Contractors' Perspectives on Delays in Healthcare Projects: A Tale of Two Contrasting Provisions

Niraj Thurairajah, Ph.D., Associate Professor, Northumbria University, Newcastle-upon-Tyne, NE1 8ST, UK.

Akila Rathnasinghe, Doctoral Student, Northumbria University, Newcastle-upon-Tyne, NE1 8ST, UK. (Corresponding author). Email: akila.rathnasinghe@northumbria.ac.uk

Charlie Roberts, Northumbria University, Newcastle-upon-Tyne, NE1 8ST, UK.

Brodie McAdam, FCIArb., Interim Deputy Dean, University of Salford, Salford, Greater Manchester, M5 4WT, UK.

Allan Abwunza, Ph.D., Assistant Professor, Northumbria University, Newcastle-upon-Tyne, NE1 8ST, UK.

Abstract:

Many construction projects are delayed due to a range of factors, including the unique spatial and environmental context of every construction site, the challenges of maintaining quality, and the timing of decision making around design. In consequence, construction contracts include mechanisms to accommodate delay while maintaining enforceability. Different standard forms of contract (SFC) adopt different approaches to managing delay and lack consistency in accommodating delays of the same nature. This study selects two SFCs commonly used in UK construction projects, New Engineering Contract (NEC) and Joint Contracts Tribunal (JCT) suites, and proposes a common approach to managing delays, focusing particularly on the handling of the compensation event (CE) and Relevant Event (RE) mechanisms in those respective contracts. Using a qualitative methodology, a multi-case study analysis was conducted comprising four general contractors utilizing JCT and NEC SFCs. The case studies enabled the analytic comparison of delay-caused challenges as between different projects delivered using different SFCs. The findings reveal that while on JCT-based projects general contractors have typically suffered cash flow and programming issues caused by employer failures to adhere to contractual timescales for

assessing requests for extensions of time, on NEC-based projects general contractors have suffered CE-related issues associated with programming and administration. Further findings were that the common challenges of both CE and RE management processes were high volume, assessment and timescales of claims, as well as timing and collaboration. Developing from these findings, recommendations are made for additional clauses to be added to SFCs to achieve a consistent approach towards construction delays.

Practical Applications: By examining delay management under two widely used standard forms of contract in the UK—the New Engineering Contract (NEC) and the Joint Contract Tribunal (JCT) suites —this research not only identifies specific implementation challenges inherent in these contracts but also offers recommendations on how to address such challenges. Contractors using JCT contracts often face cash flow and scheduling issues due to employer delays in assessing extension of time requests, while those using NEC contracts encounter complexities with compensation events. To address these issues, the study proposes incorporation of additional clauses in contracts to standardize delay management, which can significantly enhance project outcomes. Furthermore, the research underscores the importance of collaborative contract management practices, particularly in NEC contracts, to mitigate delay-related challenges and promote timely project completion. These findings are crucial for industry professionals seeking to improve project efficiency, minimize disputes, and achieve successful project delivery. By adopting the recommended strategies, practitioners can enhance their approach to managing delays, ensuring smoother and more predictable project execution in the healthcare construction sector. The Institution of Civil Engineers and the Joint Contracts Tribunal, both responsible for publishing these contracts, and other institutions with similar provisions are also likely to find these recommendations useful when revising their contract documents.

Keywords: Compensation Events (CE), Contractors, Construction Industry, Extension of Time (EoT), Healthcare Projects, Standard forms of Contract (SFC).

Introduction

A time delay in construction projects has been simply viewed as the act of not completing the specific work item(s) or the whole project by the deadline set out in the initial contract (Alhyari and Al Ani, 2022; Kowalczyk *et al.*, 2018). Though industry stakeholders try their best to avoid delay, delays are common in most construction projects due to the uncertainty surrounding project implementation, hence the need for flexibility in contracts afforded by extension of time provisions (Farrell and Sunindijo, 2022; Burr, 2016). Nowadays, most construction projects are let using contracts based on one or other of a relatively small "pool" of Standard Forms of Contracts (SFCs), which varies geographically and jurisdictionally, but which help to set a common basis upon which projects can be implemented. Though all SFCs include mechanisms to meet common challenges of construction projects such as delay, each SFC has a unique way of dealing with delays. SFC delay and extension of time clauses typically provide ways to manage the cost and time consequences of complex and sometimes inter-related delaying circumstances. Keane and Caletka (2015) classify construction delays into four categories: excusable, non-excusable, compensable, and non-compensable, thus establishing a framework for analyzing how contracts may allocate delay risk events to the contractor and the employer. This framework for codifying the type of delay occurrence is a manifestation of the different ways in which delays can occur in construction projects, causing significant problems for both the employer and the contractor.

What makes delays problematic is not so much how to eliminate them but rather how to identify them early, and assess their nature and impact accurately (Keane & Caletka, 2015), particularly during the construction period. Because of this, many SFCs contain clauses which enable the originally agreed time for project completion to be extended in certain circumstances (Extension of Time clauses, EOT), thus allowing for schedule flexibility whilst also maintaining some control over the calculation and allocation of the financial impact of delay. For example, where a project runs late for reasons which are not contractually the responsibility of the contractor (i.e. excusable delays) EOTs clauses in SFCs will typically protect the contractor from liability for liquidated damages (Burr, 2016).

Unless properly dealt with, delays have the potential to cause disputes in construction projects (Satish *et al.,* 2020). Keane and Caletka (2015) highlighted the need to seek any remedies at the earliest opportunity to prevent such disputes. Though early remedies for delays have been proposed, in reality, contractors are confronted with difficulties in identifying the most suitable resolution mechanisms. Consequently, SFCs have standardized approaches for predetermined delay scenarios. For example, the Joint Contracts Tribunal (JCT) suite of contracts provides a retrospective approach to delays while considering the "time" dimension, whereas the New Engineering Contracts (NEC) suite deals with time and cost impacts as they arise, promoting a prospective approach. The JCT suite of contracts, which has been very widely used in the UK construction industry, now faces stiff competition as many Employers, including government departments and funding agencies, push for the adoption of the NEC alternatives (Besaiso, et al 2018). Yet sections of the construction industry, which is largely characterized by its adversarial nature, continue to resist the adoption of the NEC suite which promotes collaborative approaches to contract administration (Lau *et al*, 2019). Although studies have been undertaken to compare various provisions in standard forms of contracts (e.g., Besaiso *et al,* 2018; Burr *et al*, 2021; Lane and Pickavance 2015), to the best of authors' knowledge there has been no research published detailing a comparative analysis of the delay mechanisms in the JCT and NEC SFCs situated in an empirical case study context. Delays matter because they have not only been identified as leading causes of cost overruns and claims but they also lead to unnecessary construction disputes (Satish et al, 2020), thereby affecting project viability and business relationships. A comparative analysis of delay provisions would not only lead to better informed decisions on which SFC provides better protection mechanisms but may also suggest areas requiring improvement to inform revisions to the SFCs. Hence, this study identified the delay mechanisms in JCT and NEC as worthy of investigation in determining the challenges for implementation and thereby providing recommendations for the development of the investigated SFCs.

Rationalization of Delay Events

This section aims to establish the different ways in which NEC and JCT standard forms treat delay in construction projects, namely, the compensation event (CE) in NEC and REs in JCT. Following a critical literature synthesis on delay events and their similarities and differences, general challenges for contractors identified by the scholars were acknowledged to establish any gaps and criticisms within the current literature in order to establish what needs to be addressed by this study.

Explanation of Compensation Events and Relevant Events

Although NEC does not provide an explicit definition for CE, the works of Robinson (2012) and Thomas *et al.* (2012) were found to reflect the contextual background for CE. Robinson (2012) acknowledged the potential of the CE mechanism in the NEC to manage all contractual claims within the limits of time and money. In furtherance to this, Thomas *et al.* (2012) described CE as a delay causing event which also triggers the reassessment of prices and the completion dates of milestone tasks. Meanwhile, NEC contracts promote the ethos of collaborative working to achieve NEC's main objectives: greater flexibility, clarity, and simplicity, and to stimulate good management (Broome, 2012; Wilmot-Smith, 2014). Consequently, the NEC clause related to CE embodies the principles behind the contract as the need to deal with CE through a prospective approach (Robinson, 2012), thus promoting timely management of the impact of delay. In light of this, Forward (2018) looked at the CE in NEC as the "magnum opus" of core clauses, highlighting CE's criticality for NEC's successful implementation. However, whilst CE-related clauses may be viewed as vital for the success of NEC contracts, they are not without problems. Eggleston (2006) highlighted the complexities that arise related to this clause in real-life contexts. This is evident in the transition from NEC3 to NEC4, where adaptability in the latter version requires parties to include additional CEs in the Contract Data, increasing the possibility of transferring more risks to the Employer (Forward, 2018). NEC3 and NEC4 refer to the third and fourth editions of the suite of NEC suite of contracts released by the Institution of Civil Engineers (ICE) in 2005 and 2017, respectively.

On the other hand, JCT is an affiliation of a construction professional group that operates as a forum to determine the clauses of standard building contracts (Hughes, Champion, & Murdoch, 2015). Notably, within JCT contracts, RE clauses are utilized to facilitate the modification of project completion dates following the incidence of REs (Wilmot-Smith 2014). The Society of Construction Law (2017) acknowledged the JCT's approach to REs as benefiting both the contractor and employer by, on the one hand relieving the contractor from liability for damages in cases of excusable delay and on the other protecting the employer against time becoming "at large", which significantly complicates loss recovery. The JCT makes no reference to a delay notice of an event being a condition precedent for a contractor's entitlement to an extension of time (Knowles, 2012) which means that contractors only need to notify when the delay becomes "reasonably apparent" (Birkby, Ponte, & Alderson, 2008) and valid extension of time claims are routinely made long after the RE occurs.

The Context of Delay Mechanisms in UK Healthcare Projects

Government is a major player in construction procurement and different areas of activity are associated with different SFC adoption. An explanatory instance is the ProCure21+ government framework, initiated by the UK Department of Health. This framework operates as a refined procurement mechanism uniquely designed for the procurement of healthcare construction capital projects within the National Health Service (NHS) and related healthcare entities. Notably, the ProCure21+ framework strategically employs the NEC contract suite, as indicated by the Department of Health (n.d.). Alongside, the other healthcare projects have been funded via private investment funding using the PFI mechanism (Eadie, Millar, & Grant, 2013), and these projects have tended to use JCT contracts (Hickman, 2000). These two alternative approaches to construction procurement of buildings in the same sector, health, provide an opportunity to examine whether there are differences in outcome or process around management of construction delays in the two different project types, one, ProCure 21+ using NEC contracts, and the other, PFI projects, using JCT contracts. This study seeks views from industry participants on whether and how the government's selection of NEC as the preferred SFC has affected delay-

resolving mechanisms in Procure 21+ projects as compared with the use of JCT in PFI procured healthcare projects.

The extra time and amounts claimed through REs and CEs can put healthcare projects under strain, considering the impact on completion dates and initial contract sums. Also, there is no consensus on how to deal with CEs and REs, and while there are contractual mechanisms to evaluate these events, their outcomes may differ depending on the employer. Such inconsistency may cause problems for all parties, particularly contractors, who need to adapt their approach depending on the outcome of CEs and REs. This study, therefore, focuses on the problems that delays and their mechanisms in the two main SFCs (NEC and JCT) can cause to the construction project and its stakeholders, and it aims to view them from the general contractor's viewpoint to gain a deeper understanding of the common issues and the ways those can be addressed.

The Procedural Aspects of Compensation Events and Relevant Events

The Procedure of Compensation Events

The NEC's approach to events as they occur suggests a prospective approach in the CE process (Burr, 2016; Robinson, 2012), supporting the view that CEs should be pre-assessed to give the employer real-time knowledge of prices and dates, and also to give the contractor the confidence and motivation to beat the quote since there will be no review (Broome, 2012). The procedure laid down in Clause 61.3 requires the contractor to notify the employer of the event within 8 weeks of its occurrence (Knowles, 2012). Then, under Clauses 61.1 and 61.2, the employer must notify the contractor of the decision or instruction (Eggleston, 2006). Overall, the time frame for the whole process is five weeks, consisting of 3 weeks for the contractor to quote and two weeks for the employer to accept.

Broome (2012) explains that for the efficient agreement of CEs, the following information is needed: a sufficiently detailed, up-to-date program as a basis for the CE to be assessed, an effective early warning system, a capable quantity surveyor (QS) to understand the program and the contractual terms, and a collaborative attitude. The extent to which the completion date is delayed is assessed against the planned completion date, and upon acceptance, the CE cannot be

reassessed even if incorrect, in which case both the employer and contractor must accept the risk (Robinson, 2012). The only way CEs can be reassessed under Clause 63.4 is if, at the time of the event, there was insufficient information, so the quotation had to be based on assumptions, and these assumptions were incorrect (Robinson, 2012; Wilmot-Smith, 2014). The CE process was acknowledged by Forward (2018) as giving the ability to link the time and financial dimensions of a particular event and thereby correlate with contract documents to have a running final account and a predicted completion date.

The Procedure of Relevant Events

The approach of JCT regarding REs is retrospective, as the claim assessment is carried out after the event has physically occurred (Burr, 2016). This approach places a duty on the contractor to notify the contract administrator (CA) of a RE when it becomes reasonably apparent that progress is likely to be affected (Chappell, 2017). Accordingly, Brawn (2012) described the three-stage process under JCT for delay event occurrences: (1) assessing whether the delay was caused by a RE, (2) determining whether it has caused a critical delay, and (3) granting a fair and reasonable additional time. However, before the additional time is granted, the contractor is obliged to prove a link between the RE(s) and the period of delay (for each event if it is a series of events) (Ndekugri and Rycroft, 2009). In addition, while additional time is claimed, Clause 2.28.6 requires the contractor to use their best endeavors in mitigating any potential delays resulting from the claimed event (and for each event if it is a series) (Birkby, Ponte, & Alderson, 2008). Once the information has been provided and assessed, additional time should be granted with a new completion date, discouraging the "wait and see" approach (Society of Construction Law, 2017). In addition, Chappell (2017) highlighted the 12-week time frame for the employer to assess and grant additional time upon the consideration of the occurrence of the event(s) and what is the likely delay to cause (for each event if there is a series of events).

Challenges in the CE and Relevant Event Procedures

Timing/Volume of Variations or Events

Many studies have revealed how difficult it is for contractors to manage the time and cost variations imposed by delay events and how SFCs' CE and RE mechanisms relate to them. Accordingly, Farrell and Sunindijo (2020) states that in complex larger projects, the number of CEs can mount up to become an onerous task for the contractor. Because having such a high number of CEs might require a professional to be fully committed to the identification, assessment, and documentation of respective claims on time (Yeung *et al.*, 2022), having an increased number of events may also make it difficult for the contractor to meet the contractual timescales (Brewer, 2007). Beezant (2012) recognized the suitability of NEC for projects that may have a modest number of CEs, thus it would be almost impossible or impractical for the contractor to administer the CE system in a larger or more complex project environment. Yet the provision for additional CEs to be included in the Contract Data under the NEC4 escalates the problem of dealing with an even higher number of CEs (Rowlinson, 2018). Despite the CE process being relatively simple, a high number of CEs can make it difficult to manage at once, which may lead the contractors and employers to abandon the procedure to sort out such issues upon completion of the project (Yeung *et al.*, 2022; Hklegal.co.uk., 2014). However, such a practice is not what the NEC primarily supports, as it proposes a prospective approach to delay events.

Assessment of Relevant Events and CE

As stated previously, the challenge of a delay event is not just its existence but also the complexity of determining the time and money impact of the event for the contractor and employer. Accordingly, Gibson (2008) recognized the significance of the assessment process for REs and CE as the most likely place for disputes between the contractor and employer. Eggleston (2006) reinforced the CA's or Project Manager's (PM's) power to assess the events if they perceive an inaccuracy in the contractor's initial claim. However, such an assessment can be the first cause of disagreements with the contractor if the contractor believes the assessed amount does not cover their costs or time for the events, eventually escalating into a dispute and causing further delays. To

avoid such issues, Furst et al. (2016) recommended the need for the PM or CA to perform the assessment with a fair and reasonable judgement of the events and use a logical or methodological analysis of the effect of the RE on completion. This is evident in Clause 2.28.1 of the JCT 2016 Standard Building Contract with Quantities (JCT 2016 SBC/Q), although the NEC4 Engineering and Construction Contract (NEC4 ECC) does not contain a similar requirement. However, Gibson (2008) cautioned employers to be mindful of the contractors' common practice of evaluating each event using a "best guess" approach rather than a more analytical technique that involves the examination of the programs and the critical path, making it almost impossible for their claims to attain 100% accuracy.

Assessment of Concurrent Delays

Concurrent delays are instances where two or more events/processes occur simultaneously and delay the construction process. In the relevant literature for there to be a "concurrent delay" it is necessary for at least one of the delaying events/processes to be a contractor risk and at least one an employer/shared risk. The concurrent aspect of these events/processes may make it difficult to form a judgement of by how much the contractual completion date should be extended by operation of the extension of time process since the contractual completion date should only be extended for employer/shared risk reasons (a RE or CE in the context of JCT and NEC respectively)(Brawn, 2012; Wilmot-Smith, 2014; Ndekugri and Rycroft, 2009). With such complexity, Ndekugri and Rycroft (2009) have summarised the legal analysis approaches potentially available for assessing concurrent delays, as outlined in Table 1.

Table 1. Strategies for the assessment of the concurrent delays

Assessment Strategies	***Description***
First line approach	This approach assumes the liability of the first event to occur among two or many events for causing the whole delay. This could imply that if the initial occurrence is deemed significant, additional time will be granted regardless of whether the contractor caused the delay through their own actions. Alternatively, it could imply that no additional time will be granted if the contractor is at fault for the initial occurrence, even if the employer's activities make the delay severe.

The 'but for' approach	The delay is considered the fault of the contractor if it would not have occurred but for the occurrence of an event for which the contractor is responsible.
The dominant cause approach	Whichever cause of delay is the dominant one, is treated as the cause of the delay. This strategy is supported by Furst *et al.* (2016), identifying the contractor's entitlement to an additional time when the delay is brought on by an occurrence covered by the REs clause with equal causation to all other causes of delay.
The apportionment approach	This approach attempts to distribute delay among various contributing factors and has been questioned in courts of law as to whether this is the correct approach. There are arguments that JCT could support this approach, stating that the contractor must provide estimates of delay for each delaying event, albeit whether this is correct may depend on the applicable jurisdictional law. Also, the employer must state the time extensions associated with each delay upon granting the additional time.
The Malmaison approach	This approach stems from *Henry Boot Construction (UK) Ltd v. Malmaison Hotel (Manchester) Ltd*, where the judge stated: "It is agreed that if there are two concurrent causes of delay, one of which is a relevant event and the other is not, then the contractor is entitled to an extension of time for the period of delay caused by the relevant event, notwithstanding the concurrent effect of the other event." This approach is supported by the Society of Construction Law Delay and Disruption Protocol (2017).

Source: Authors' own creation based on (Ndekugri and Rycroft, 2009).

More recently, the various approaches have been summarised by Furst *et al.* (2022) as indicated below, and this formulation has received judicial approval in *Thomas Barnes & Sons plc v Blackburn with Darwen Borough Council*:

> In respect of claims under the contract:
>
> (i) depending upon the precise wording of the contract a contractor is probably entitled to an extension of time if the event relied upon was an effective cause of delay even if there was another concurrent cause of the same delay in respect of which the contractor was contractually responsible; (para 118) and
>
> (ii) depending upon the precise wording of the contract a contractor is only entitled to recover loss and expense where it satisfies the "but for" test. Thus, even if the event relied upon was the dominant cause of the loss, the contractor will fail if there was another cause of that loss for which the contractor was contractually responsible." (at 9-105)

Although there are various strategies for the assessment of concurrent delays, Knowles (2012) identified the real challenge behind concurrent delays as the fact that there is no exact rule

concerning which delay takes precedence and that there is inconsistency within the case law. While all methods have some support, the difficulty is that each case must be assessed individually, with the only common aspect being the need for the employer to act in a fair and reasonable manner in making delay assessments. Therefore, concurrent delays were found to be causing uncertainty for the contractor, as the approaches can differ from one project to another.

Overall, the literature review on both SFCs reveals issues with assessment, volume, and concurrent factors, laying the groundwork for further investigation in this study. Further, the control within the delay mechanisms in both SFCs is found to be more vested in the employer, leaving the general contractor exposed to being dependent on the employer. Although both SFCs are widely used in the construction industry, a consistent agreement among industry or academia on how to analyze delays was not found, with the management of the impact of delays potentially being subject to the judgement of the employer's representatives.

Research Methodology

Using a qualitative case study approach based on the exploratory aspect of the research problem, this study explored how the delay mechanisms in JCT and NEC SFCs facilitate or exacerbate challenges to contractors in healthcare projects. Yin (2014) recognized the value of employing case studies to investigate research questions that begin with "how" and "why," as well as in examining a contemporary issue in its actual setting where the researcher has no control over participants' behavioral actions in the concluded projects. Case studies are most suited for offering local (i.e., accurate and realistic) interpretations of a phenomenon, which the researcher then frames inside a theoretical framework to provide the means for extending or advancing the current theory, according to Harrison and Corley (2011, p. 19). A case study approach was deemed appropriate as a result, as it would give a thorough grasp of the key issues and a broad awareness of associated issues (Knight & Ruddock, 2008). The case study approach provided for an in-depth study into the concept of delays in its real-world context, as it manifests in projects executed under the two SFCs (Yin, 2014).

Embedded Multiple Case Study Design

In terms of the adopted case study design, this study followed the embedded multiple case study design (Fig 1.) identified by Yin (2014).

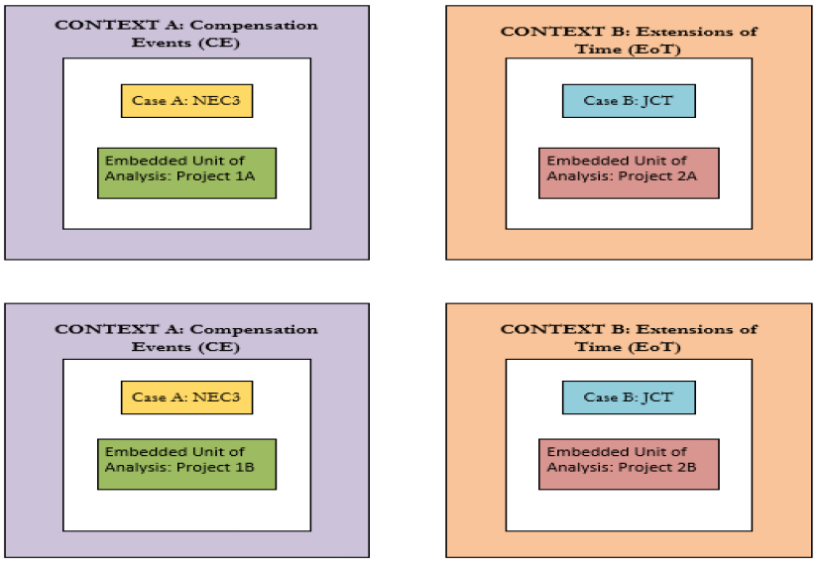

Fig 1. Adopted multiple-case study design (Source: Authors' own creation based on Yin (2014))

The above design parameters were determined to systematically form the basis of the investigation. To study the challenges general contractors are experiencing with CEs, two healthcare projects utilizing NEC3 were chosen, whereas the challenges posed to general contractors by REs under JCT 2016 (SBC/Q), were explored in two other healthcare projects. Adopting two cases for each SFC facilitated the process of literal replication within the cases and theoretical replication of the findings across the two SFCs (Yin, 2014).

Background of the Case Studies and Study Participants

According to Yin (2014), deploying multiple cases yields better findings, and the criteria for choosing a case study depends on practicality, judgement, time restrictions, and financial constraints. The purposive selection method (Maxwell, 2013) was employed to provide the competitive advantage of strategic case selection (Patton and Appelbaum 2003). Such purposive selection targeted cases that the research team could "establish the most productive relationships" with (Maxwell, 2013, p. 99) to compare the delay provisions in the two SFCs. Accordingly, four exemplifying projects consisting of NHS programs and private healthcare projects ranging in value from £3.5 million to £78.0 million were selected. The general contractors in all the selected

projects experienced problems because of the delay mechanisms of the respective SFCs used. Table 2 summarizes characteristics of the case studies and profiles of the participants, and a document survey under each case study for data collection. Each participant was coded serially from P1 to P9 while each document was coded based on the project from which it was obtained (as shown in brackets) in a manner that would make it easy to link the participant and document back to each project and the SFC used.

Table 2: Characteristics of the cases, profiles of the Participants and collected documents.

	Project Code	***Used SFC***	***Contract sum***	***Roles of Participant and Participant Codes***	***Documents collected and Document Codes***
Case Study A -NEC3	Project 1 **(1-NEC)**	NEC 3	£78.0 m	Participant 1: Senior QS **(1-NEC-P1)** Participant 5: Contracts Managing Surveyor **(1-NEC-P5)**	CE Tracker (1-NEC-D1) Communication of CE's impact on completion date (1-NEC-D2)
	Project 2 **(2-NEC)**	NEC 3	£9.5 m	Participant 3: QS **(2-NEC-P3)** Participant 6: Associate Director **(2-NEC-P6)**	Rev 09 program (2-NEC-D1) Rev 20 program (2-NEC-D2) Email with CE information (2-NEC-D3)
Case Study B- JCT 2016 (SBC\Q)	Project 3 **(3-JCT)**	JCT 2016 (SBC/Q)	£12.0 m	Participant 4: Senior QS **(3-JCT-P4)** Participant 2: Associate Director **(3-JCT-P2)** Participant 9: QS **(3-JCT-P9)**	Executive delay program (3-JCT-D1) Executive summary of delays (3-JCT-D2) Delay communications 1, 1a & 1b (3-JCT-D3) Contractors pour sequence (3-JCT-D4)
	Project 4 **(4-JCT)**	JCT 2016 (SBC/Q)	£3.5 m	Participant 7: Associate Director **(4-JCT-P7)** Participant 8: Senior QS **(4-JCT-P8)**	

Data Collection

In terms of data collection, semi-structured interviews provided an opportunity to simplify complex perspectives and make the questions as well as responses properly understood through repetition and rephrasing (Sekaran, 2016). As the acceptable sample size in qualitative research, Hennink and Kaiser (2022) recommended 9–17 interviews. Accordingly, in this study, nine top-, and middle-management level professionals who were directly involved in delay event identification, evaluation, assessment, and documentation aspects, were interviewed. In addition to semi-structured interviews, a document survey was integrated with each case study to complement interview data and add further contextual details to the delay events in the respective case studies. Both methods were adopted to collect data from multiple sources to achieve multiple lines of convergence, in line with good practices of case study research (Yin, 2014). Documents provided access to archival data for verifying information obtained from the interview participants, which enhanced reliability (Miles et al., 2014).

Data Analysis

Content analysis was deployed to analyze the qualitative data collected. The content analysis helped to identify the critical areas within the delay processes of JCT and NEC that require further improvement. Accordingly, a three-stage approach like that used by Rathnasinghe *et al.* (2022) was adopted, in which firstly, key themes were identified in transcribed transcripts using open coding, then classified using axial coding, and finally supported by statements from the transcripts using a selective coding process. In addition, the analysis of the data was implemented in the form of cross-comparisons among the case studies, initially within the same contexts, to identify the themes through thematic analysis. This was followed by a cross-case synthesis of the contexts to show recurrent themes (Yin, 2014). Cross-case synthesis helped to identify and analyze similarities, differences, and patterns across cases (Goodrick, 2014). The purpose of the comparative case study was to provide an understanding of the implications of the problems facing the general contractors regarding the CEs and REs in healthcare projects. Finally, such analysis helped to establish

similarities and differences between SFCs and consequently enabled the development of propositions.

Research Findings

As previously mentioned, the authors assigned codes to the projects and the individuals interviewed to facilitate the identification of the selected Standard Form of Contract (SFC). This coding system aimed to enhance the clarity and readability during the analysis of findings in this section. Consequently, the initial two case studies (1-NEC and 2-NEC) have implemented the NEC as their chosen SFC, while the latter two case studies (3-JCT and 4-JCT) have opted for the JCT. Moreover, participants within each case study were assigned extended codes to above project codes, such as participant 2 from an NEC-deployed case study- 1 being identified as 1-NEC-**P2**.

Volume and Concurrency

It was striking that the research identified that in respect of each of the NEC and JCT projects analyzed, there was one aspect of contract management which stood out as being particularly challenging, but that there was a difference between the NEC and JCT groups as to what that was. For NEC contracts, the key problem appeared to be the volume of CE (i.e., the number of CEs), whereas for JCT contracts the key problem was managing concurrent/multiple delaying factors via the EOT process. Though volume and concurrency are not necessarily identical, their consequences were found to be similar in the two SFCs. For this reason, delay events were compared around these themes. Both the volume of delay events and the challenges of dealing with concurrency of delays/multiple causes have a direct influence over the workload of contractors. Findings of this research suggest that both volume and concurrency of delay events are biggest issues for contractors undertaking projects based on both SFCs.

The two participants (i.e., 1-NEC-P1 and 1-NEC-P5) from 1-NEC project highlighted 571 instances of CEs in their project as "*death by a thousand cuts*," stating the volume of CEs was the biggest issue they faced during the project's progression. In one instance, the general contractor had to send a notification document (1-NEC-D2) to the project manager (PM) stating that the assessment for these CEs could only be finalized after project completion. This was due to the

high volume of CEs received so close to the take-over date. Similarly, the data collected from Project 2-NEC showed that there were 95 instances of CEs by the time the project was 83% complete. Consequently, the CEs led to an eight percent increase in the gross maximum price of the project. The volume of CEs also caused the initial program duration of Project 2-NEC to be extended from two months, with the participant 2-NEC-P3 stating that CEs had created a "*big intensity*" to their workload. According to the participant 2-NEC-P6, the high volume of CEs in Project 2-NEC meant that "*most CEs are concerned with minor work items and thus difficult to administer because suddenly, you've got a lot of different things happening at the same time, which is what's causing the program delay*."

The volume of CEs also caused difficulties for the general contractor on Project 2-NEC, who encountered multiple and extensive changes triggering significant cost and time overruns, which were not only difficult to manage but also time-consuming to resolve. The number of changes and the time taken to resolve them had an impact on the general contractor's cash flow, affecting profitability.

On the other hand, there were concerns about concurrent delay events in Project 2A because the general contractor had submitted six claims at once, some of which were clear-cut in their favor, yet others were not. The issue was that, to convey to the employer the delay caused by each alleged RE as required by JCT, the contractor had to look for a way to segregate the impact of each event on the overall schedule. This increased the amount of work required by the general contractor, who had to guarantee that the arguments made were clear and, if there were several arguments, that there was a timeline showing how the arguments interacted with one another.

Assessment

Timescales for Assessment

On both the JCT and NEC contracts, there were issues with CAs and PMs not adhering to contract deadlines. In three out of four cases, contractors considered they had adhered to deadlines requiring notification of delay events from their end; however, CAs and PMs were found to frequently take longer than the period allowed under the contract to accept or reject the

contractor's claim or estimate. The assessment of orders by CAs and PMs in all four projects exhibited a substantial time frame, averaging between 14 to 20 weeks (i.e., in Project 1A, the assessment duration was 16 weeks, in Project 1-NEC it was 13 weeks, in Project 3-JCT it was 17 weeks, and in Project 4-JCT it was 20 weeks).

Participant 1-NEC-P5 stated that "*in 50% of cases where timescales were not followed, something was wrong with that order*," attributable to the lack of clarity from the contractor's perspective between CEs that had been instructed by the PM and CEs that only required a quotation. Such ambiguity made it difficult for the general contractor to update their program accurately, leaving them at risk of not becoming aware of the impact of the claimed CEs until later in the project. Participant 2-NEC-P3 added, "*It depends if it's a sensitive quote, because in such cases, they are going to spend more time on it*," which led to a lack of clarity on what the employer required.

The general contractors' most serious issue in terms of REs was the CA's failure to adhere to the 12-week timeframes specified in the JCT contracts. Both projects 3-JCT and 4-JCT experienced a 'wait-and-see' approach in terms of the PM assessing claims, meaning that the 12-week deadlines were not met by the PM. For instance, participant 3-JCT-P4 argued that "*the 12-week timescales do not have a lot of teeth*, *so there is no mention that it is automatically accepted or rejected if you miss your 12 weeks or do not get awarded in 12 weeks*." Participants 3-JCT-P4 and 4-JCT-P8 stated that it is in the PMs' best interest to wait and see how the work progresses, as this may allow the PM to go back to the general contractor arguing that the projects were no longer behind schedule and therefore did not require additional time. The participants from Project 3-JCT also raised the question of uncertainty surrounding the start of the 12-week period. They cited an instance in which the contractor would submit its claim and then, six weeks later, the CA would request additional information. In this situation, it was unclear for most contractors whether such a delay would extend the 12-week period.

Participant 4 (3-JCT-P4) from Project 3-JCT added that the CA's ability to reassess REs is a contributing factor to the wait-and-see approach, as the CA can go back and grant additional time if the general contractor has in fact encountered a delay. The issue led to a period of uncertainty as to how the general contractor should proceed with the works. Additionally, it was

discovered that Project 4-JCT's general contractor experienced profitability and cash flow issues because of the time taken to resolve RE claims.

Assessment Techniques

Participants in Projects 2-NEC and 3-JCT revealed that their CE/REs were assessed analytically. However, assessments in Project 4-JCT were made on a "best guess" basis. Meanwhile, the data collected on the assessment of CEs showed that the basis of the analysis of quotes was a mix of analytical and "best guess" on Project 1-NEC.

Content analysis of documents revealed that the analytical approach to assessing REs in Project 3-JCT was due to the level of detail the general contractor was required to and did provide when submitting the claim to the contract administrator. Participant 3-JCT-P9 explained that to substantiate the EOT claim, a step-by-step process showing output per worker, fixing times (i.e., for installing building components/ fixtures), and hook times (i.e., lifting and hoisting of components/ materials using cranes) was provided to the CA, who then made an analytical assessment. Additionally, an executive summary outlining the delay event and its potential impact on the overall construction schedule had also been submitted. However, participant 4-JCT-P7 noted that "*it's viable, but most of the time, the employer representatives do not have the analytical skills to undertake a comprehensive review.*"

Participant 1-NEC-P5 expressed the possibility of "*employer's representatives taking advantage of the fact that the contractor is entitled to some preliminary work and contingency within your pricing of your preliminary work, and quite often the employer will knock that out*." This would leave the contractor with no option other than going for adjudication, which is not practical with every change the employer makes to a CE. On Project 1B, however, all participants acknowledged the thorough and analytical nature of the PM's assessments, while having no experience with PM changing their quote based on a guess.

Timing

The timing of claims for CEs and REs was identified by participants as a major issue. Accordingly, in NEC projects, the primary issue the general contractors encountered was that the PM did not

fully understand the implications of the CEs, whereas, in JCT projects, programming and sequencing issues of work were caused by the timing of the REs.

Considering Project 2-NEC, for example, the timing of CEs caused problems for the general contractor because initially simple CEs were introduced late, making them more complex to administer. For example, participant 2-NEC-P3 presented an instance where the employer needed more pattress boxes (i.e., conduit or socket boxes) in rooms, and by this time these rooms had already been completed. Therefore, the CE included costs for additional pattress boxes, reinstating the surfaces, and finishing, as well as a remobilization cost for the partition subcontractors. Such extra costs could have been avoided if these demands had been made prior to the completion of units. It is worth noting, of course, that this type of late design change is a routine feature of construction projects, regardless of the terms on which the parties are contracting. In addition, participant 1-NEC-P1 stated that "*when a CE is issued under Clause 61.1, the employer's party expects it to happen instantly, and what they do not understand is that there is a procurement process that takes place, a clarification process in terms of work information, and a leading period for the subcontractors and products.*" As a result, participant 1-NEC-P1 emphasized the importance of PMs appreciating the efficient impact that CE may have at an appropriate time rather than at a later stage.

The fact that Clause 2.28.6 of the JCT contract requires the contractor to use its best endeavors to mitigate delays also caused problems for the contractor in Project 3-JCT, considering the timing of the claim submission for the REs. Accordingly, the contractor was forced to begin work to mitigate additional delays without knowing whether the CA would grant the initial request for additional time. Meanwhile, the CA could look back and determine faults in what the general contractor had done, the same issue arose for the general contractor on Project 4-JCT. As a result, the contractor reported being forced to work out of sequence to mitigate the delay. Whilst this decision by the contractor appears to be a rational response to the way that the JCT allocates risk in such circumstances, it needs to be kept in mind that the only perspective which is being examined in this study is that of the contractor.

Collaboration

Within the NEC projects, participants affirmed that collaboration was evident between the general contractors and employers. Participant 2-NEC-P3 stated, "*NEC is all about collaborative working, team working, like early visibility and keeping your employer informed, and I do think it does encourage being more aware of maintaining relationships.*" Participant 1-NEC-P5 also explained that NEC promotes collaboration in the way it pushes parties together to work through CE issues. The need to be collaborative was more evident in Project 1-NEC, where 467 of the 571 CEs were caused by the employer. In contrast, collaborative working was not visible in JCT projects. For example, as participant 3-JCT-P4 stated, "*With this job being traditional, it was much of us and them, so there's no collaboration.*" Participant 3-JCT-P4 further explained that the JCT contract does not have clauses to encourage people to work together the same way NEC does and that JCT is a "*more aggressive form of contract.*" Additionally, in the two JCT projects, the employer hired the architect, placing the risk squarely on the employer's shoulders and hindering collaboration by fostering a more adversarial mentality. These findings underline how the collaborative or non-collaborative drafting of SFCs has, in these projects, set the tone for the nature of project relations.

Discussion of Research Findings

The empirical findings revealed the following challenges which need to be addressed to achieve overall stability and hence enhance the sector.

Volume and Concurrent Delays

The most significant issue that general contractors faced in NEC projects is the volume of CEs. The issues arising from the volume of CEs were mostly related to administration difficulties and programming problems. Eggleston (2006) viewed the volume of CEs in terms of the inability to update the construction program promptly, noting that CEs should be rare events. However, case studies affirmed that CEs are not rare events, and this may be due to the CE clause within the NEC being designed in such a way that changes can be readily implemented. This research finding also supports Brewer (2007) who argued that the impact of the number of CEs may not become apparent until later in the program. This was seen as a challenge because NEC requires

the contractor to identify all CEs prospectively and determine their impact on the intended completion date.

Concurrent/multiple cause delays, like the volume of CEs, were the most significant problem for contractors in JCT projects. Data from JCT-implemented projects revealed that general contractors struggled to analyze concurrent/multiple cause delays, particularly in evaluating the individual impact of each delay event. Similarly, Brawn (2012) recognized the difficulty in evaluating concurrent delays. In addition, the lack of a precise process for analyzing concurrent delays adds to the difficulty of evaluating such claims. It may be argued that this difficulty increases the workload on contractors as they need to be thorough in submitting their claims. On the other hand, the case studies indicate that where more information is provided, the need for the CA to make a "best guess" on EOT is diminished. These challenges could explain why concurrent delays have been the subject of disputes in some of the cases determined by the courts, pointing to the difficulties experienced in assessing such claims during project execution. For instance, the case of *Thomas Barnes & Sons plc v Blackburn with Darwen Borough Council* was a first instance decision on a dispute arising from a project that involved the construction of a bus station based on the amended JCT SBC/Q 2011 edition. The court held that the contractor was entitled to an extension of time where the hub steel deflection (employer risk) and the roof coverings (contractor risk), both on the critical path, were concurrent causes of delay. The extension awarded by the court exceeded what the CA had granted but was less than the time claimed by the contractor. The judge observed in paragraph 144 of the ruling that while the problem with the hub structural steelwork started in October 2014 and was not resolved till January 2015, it was not the only cause of delay during that period because of other delays occasioned by roof coverings. The case is illustrative of the complexity of determining correct and appropriate extensions of time during a project. It may also be relevant to reflect that one factor which may contribute to some disputes around EOTs in JCT projects is that, as found above, the SFC itself does not promote collaborative behavior. It is tantalizing to speculate whether the *Thomas Barnes* case would have terminated as it did had the job been let on an NEC.

Assessment

Timescales of Assessments

The failure of CAs and PMs to adhere to the prescribed timescales was identified as a significant issue for contractors on both SFCs. Birkby, Ponte, and Alderson (2008) derided the wait-and-see approach by project administrators, pointing out that it would make it difficult for contractors to maintain a healthy cash flow and program. Although Clause 2.28.2 of the JCT contract required a 12-week timeframe to communicate the decision on the award of an additional time from the date of receiving the required particulars, no penalty was specified for the employer if this timeframe is not met, creating uncertainty in the process of administering the contract. Study participants revealed that this was a caveat used by employers to justify the wait-and-see approach, stating that doing so was in their best interest. Unfortunately, the problems encountered by contractors because of such delays in communicating claim awards have not been adequately addressed in the empirical literature. However, this study has established uncertainty, cash flow problems, and unprofitability as the challenges faced by the contractor, making the JCT contract more prone to claims and disputes as contractors exploit such loopholes to compensate against losses.

Considering NEC projects, empirical data revealed that contractors experienced minor issues with PMs missing the prescribed contractual timeframes for assessment. Just like the JCT, it was discovered that existing literature does not adequately address the issues that general contractors may face if the PM fails to meet the timeframes. However, the current NEC4 Engineering and Construction already includes clauses for the process if the PM timed out on the claim award. Clause 61.4 indicates that the contractor's notification is deemed to have been accepted as a CE if the PM fails to respond within two weeks after the contractor's notification reminding the PM of such failure. Such a clause ensured stricter adherence to the timescales in the NEC case studies, which faced fewer issues. Findings reveal that when deadlines were missed, both parties acknowledged this and took a collaborative approach to resolving the CE, minimizing the potential for a dispute. However, the lack of clarity for the contractor to proceed with work was a challenge in an instance where the employer failed to adhere to the specified timeframe.

One case that illustrates the gravity of Employers' failure to timely assess requests for additional time is *Walter Lilly & Company Ltd v Mckay & Another*. The case arose from a project based on the amended JCT Standard Form of Building Contract 1998 Edition Private Without Quantities. The project involved the construction of a new building at No.3, Boltons Place, London SW5 over a period of 78 weeks running between 12 July 2004 to 23 January 2006. The project was characterized by substantial delays, with several requests for additional time. However, by the end of June 2008, the contract administrator had not responded to 196 out of 234 notifications for extension of time. These notifications were eventually determined in favor of the contractor by the Technology and Construction Court (a specialist court dealing with small construction claims in the UK), albeit only after substantial dispute resolution costs had been incurred by the parties in a matter which would all have been avoided had REs been properly assessed within the contractual timescales. The precise factors which lead to the failure to assess on time cannot be known, but again the JCT contract does not include mechanisms which promote collaborative working.

Assessment of Events

Regarding the assessment of events, Gibson (2008) revealed the need for the employers' agents to be analytical but stated that in practice, a "best guess" approach has been mostly adopted. However, findings of this study suggest inconsistencies in the approaches followed by employers' agents in assessing CE and RE claims. For instance, the claims in each case study were assessed in different ways: analytically, by best guess, or a mixture of the two. The literature on the evaluation of REs and CEs revealed a similar aspect: there is no unanimous understanding of how the employers' agents should evaluate the general contractor's claims or quotes. Under Clause 64.1 of the NEC contract, the PM has the right to reassess CE quotes that they believe are incorrect and has the power to strike out portions of the quotation. This, along with a lack of understanding of the implications of a CE, emerged as a problem for contractors in the process of assessing claims and quotes.

Meanwhile, the analytical approach taken by the employer in Project 3-JCT was described by the study participants as having been done in the "correct way," in that arguments had been put

604 forward with evidence. This approach is supported by Denny, Clay, and Hudson (2018), who
605 viewed delay analysis as a forensic investigation. While the literature calls for an analytical
606 approach, the JCT contract simply states the need for fair and reasonable judgement by the CA in
607 assessing delays, creating ambiguity with no definitions on how this can be achieved in practice. It
608 may be that such ambiguity arises from the fact the JCT contract has no requirement for a program
609 as a contract document, making it difficult to compel the contractor to submit such a program for
610 analysis of the REs (Lane & Pickavance, 2015). Despite these shortcomings there is a rich
611 literature relating to how to prepare delay and disruption claims (e.g. Burr, 2016 and the Society of
612 Construction Law's Delay and Disruption Protocol, 2017).

613 ***Timing***

614 Findings indicate that the timing of events is a common issue for all contractors, irrespective of
615 the type of SFC used. In NEC projects, contractors found the timing of CEs to be a major
616 challenge in getting the CE quotation accepted because the PMs were found not to be fully
617 knowledgeable about the likely implications of the CEs. In addition, it appears that the NEC
618 contract allows CEs to be introduced at any point during construction, without acknowledging the
619 issues arising out of the timing of CEs. The same is true about the literature surrounding the CE
620 mechanism, with the majority focusing on how volume can cause issues with no mention of timing.

621 Findings from the JCT-related case studies, on the other hand, suggest that the timing of
622 events leading to REs claims caused challenges for contractors in sequencing and programming
623 their work, resulting in uncertainty. Chappell (2017) described the procedure to be followed if the
624 RE occurs within 12 weeks of practical completion, and that the contractor must use their best
625 efforts to mitigate delays. However, there is no clear definition of "best efforts," creating
626 uncertainty for the contractor when programming works to mitigate the delay.

627 ***Collaboration***

628 Findings confirmed the NEC's stance on promoting collaboration in the construction
629 project environment. Promotion of collaboration is particularly important in healthcare projects,
630 which have multiple stakeholders with competing priorities. A collaborative environment therefore

assists the parties to communicate and thereby foster innovation in these projects. The collaborative nature of NEC contracts has been recognized in previous studies, with Broome (2012) and Lau et al., (2019) identifying the need for parties to act in the spirit of mutual trust and collaboration in NEC-adopted projects. This non-adversarial approach has been found to foster better working relationships, thus minimizing potential disputes in construction projects (Besaiso, et al, 2018). In addition, findings revealed the need for contractors to submit monthly programs and keep a running final account in accordance with NEC clauses to avoid any potential disruption to the collaborative project environment.

Whilst some previous studies had found collaboration occurring on JCT based projects, that was not the finding here. None of the JCT projects operated in a particularly collaborative way. Gibson (2008) argued that it is only a requirement within the JCT contract that the parties work in such a way as not to impede performance, implying that collaboration is not encouraged to the same extent done in the NEC SFC.

Conclusions and Way Forward

This study aimed to identify and compare the common issues faced by general contractors on healthcare projects regarding the delay processes within JCT and NEC standard forms. The main challenges identified for the general contractors were administration and programming issues caused by the volume of delay events and concurrent/multiple cause delays. The failure of the CAs and PMs to meet deadlines caused uncertainty, programming, and cash flow issues. The general contractors were also affected by a lack of consistency in the assessment of claims, which resulted in uncertainty and unfair assessments, and the timing of events hampered the programming and sequencing of work. The study also established that in most projects, delay provisions in the SFC were not strictly followed. Findings also suggest that the approach adopted in the NEC projects was collaborative, enabling parties to the contract to proactively identify and resolve any delay-related issues, compared to the adversarial approach adopted in the JCT projects. Thus, it can be concluded that the administration of delays was more problematic under the JCT

contract than the NEC contract. Additionally, provisions that spelt out consequences of failing to timely assess requests for additional time helped to instill discipline in administering the contract.

Due to the nature of healthcare projects, there are many stakeholders who influence design and construction, allowing opportunities for change throughout a project. Regardless of the SFC used, social infrastructure projects such as hospitals are bound to be influenced by multiple parties. As a result, involving various stakeholders early in the process is critical for limiting potential changes during the construction phase. Furthermore, healthcare projects should be designed with the understanding that change is unavoidable, and contractors and employers should be prepared for it. This could include both parties ensuring that a member of their project teams is solely responsible for dealing with change as it arises.

Additional SFC clauses may also improve the assessment of delay events. The inclusion of a clause stating that assessments must be made using a uniform analytical technique such as the Delay and Disruption Protocol (Society of Construction Law, 2017) would offer general contractors more confidence in submitting quotes or claims. Although it would require additional input of human resources from the contractors, this requirement is likely to reduce project disruptions while strengthening bonds between the employer and the general contractor.

The implementation of the CE and RE processes clearly causes the most problems for general contractors, as strict adherence to contract clauses varies depending on projects, employers, and relationships. One response to this finding would be to counsel that the frequency of issues encountered by general contractors would be reduced if the industry approached all projects with a serious commitment to abide by the letter of contract clauses, particularly regarding the delay processes. However, the many guidance documents which have been written to give this advice to industry over the course of decades without industry learning or being able to consistently follow it suggest that an alternative recommendation may be more effective. What the empirical evidence does suggest is that even in imperfect circumstances, for example where contractual processes have not been strictly followed, more positive outcomes are likely in collaborative as opposed to adversarial environments. The evidence also indicates that the absence of contractual encouragement of collaborative approaches in the JCT SFC does make collaborative environments

685 less likely. Accordingly, it is proposed that introducing a clause promoting a collaborative
686 approach within the JCT SFC may be something worth exploring. Lastly, to improve the JCT and
687 NEC delay processes, a shift in attitude toward delays is required. Improvements can be made,
688 and healthcare projects will benefit from additional clauses, early involvement of contractors, and
689 the acceptance that change is unavoidable. However, the JCT contract requires considerable
690 changes to introduce provisions for mandatory and updated programs and consequences of the
691 employers' failure to timely assess and respond to contractors' notifications and requests for
692 additional time.

693 Because much of the existing literature is from the perspective of the employer, this study
694 provides novel insights into the general contractor's perspective on the delay mechanisms. It also
695 fills a gap in the literature by directly comparing JCT and NEC SFCs and their delay mechanisms;
696 hitherto, this area had not been compared directly. The study reveals that there are common issues
697 among the standard forms and that the problems may not be inherent in the contracts themselves
698 but rather in the industry. Examined through the Transaction Cost Economics lens, the study
699 contributes to the growing body of knowledge on how the parties may choose to address
700 uncertainties arising from gaps inherent in the SFCs. Under this theory, incomplete contracts may
701 lead to opportunistic behavior as one or more parties capitalizes on the ensuing uncertainty in the
702 contract execution process (Williamson, 1998). While acknowledging that including additional
703 clauses can potentially improve SFCs but not make them be 100 percent complete, an overall
704 change in attitude that embraces parties' collaborative approaches to project implementation might
705 be seen as a panacea to project success.

706 ## Data Availability Statement

707 Some or all data, models, or code generated or used during the study are proprietary or confidential
708 in nature and may only be provided with restrictions.

References

List of Cases

Henry Boot Construction (UK) Ltd v Malmaison Hotel (Manchester) Ltd (1999) 70 Con LR 32.

Thomas Barnes & Sons plc v Blackburn with Darwen Borough Council (2022) EWHC 2598 (TCC).

Walter Lilly & Company Ltd v Mckay & Another (2012) EWHC 1773 (TCC).

Works Cited

Adel Al-Kharashi & Martin Skitmore (2009) Causes of delays in Saudi Arabian public sector construction projects. *Construction Management and Economics*, 27:1, 3-23.

Alhyari, O.H. and Al Ani, A.R. (2022) 'Is the engineering and construction contract legally less competitive than the Red Book in Civil Law Countries?', *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, 14(3). doi:10.1061/(asce)la.1943-4170.0000543.

Besaiso, H., Fenn, P., Emsley, M., & Wright, D. (2018). A comparison of the suitability of FIDIC and NEC conditions of contract in Palestine. *Engineering, Construction and Architectural Management*, *25*(2), 241-256.

Bezzant. (2012) Compensation event procedure and assessment under the NEC3 Engineering and Construction Contract (Third Edition) [Notes for Seminar]. Available at: https://www.ceca.co.uk/wp-content/uploads/legacy-media/96888/seminar_notes_-_386e__-_compensation_event_procedure___assessment_under_the_nec3.pdf [Accessed 22nd October 2023].

Birkby, G., Ponte, A. and Alderson, F. (2008). Good practice guide: Extensions of Time. London: RIBA.

Brawn, D. (2012) 'Extensions of time and liquidated damages in construction contracts in England and Wales', International Journal of Law in the Built Environment, Vol. 4 Issue: 1, pp.75-90.

Brewer, G. (2007). 'Compensation Events under NEC3'. Contract Journal. 32.

Broome, J. (2012). NEC3 : a user's guide. London: ICE Publishing.

Burr, A. (2016). Delay and disruption in construction contracts. 5th ed. Abingdon: Informa Law from Routledge.

Burr, A., Matute-Castro, A., & Leogrande, C. (2021). Using FIDIC and NEC standard form contracts on Peruvian infrastructure projects. *Construction law journal*, *37*(5), 273-291.

Chappell, D. (2007). Understanding JCT standard building contracts. 8th ed. London: Taylor & Francis.

738 Chappell, D. (2017). Understanding JCT Standard Building Contracts. 10th ed. Milton: Routledge, pp.93-
739 111.
740 Dennys, N., Clay, R. and Hudson, A. (2018). Hudson's building and engineering contracts. 13th ed.
741 London: Sweet & Maxwell.
742 Department of Health (n.d) The ProCure21+ Guide. Leeds: Department of Health Available
743 at: http://www.procure21plus.nhs.uk/resources/downloads/ProCure21Plus%20Guide.pdf [Acc
744 essed 22nd October 2023].
745 Eadie, R., Millar, P. and Grant, R. (2013). 'PFI/PPP, private sector perspectives of UK transport and
746 healthcare'. Built Environment Project and Asset Management, 3(1), pp.89-104.
747 Eggleston, B. (2006). The NEC 3 Engineering and Construction Contract: A commentary. Hoboken:
748 Wiley.
749 Farrell, A. and Sunindijo, R.Y. (2020) 'Overcoming challenges of early contractor involvement in local
750 government projects', *International Journal of Construction Management*, 22(10), pp. 1902–1909.
751 doi:10.1080/15623599.2020.1744216.
752 Forward. (2018). *Architect's Guide to NEC4* (1st ed.). RIBA Publishing.
753 Furst, S., Ramsey, V., Hannaford, S., Williamson, A., Uff, J., Hughes, S., Thomas, D. and Keating, D.
754 (2016). Keating on construction contracts. 10th ed. London: Sweet & Maxwell.
755 Furst, S., Ramsey, V., Hannaford, S., Williamson, A., Uff, J., Hughes, S., Thomas, D. and Keating, D.
756 (2022). Keating on construction contracts. 11th ed. London: Sweet & Maxwell.
757 Gibson, R. (2008). Construction Delays Extensions of time and prolongation claims. London: Taylor &
758 Francis.
759 Goodrick, D. (2014). Comparative Case Studies, Methodological Briefs: Impact Evaluation 9, UNICEF
760 Office of Research, Florence.
761 Harrison, S. H., and K. G. Corley. (2011).Clean climbing, carabiners, and cultural cultivation: Developing
762 an open-systems perspective of culture. Organ. Sci.22 (2): 391–412.
763 Hennink, M., and Kaiser, B. N. (2022). Sample sizes for saturation in qualitative research: A systematic
764 review of empirical tests. *Social Science & Medicine*, *292*, 114523.
765 Hickman, D. (2000). PFI and construction contracts. Oxford: Chandos Pub., p.32.

766 Hklegal.co.uk. (2014). Managing Compensation Events – Practical Tips. [online] Available at:
767 https://www.hklegal.co.uk/2014/05/19/managing-compensation-events-practical-tips/
768 [Accessed 22nd October 2023].
769 Hughes, W., Champion, R. and Murdoch, J. (2015). Construction contracts: Law and Management.
770 London: Routledge.
771 Keane, P. and Caletka, A. (2015). Delay analysis in construction contracts. (2nd Ed.) Oxford: Wiley-
772 Blackwell.
773 Knight, A. and Ruddock, L. (2008). Advanced research methods in the built environment. Chichester, U.K.:
774 Wiley-Blackwell.
775 Knowles, R. (2012). 200 contractual problems and their solutions. West Sussex, UK: Wiley-Blackwell.
776 Kowalczyk, A., Meszek, W., Rejment, M., & Dziadosz, A. (2018). Delays in construction works in Polish
777 construction industry from the contractors' point of view. In MATEC web of conferences (Vol.
778 222, p. 01008). EDP Sciences.
779 Lane, N., & Pickavance, K. (2015). Cost and time management in the Joint Contracts Tribunal Major
780 Projects Contract and the Chartered Institute of Building Complex Projects Contract - a
781 comparative analysis. *Construction law journal*, *31*(6), 295-310.
782 Lau, C. H., Mesthrige, J. W., Lam, P. T. I., & Javed, A. A. (2019). The challenges of adopting new
783 engineering contract: a Hong Kong study. *Engineering, construction, and architectural management*, *26*(10),
784 2389-2409.
785 Maxwell, J. A. (2013). *Qualitative research design: An interactive approach* (3rd ed.). Sage Publications, Inc.
786 Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook* (3rd ed.).
787 Thousand Oaks, CA: SAGE Publications, Inc.
788 Ndekugri, I. and Rycroft, M. (2009). The JCT 05 standard building contract. 2nd ed. Oxford: Butterworth-
789 Heinemann.
790 Patton E. and Appelbaum S. (2003). The case for case studies in management research. *Management Research*
791 *News. 26*(5), pp.60-71.
792 Lucinda, R. (2012). "Claims for compensation events - how should a contractor prove its claim for time?"
793 Construction Law Journal(6): 507-514.
794 Rowlinson, M. R. (2018). *A practical guide to the NEC4 engineering and construction contract*. Wiley-Blackwell.

795 Satish, K. V., Abhilasha, P., Santu, K., Raag, L., & Neeraj, J. K. (2020). Causal Modeling of Disputes in
796 Construction Projects. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*,
797 *12*(4).
798 Sekaran U. (2016). *Research methods for business: a skill building approach*. 5th ed. New York (NY): Wiley.
799 Society of Construction Law (2017). The Society of Construction Law Delay and Disruption Protocol.
800 [online] Hinckley: Society of Construction Law (UK). Available at:
801 https://www.scl.org.uk/sites/default/files/SCL_Delay_Protocol_2nd_Edition.pdf [Accessed
802 22nd October 2023].
803 Thomas, D., Lee, K., Constable, A., Evans, R., Stansfield, P., Mort, J., Lazur, T., Sareen, B. and Ellis, C.
804 (2012). Keating on NEC3. London: Sweet & Maxwell.
805 Williamson, O. E. (1998). Transaction cost economics: how it works; where it is headed. *De*
806 *Economist, 146*(1), 23-58. doi:10.1023/A:1003263908567
807 Wilmot-Smith, R. (2014). Wilmot-Smith on construction contracts. 3rd ed. Oxford: Oxford University
808 Press.
809 Yeung, J.F., Chan, D., Chan, J. and Lok, K. (2022). 'Development of a composite project performance
810 index for the New Engineering Contract (NECPPI) of construction projects in Hong Kong: A
811 Delphi study', *International Journal of Construction Management*, 23(16), pp. 2804–2817.
812 doi:10.1080/15623599.2022.2100058.
813 Yin RK. (2014). *Case study research: design and methods*. 4th ed. Thousand Oaks (CA): Sage Publications.