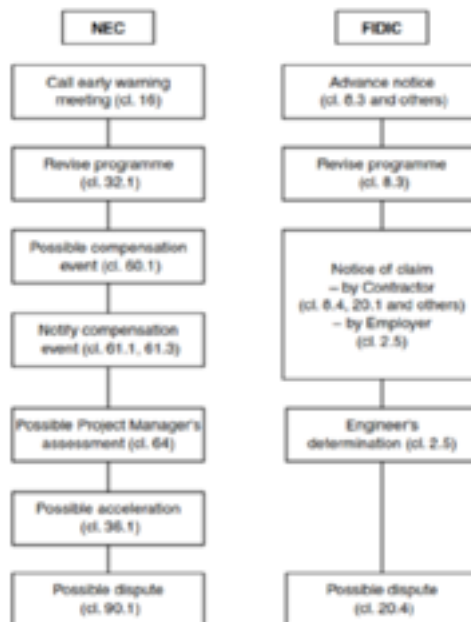


Figure 06: Claim Procedures for NEC & FIDC 1999
Source: Forward, (2002)

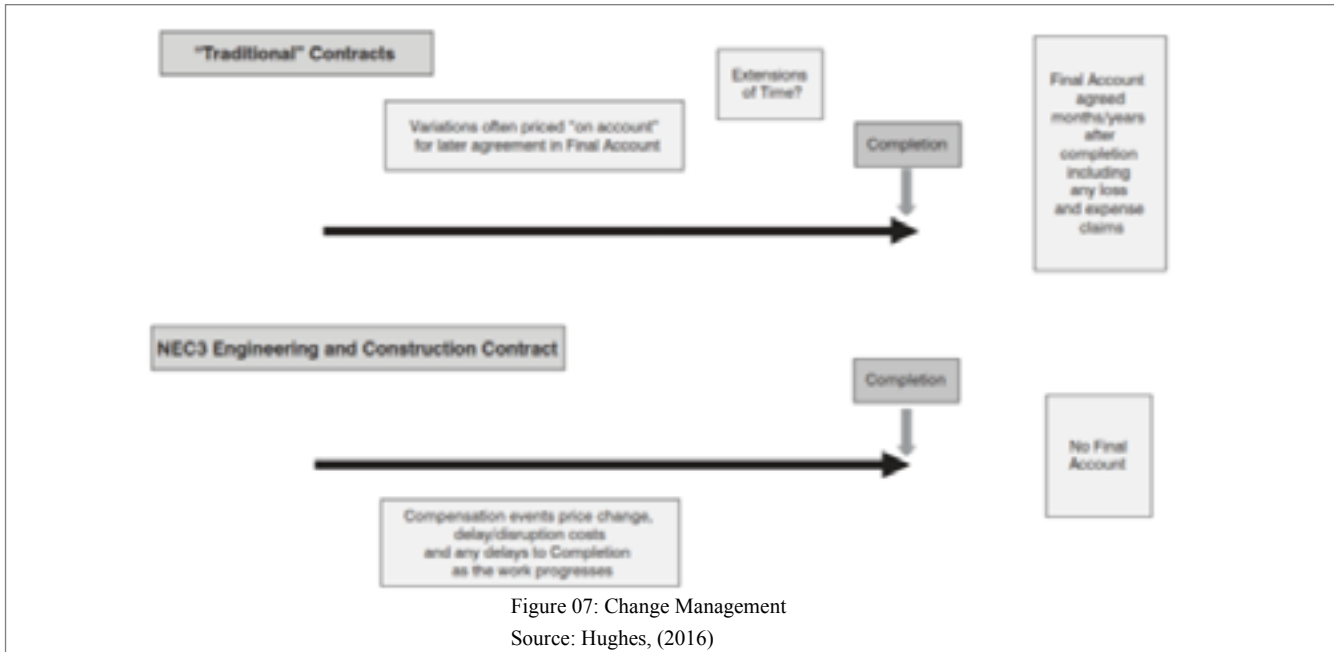
The valuation of CE in NEC is entirely different from FIDIC. The assessment is made based on either forecast or actual cost plus a pre-agreed fee, where it will cover the contractor's overhead, profit, and risk.

NEC imposes sanction on the PM when he fails to respond to the contractor's notification within one week. The contractor will have to notify the PM for his failure, and if the PM did not respond within two weeks, the CE deemed

to be accepted. Similarly in the valuation of the CE, if the PM fails to respond within two weeks, the contractor will have to notify the PM for his failure, and in case the PM did not respond within two weeks, the contractor's quotation deemed to be accepted. The intention is to update the price and the completion period within a short time. As a result, there should be no need for a final account where the issues are resolved as the works progress.

The downside of CE is that matching the actual events to the words of the contract may not be easy. The contractor will have to convince the PM that the words of the CE are matching with the actual event, failure to convince the PM will lead to dispute procedure (Powell, 2016). Eggleston, (2006) argue that NEC forms have placed more risks on the contractor than any other standard forms by putting the risk of inadequate forecasting on the contractor. Besides, under clause 65.2, the assessment of the CE is not revised if it was discovered later that forecast was based on wrong information. NEC adopts what is known as “the first-in-line

approach” to causative events. Therefore if there was a delaying event which the contractor is entitled to be compensated upon and that event is overtaken by another delaying event for which the contractor is responsible. The result would be that the contractor will continue to be paid for the first event even though he is no longer suffering losses due to this event. Another point within clause 63.3 is that the assessment of the extension of time is made with respect to the programme and not to the completion date. Therefore the contractor owns overall float in his schedule (Figure 07).



Physical and weather conditions risks: The risk of physical conditions is covered under sub-clause 4.12 of FIDIC 2017 and subclause 60.12 of the NEC4. Under FIDIC, the contractor entitlement to compensation will depend on “traditional foreseeability test,” where the contractor can recover cost and time but not profit if the physical conditions were not foreseeable by an experienced contractor. Sub-clause 4.12.5, limits the entitlement of the contractor to time and cost compensation as long they are not offset by positive unforeseeable conditions. This clause can lead to adding unnecessary high prices by contractors in their tenders (Swiney, 2007).

In NEC, the compensation of the contractor will depend on the “probability” test. The contractor would be compensated for time and money if the physical conditions at the time of entering the contract were having a small chance of occurring that it will be unreasonable for an experienced contractor to allow for them [35]. The contractor will be compensated for only the difference between what he found and what he should allow. It means that, if the contractor did not allow anything for time and money regarding physical conditions, he would not be able to recover the full value of compensation [7].

Both contracts attempt for equitable risk sharing, but the provisions suffered from lack of sufficient clarity such as “physical condition,” and “experienced contractor” in FIDIC, and “small chance” in the NEC. The case of Humber Oil Trustees Ltd v. Harbour and General Public Works (Stevin) Ltd raised a question regarding the extent of the term “physical conditions,” as it seems that the term is not restricted to ground conditions only.

Jaeger, A. and Hök, G. [19] criticised the foreseeability test in FIDIC explaining that the judgment on whether the physical conditions are unforeseeable or not is not easy and might often result in different views. In *Obrascon Huarte Lain SA v Her Majesty’s Attorney General for Gibraltar*, the contractor’s claim for unforeseen ground conditions was rejected, although the ground conditions were not expressly identified in the geotechnical report.

For weather conditions, it was covered under FIDIC 2017 sub-clause 8.5 and in NEC4 under sub-clause 60.13. Under FIDIC, the contractor may claim only time, not costs for ‘exceptionally adverse climatic conditions.’ On the other hand, under NEC, the contractor can claim both time and money. FIDIC is more subjective in restricting an extension of time for only “exceptionally adverse” weather, leaving it to the parties to determine what is meant by “exceptionally adverse.” NEC provides a more objective approach by comparing weather measurement of one month to ten years records provided by an independent party such as the meteorological office.

Exceptional vs prevention events Except for the different terminology used, both forms have the same philosophy in transferring these kinds of risks to the employer to avoid padding the tender prices by the contractors [12].

FIDIC was criticised because the definition of these events was open-ended, where a human-caused event could be covered if it met the criteria of sub-clause 18.1. Exceptional events do not have to be unforeseeable. A foreseeable event may be considered an exceptional event as long as it is beyond the parties' control. Also, The entitlement of the contractor to any (Indirect) claim for additional time and cost resulting from consequences of exceptional events remain ambiguous due to the restrictive wording "is prevented from performing any of his obligations" [19].

As for NEC, it was previously considered (in NEC3) that the prevention clause is a gold mine for contractors and minefield for employers, and it will be usually be deleted [30]. In NEC3, a contractor may argue that insolvency of suppliers or defective work by subcontractors is an event that has a small chance of occurring and unreasonable to allow for it. Therefore, it would amount for prevention event. However, with the changes incorporated to NEC4, the potential impact of clause 19.1 in NEC3 have significantly been reduced. NEC4 made it clear that the event must stop the "whole of the works," this highlights the fact that prevention event must be indeed an exceptional event. However, NEC was criticized for using difficult tests such as "small chance" or "unreasonable to have allowed for" to examine whether these events considered as prevention events or not.

Termination of Contract Under FIDIC, the contract can be terminated through four ways; by employer sub-clause 15.2, by contractor sub-clause 16.2, for employer's convenience sub-clause 15.5, and by either party through exceptional event through sub-clause 18.6. FIDIC includes a provision that does not exist in any other standard forms of contract, where sub-clause 16.1 entitles the contractor can suspend and terminate the contract if the employer fails to provide evidence for his financial arrangements under sub-clause 2.4.

NEC includes a termination table summarising the reasons upon which either party may terminate the contract. The table refers to the reasons listed in clause 91, ranging from R1 to R22 in NEC4. Also, NEC allows the employer to terminate the contract for convenience. However, NEC4 include this provision as a secondary option X11, unlike NEC3, which was included in the core clauses.

Dispute Resolution

Both forms have introduced an independent dispute resolver as part of the contract. FIDIC has presented the engineer as the first recourse in preventing disputes. The engineer plays an active role in the early stage of the claim process by determining whether a notice is valid or not. The engineer in the 2017 edition is compelled to respond within a set time, and it is no longer permitted to leave unanswered issues. In NEC, there is no similar role for the PM. However, NEC4 has introduced a new option of referral to senior representatives of the parties to the project. The idea is to provide for four weeks for negotiation to see whether a more formal dispute can be avoided.

The resolution method used by FIDIC 2017 is Dispute Adjudication/Avoidance Board (DAAB), where NEC4 Option W1 for international contract and option W2 for contracts within the UK complying with the Housing Grants, Construction and Regeneration Act.

Also, NEC4 introduces option W3 Dispute adjudication board (DAB) which is similar to FIDIC DAB, and it is used Only where the UK mandatory adjudication provisions do not apply.

DAAB in FIDIC composed of one or three persons and can either be a standing or an ad hoc board, engaged only when a dispute occurs. DAB in NEC consisting of one person tasked with visiting the site regularly and ready to assist with identifying and solving potential areas of conflict.

Building information modelling (BIM) FIDIC 2017 still did not address the use of its form for BIM-enabled projects. However, it did provide a special advisory Note within the Special Provisions which deals with the use of BIM. FIDIC emphasises on the team collaborative approach for successful use of BIM. FIDIC added that shortly it would publish a Technology Guidelines to provide further detailed support for BIM.

NEC4 has an advantage as it includes a new secondary option X10 as a response to the increasing use of BIM in construction. Under the new option, the contractor is required to provide an "Information execution plan" in the same way as the requirement for the programme. The option deals with other issues such as model, ownership, and liability.

Supply Chain Management

The difference between both forms is the nomination of sub-contractors. FIDIC 2017 deals with nominated sub-contractor under Clause 5. The nomination process must include the contractor's approval. The provision gives the contractor the right to object in certain conditions. Once the sub-contractor is appointed, clause 5.1 makes it clear that the contractor remain responsible for the actions and omissions of the sub-contractor. The payment of the nominated sub-contractor is to be certified by the engineer and paid by the contractor. Later, the engineer may ask for proof that the sub-contractor was paid those payments under sub-clause 5.2.4.

Under NEC4, there is no provision for nominated or named sub-contractors. In the case of sub-contracting took place, it will be the contractor's prerogative, not the client's or the PM's.

NEC Case Study

Al Raha Beach Project, Abu Dhabi, UAE

Al Raha Beach is a 500ha mixed-use waterfront development, located in Abu Dhabi, UAE. The estimated value of the project is £10.3 billion. The project consists of eleven mixed-used precincts of marinas, hotels, shops, offices, houses and apartments up to 40 storeys high, with accommodation for over 120,000 people. The project includes an infrastructure scope consisting of six major interchanges with the existing highway, 75 bridges, roads, light rail, canal networks, and service installations. (NEC, 2019) (Figure 08).



Figure 08: Raha Beach Project
Source: NEC, (2019)

In 2007, a leading United Arab Emirates developer Aldar Properties took a step which believed to be the first in the Middle East by adopting NEC3 to procure the development of Al Raha beach. The Arabian Business magazine quoted the project director Michael Cox as saying that the move will ensure quality, time and cost certainty. He also states that; *“The implementation of the NEC contract on Al Raha Beach is a massive step forward in the region. We believe that the NEC contract will attract world-class vendors required for the efficient and timely delivery of the Al Raha Beach development.”*

Aldar formed a joint venture with the contractor Laing O’Rourke. Christopher Wilkinson, the managing director of Aldar Laing O’Rourke states that *“The higher degree of fairness to all parties that the contract provides is enabling us to attract the world’s best talent for our own management staff, as well as the supply chain we require to work with us.”*

One of the main elements of the project was the Aldar’s new headquarters building, which is the most high profile in the development [36] (Figure 09).



Figure 09: Aldar’s new head quarter building
Source: Lane, (2010)

The building was procured using the NEC contract, where both parties share gains or pains. The estimated cost was of £1.2bn, the final cost to be under £1bn as prices dropped during the latter stages of the build. Peter Taylor, the project leader, states that:

“The beauty of the contractual relationship meant we could crack on with it just by sitting down and agreeing it was the right thing to do.” The project duration was set for six years (2006-2012). During the first three years of the project, the main elements of the project were completed. The new HQ building, Al Bandar residential precinct, Roads and interchanges, and Utilities and other infrastructure were completed.

The reasons for the limited usage of NEC within the Middle East

Although NEC form was previously introduced to the Middle East through Al-Raha Beach project in UAE, this has done little to encourage its usage. FIDIC conditions continue to dominate the market. Attia [37] argues that there is no form of contract is inherently better than another if it was appropriately administered. The administration is a crucial factor for success. Under both contracts, claims will still arise. However, NEC promotes a more collaborative approach. The success of NEC will depend on the change of the mindset from all of those involved in the construction process.

Savager [38] argues that the issue for the Gulf region is that employers are usually trying to transfer the whole risks to the contractor in return for a fixed price to buy certainty, ending up with unbalanced risk allocation. At last, the result would be costly and entrenched disputes. A survey done by the law firm Pinsent Masons within the Gulf region showed that almost three-quarters of market participants had worked on projects using “heavily” or “very heavily” amended FIDIC contracts. The modification falls into two main categories:

- Transferring the risk from the Employer to the contractor.
- Allowing the Employer to retain control over the contract administration.

These amount of changes undermined the main advantages to the industry of SFCs.

Therefore the question is not about if NEC is a suitable contender for projects in the region, but whether employers are willing to give the NEC a go and if so, do various stakeholders can change their mindsets to realise the NEC’s full potential.

Patterson [39] has listed four reasons for why NEC still after twenty years is used only in the UK, South Africa, Hong Kong, and New Zealand;

1. Limited choices: The policy of the Multilateral Development Banks was limited to FIDIC as a choice for a form of contract.
2. Time: NEC form took some years in the UK to take hold, so it requires more time to expand its usage.
3. Inertia: Employers are routinely considering the last contract used. They should investigate other options to deliver their projects.
4. Lack of awareness: The awareness level outside the mentioned four countries is significantly low. NEC is a part of the not-for-profit ICE, and it merely does not have access to sufficient marketing spend to push NEC hard into new markets. However, this could also be an advantage, because construction professional might be more wary of a profit-making organization pushing its form of contract.

Conclusion and Recommendation

Conclusion

This thesis was set out to examine the effectiveness of FIDIC conditions and NEC contracts in reducing construction disputes in the Middle East. The objectives of the research were to identify the role of standard forms of contract in construction, identify the sources of construction disputes in the Middle East, critically evaluate both contracts, assess the performance of NEC contract outside the UK, and to investigate the reasons for the limited usage of NEC contracts in the region. The research was based on a hypothesis that both forms are suitable to be used. However, the greater emphasis on risk management in the NEC contract would lead to reducing disputes in construction.

The qualitative approach was chosen as a strategy for preparing this research. The used two methods are Desk research and Case study. Neither questionnaires nor interviews were used to avoid any bias in the evaluation between both contracts, where the majority of practitioners in the Middle East might lack awareness of the NEC contract, and they might have preconceived ideas and decisions.

The first two objectives of the research were achieved through chapter two, the literature review, while the rest of the objectives were achieved through chapter four, analysis of secondary data.

For the first objective, it is found that the role of the SFCs was to provide a formal predetermined arrangement that could deal with any circumstances arises during the construction between the parties. They are flexible, economical, can handle complex arrangements, and are familiar to most practitioners. The most severe challenge facing SFCs is the frequent modifications that usually done by employers that would lead to unfair risk allocation between the parties resulting finally in disputes. For the second objective, it is found that the most common sources of construction disputes in the Middle East are; compensation of time and money, poorly contract administration, and client's variations. Negotiation, Dispute adjudication board, and arbitration are the most commonly used methods of dispute resolution.

For the third objective, it was achieved by comparing both contracts. The comparison has considered fifteen items that represent the major features of any SFC. It is found that NEC contract has the advantage of clarity, partnering,

providing alternative payment options, handling the programme effectively, early warning, change management, dealing with weather conditions risks and BIM inclusion. However, it is fair to say that FIDIC 2017 has witnessed a significant change in its philosophy, where it adopted the proactive approach in managing construction projects rather than traditional manner.

In terms of clarity, it seems that the NEC contract is more apparent than FIDIC conditions. The use of plain English, having a simple structure, and avoiding the use of legal jargons and cross-referencing between clauses makes NEC much easier to be understood than FIDIC. However, there still some concerns regarding the language and the style of NEC.

For the partnering, NEC has retained its position in encouraging the collaborative work by the parties and the inclusion of ECI provision. Unlike FIDIC, which lacks both. However, the lack of these provisions does not make FIDIC an adversarial contract, but it gives the NEC this advantage.

Another advantage of the NEC is that it provides other alternative payment options such as target and cost reimbursable option. The payment procedures are the same for both contracts, except in NEC options C to F, where the contractor is paid in advance, not in arrears. Also, NEC gives quicker payments than FIDIC.

For the contract programme, NEC has retained its position in handling this valuable tool effectively. Despite the amendments that FIDIC made in its latest edition concerning the programme, it did not impose any express sanction for non-compliance. In return, NEC imposes a rigid regime for submission, acceptance, and revision of the programme to maintain its worth of this tool. NEC imposes sanctions on both the contractor and the PM for non-compliance. If the contractor failed to submit his programme, Twenty-five percent of the price for work done would be retained until the programme is submitted. In case if the PM was unable to respond to the submitted programme, the contractor will have to notify the PM of his failure. If the PM continues not to respond, the programme deemed to be accepted.

As for the early warning, although the inclusion of both contracts to this kind of system. NEC was the one to express its interest in running this system effectively by imposing a sanction for non-compliance, where the contractor may lose his entitlement for compensation if an early warning was not given. FIDIC has realised the importance of early warning in minimising disputes. Therefore a new sub-clause 8.4 (advance warning) was added in FIDIC 2017, but it did not indicate any consequences if the sub-clause was not followed.

For change management, it seems that NEC has the advantage of being fairer than FIDIC in the valuation of variation. NEC uses forecast or actual cost in the assessment, where FIDIC uses contract rates or rates of similar works. Also, FIDIC obliges the contractor to proceed with the variation even before settling on its price. NEC always keen to update the price and completion period through a short time, so there will be no need for preparing a final account. Also, FIDIC 2017 took the same trend by putting an end to the delay tactics in responding to claims. Sub-clause 3.7 sets 42 days for the engineer to make his determination otherwise the claim deemed to be rejected and will subject to DAAB decision. The downside of NEC in this regard is that the burden of proof is likely higher than FIDIC, matching the actual events

to the words of a compensation event is not an easy task. The use of FIDIC to different contractual machinery for variations and claims have made the burden of proof less onerous than in NEC.

For dealing with weather conditions risks, it is found that NEC is more objectively in the assessment of this risk by comparing weather measurement of one month to ten years records. While FIDIC is more subjectively by restricting an extension of time for only exceptionally adverse weather, it leaves the matter to the parties to decide what constitutes exceptional weather. Also, NEC entitles the contractor for time and cost compensation for this type of risk while FIDIC gives only time.

The last advantage of NEC is the inclusion of BIM through option X10 of the NEC4, while FIDIC still did not address the use of its form for BIM-enabled projects. However, it did provide a special Advisory Note within the Special Provisions which deals with the BIM.

As for the rest of the comparative items, like the role of engineer/PM, design responsibility, exceptional/prevention events, dispute resolution, supply chain management, these items have made no difference in the evaluation. Both contracts have their procedures in dealing with these provisions.

For the fourth objective, Al-Raha Beach development project is a practical example of the competent performance of NEC contract outside the UK, especially where the project was developed within the Middle East in UAE. For a large, complicated project with a significant massive budget of £10.3 billion, NEC contract was chosen for managing the project. The project stakeholders have chosen NEC contract because of their trust that the contract provides a high degree of fairness to all parties. As a result, the main elements of the project were completed in the first three years of the project, knowing that the project duration was set for six years.

As for the last objective, four reasons were identified for the limited usage of NEC in the Middle East. The first is limiting the choices of MDBs for choosing a standard form of contract to FIDIC. The second is the need for more time so that NEC can be widely used. The third is the routine consideration of employers and lack of desire for change. Finally, the lack of awareness of practitioners in the Middle East about NEC.

In summary, it seems that the research Hypothesis appears to be true. Both NEC contract and FIDIC conditions have commendable features and could be used anywhere. However, NEC would lead to more reducing in disputes because of its greater emphasis on risk management. Also, it is fair to say that the amendments in FIDIC 2017 are very welcome, and in fact, it can be considered as another challenge facing the expansion of NEC in the Middle East.

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