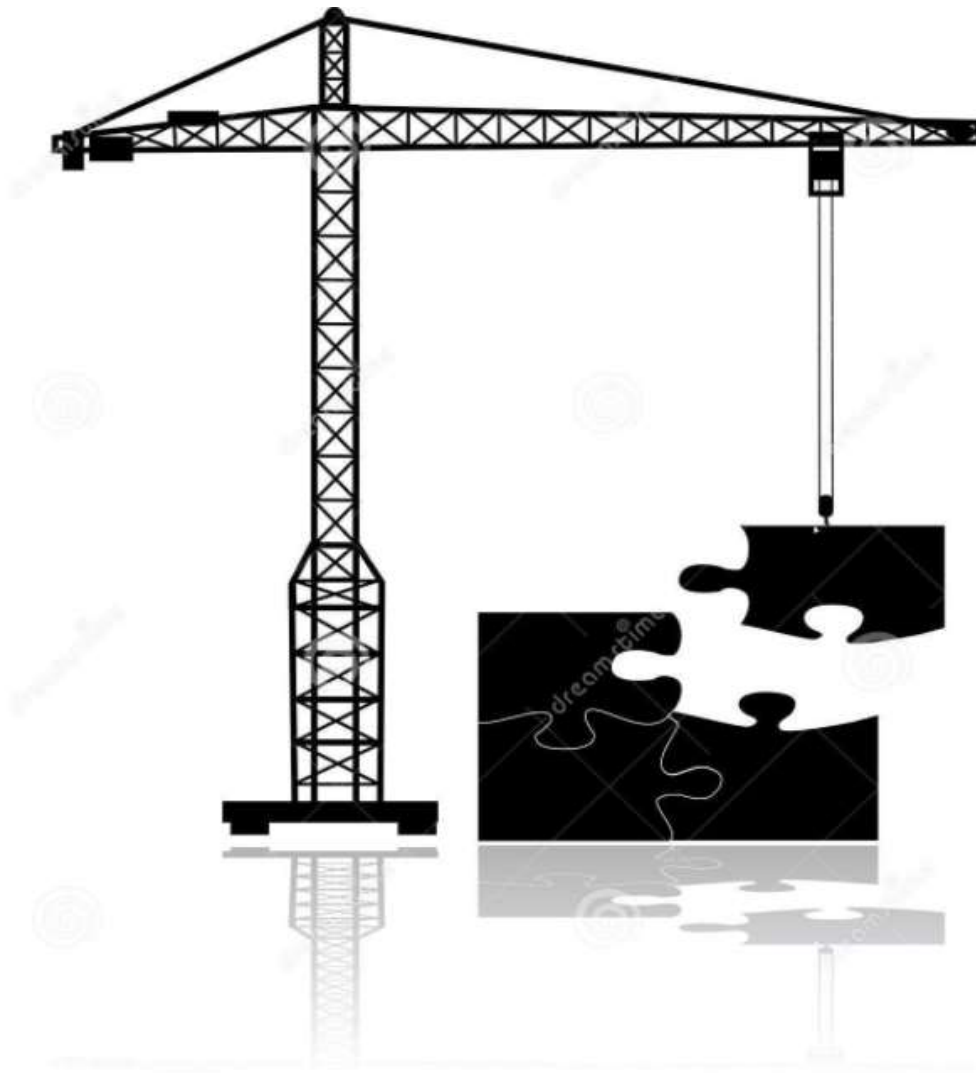


A CRITICAL EVALUATION OF IMPLEMENTING VARIATION MANAGEMENT PROCESS (VMP) UNDER NEC



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ABSTRACT

Purpose – Variations within construction projects are unavoidable due to each project having unique characteristics, so an efficient Variation Management Process (VMP) is required to ensure that changes are incorporated. VMP within traditional contracts have a reactive approach leading to disputes, litigation and a negative impact on cost, time and quality. To overcome these issues, the New Engineering Contract (NEC) is aimed at incorporating VMP that is proactive and collaborative. However, there are many challenges in its implementation, so it is important to address them. Thus, the purpose of this paper is to identify the challenges and barriers whilst implementing VMP in NEC and recommend ways in overcoming these challenges.

Methodology – A qualitative research method through semi-structured interviews was selected for this research as it allowed the researcher to achieve the research aims by capturing the subjective views of professionals' regarding the challenges and barriers faced whilst implementing VMP and the recommendations. The data was collected by interviewing fifteen professionals (PM/QS) with NEC experience to ensure that relevant data is obtained. The sampling process implemented an information power concept to ensure that relevant data is obtained with a restrictive sample size. Research ethics was given due consideration throughout the process.

Key Findings – The result reveals that professionals faced adversarial cultures and mindsets whilst implementing VMP. The reasons for this were due to resistance in adopting the process, lack of understanding of VMP, the negative use of Z clauses, poor drafting of EWs/CEs and various interpretations of the 8-week time bar. To address these challenges, the following are recommended to ensure effective VMP leading to collaborative working, time and cost savings and better quality on a project.

1. Pre-contract – Parties need to ensure that at pre-contract stage a consistent procurement strategy is adopted within the entire supply chain, restrict the use of Z clauses and aligning client governance with contractual timescale. Further, clarification of the 8-week time bar through Z clauses or by NEC clarifying this within the NEC guidance notes.
2. Induction –familiarisation and commercial induction at the start of the project to have a common understanding of project risks, Z clauses and commercial requirements within VMP.
3. Encourage more women into construction – to bring new skill sets, different perspectives and improved decision making to change cultures.
4. Free NEC training – to increase trained programme professionals leading to effective CE assessment.
5. Lessons Learnt – NEC to centralise a platform for professionals to include lessons learnt from the previous projects for knowledge sharing and reducing unnecessary administration.
6. Standardised Software – by NEC approved software companies for better administration of VMP leading to time and cost savings.
7. PM's role – PMs to be given delegated authority to ensure that CEs are implemented as per contract timescales. PM assessments to be carried out as a last resort and when used then PM to adopt scientific approach to PM assessment.

Implications – The findings would benefit construction professionals whilst implementing VMP. This will allow professionals to adopt adequate strategies as recommended above to overcome some of the challenges by ensuring necessary changes are made pre contract, during project commencement and the construction phase.

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CHAPTER 1 - INTRODUCTION

1.1 RESEARCH SUBJECT

A standard form of contract was introduced to address the time and cost issues faced by parties in drafting the terms of nonstandard contracts for each project (Finch, 2019). However, the traditional standard contracts also faced challenges such as a lack of clarity and interpretation of the contract terms, leading to adversarial contracting behaviour (Lau et al., 2019). The Latham Report (1994) also highlighted increased litigation and mistrust between contracting parties. The Institute of Civil Engineers (ICE) conducted a review in 1986 and published consultation in 1991, where it was discovered that an alternative standard form of contract that supports good practice for civil engineering design and construction is required, as the existing contracts were of a single disciplinary concept which increased disputes and wastage of resources. The main objectives were clarity and simplicity, flexibility of use and a stimulus for good management (Gerrard, 2005).

The New Engineering Contract (NEC) came into existence in 1993 with the aim of collaboration to resolve the challenges faced by traditional contracts. The Latham Report (1994) suggested that NEC includes best practices and recommended that the public and private sectors should use NEC, with the target that 1/3 of government funded projects should use NEC by 1998. NEC contracts have been endorsed for public sector use by the UK Government Construction Strategy as well as other prominent boards (NEC, n.d.). Successful projects have been delivered through NEC contracts such as The London Olympic Games 2012, London Cross Rail, Procure 21 plus and many others.

Much research has been undertaken to highlight the benefits of using NEC on a construction project (Wright and Fergusson, 2009; Chan et al., 2014). However, there is very limited research that focuses on Variation Management Process (VMP) in NEC. Variations are unavoidable within construction projects and can be at any RIBA stages, radical or gradual, and the impact may be minor, major or neutral (Motawa et al., 2007). Variations cause the

highest amount of disputes, negative effects and has huge impacts on project performance, time, and cost (Wright, 2016).

Due to the unavoidable nature and the dire impact of variations, it is important to ensure that there is an efficient VMP. It is important that the industry takes a proactive and flexible approach to VMP to minimise disputes and litigation, effective programme management (Hastings and Kerr, 2018) and increase contingency (Clough and Sears, 1994). VMP requires anticipation of the variation's impact and control, coordination within tight timescales, important decision making by parties, different methods of working, rethinking of strategy and updating resource planning (Faisal and Low, 2007). JCT has a reactive approach to VMP, leading to higher disputes, litigation, impact on cost, time and quality (Alsuliman and Bowles, 2012). However, VMP in NEC aims to take a proactive approach to dealing with variations (Gerrard, 2005), but faces challenges during VMP implementation.

1.2 KNOWLEDGE GAP

Various studies have been undertaken by academics highlighting the benefits of NEC and many reports by professionals on the topic. However, little focus is given to the challenges faced by practitioners whilst VMP implementation. VMP in NEC has three key stages, EW notification, CE notification and CE assessment and implementation. This research is undertaken to investigate the challenges faced during each of these stages and recommendations to address it.

It is experienced that some professionals resist in adopting the VMP as they are used to doing things in a traditional way. Further, there is criticism that implementation of VMP in practice creates barriers such as a resistance to change and a lack of training and awareness (Finch, 2011; Mason, 2007). Thus, it is important to understand through this research the effectiveness of implementing VMP.

It is experienced that EW meetings are used to discuss liabilities as opposed to finding a solution. It is criticised for creating a negative and adversarial contracting culture as EWs are used to allocate liabilities, apportion blame to other parties and ignored by parties (Klein, 2017; Heywood and Nobbs, 2019). Thus, it is important to understand from the research the challenges that are being faced during the EW process and recommendations to address these.

Through experience, the challenge faced was regarding different interpretations of the 8-week time bar in notifying a CE by contractors, leading to negative behaviours and time and cost impacts due to lawyers' involvement. Timescales within VMP faces challenges such as not being realistic due to the full extent of the CE not being known at an early stage or timescales being amended through Z clauses leading to a halt in the VMP (Gray and Hughes, 2001; Russon 2020). It is acknowledged by many professionals within the industry that VMP is admin heavy. Some projects have started using software to address this issue; however, they have faced challenges such as a lack of capital investment, training costs and resistance to adopting technology (Charoenngam etl al., 2003; Clarkson 2013). This research is to investigate the challenges faced by professionals during CE notification and how it can be addressed.

CE assessment and implementation faces criticism that it may be difficult to forecast cost and time within tight timescales, PM assessments being biased toward clients and client governance not being aligned with the contractual timescales (Fish and Reynolds, 2010; Gray and Hughes, 2001). This may lead to disputes between parties and an adversarial culture. This research is to establish the challenges faced during this stage and recommendations for making it effective.

1.3 RESEARCH AIM AND OBJECTIVES

Aim: The aim of this investigation is to critically evaluate the implementation of VMP under NEC3/4 during the construction phase within the UK and provide recommendations for effective VMP execution. The objectives to achieve the aim are as follows:

- To investigate the causes and impact of variations on a construction project through secondary research via a literature review.
- To establish the challenges faced during implementation of VMP through a comprehensive literature review.
- To examine the barriers in implementing VMP by undertaking primary research.
- To analyse the data and compare these with the literature review to investigate the effectiveness of VMP implementation.
- To provide recommendations for effective implementation of VMP which supports collaborative working and mitigates the impact on time, cost, and quality.

1.4 STRUCTURE OF THE DISSERTATION

Chapter 1 – will commence the research by explaining the basis of the research, knowledge gaps and details about aims and objectives.

Chapter 2 – will emphasise the key concepts of VMP by critically reviewing existing literature taking into consideration the aims and objectives of the research. This chapter will expand on the knowledge gap and challenges faced whilst VMP implementation.

Chapter 3 – will focus on the research methodology by detailing the research methods available, how similar research has been undertaken, justification of the primary research methods, rationale of the research design and research ethics.

Chapter 4 – will present and analyse the primary data and link it to the existing literature to understand the data and provide recommendations.

Chapter 5 – will conclude the research by providing conclusions with the research aims and objectives taken into consideration. This chapter will also provide a summary of the reasons for choosing this research, how it is undertaken and recommendations. Further, it will explain this research contribution to practitioners and current research and finally limitations will be presented with areas of further research requirements.

CHAPTER 2 - LITERATURE REVIEW

2.1 INTRODUCTION

This chapter concentrates on the existing literature and knowledge gap related to VMP focusing on the aims and objectives of the research. The review will emphasis on the need for NEC contracts, causes and impacts of variations, implementation of VMP, knowledge gaps and summary. The clauses referred in this research are taken from NEC4 as it is the latest version.

2.2 NEED FOR COLLABORATIVE CONTRACTS

It was noted that the standard form of contracts faced challenges such as procurement and labour (Ministry of Works, 1944) and had issues with collaboration (Ministry of Works, 1962). Latham Report (1994) confirmed that the weaknesses were increased by conflict/litigation, lack of clarity and the creation of mistrust within the construction industry. The main problems were the role of contractor for their position within the contractual framework (Berry, 2000; Heath, n.d.) and procurement where the client's attitude is to procure based on the lowest price as opposed to quality drivers (Lingard and Holmes, 2001; Egan, 2008).

The Latham Report (1994) stressed the need for a modern contract which incorporates 11 conditions, such as mutual co-operation, teamwork, defined roles and duties, simple language and guidance notes, risk allocation, avoidance of variations, revised assessment of interim payments, fair payment mechanism, trust funds, quick dispute resolution, incentives for exceptional performance and advanced mobilisation payment. Egan (1998) supported the idea of developing long term relationships between the parties and teamwork. ICE developed a new form of contract named NEC in 1993 to ensure collaboration and teamwork between parties.

NEC is a modern standard form of collaborative contract which stimulates good project management of risks and uncertainties (VMP), flexible (multi-disciplinary concept), clear, and simple to understand (Broome, 2019). However, NEC faces criticisms from legal professionals (Corney, 1996), but Lloyd and Wightman (1996) stated that there is hardly any

contract which lawyers do not question. The first NEC revision was done in 1995, with the latest revisions being NEC3 in 2005 and NEC4 in 2017. The selection of contract depends on allocation of risks and complexity (see figure 2.1). NEC4 has two additional contract suits (Design Build Operate Contract and Alliance Contract). Once the contract is selected, secondary clauses and payment options need to be finalised (see figure 2.2) before execution of the contract. It is important that senior management has knowledge and understanding of NEC, so the correct contract is chosen (Fox, 2006).

Figure 2.1: NEC3 suite of contracts (Patterson, 2018)

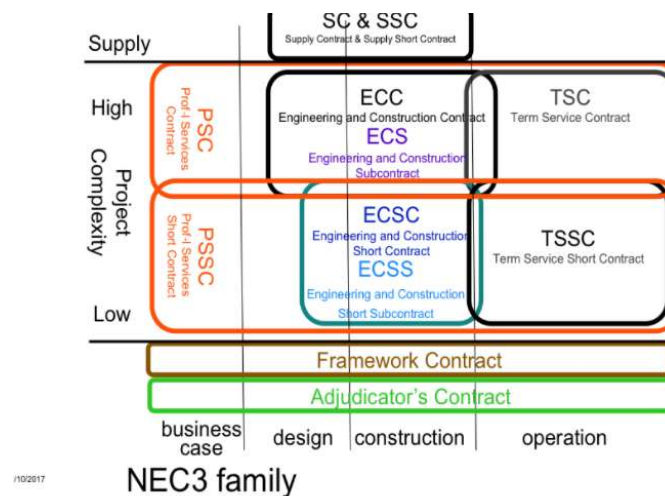
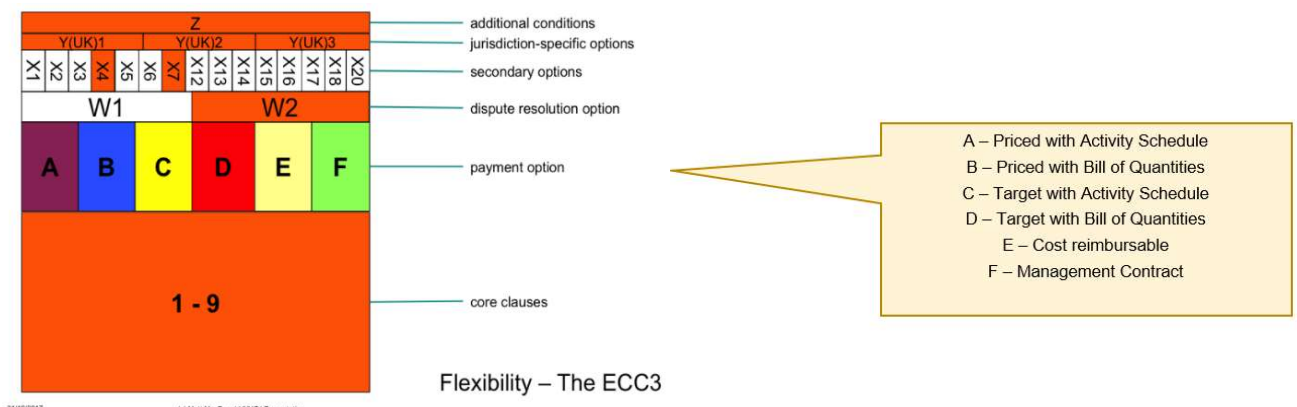


Figure 2.2: Selection of payment options and secondary clauses (Patterson, 2018)



NEC is different from the previous standard form of contract as it is based on a proactive and collaborative approach to sharing risk and reward through modern procurement processes (Higgins, 2017).

2.3 CAUSES AND IMPACT OF VARIATIONS

One of the main problems in construction is that variation on a project is inevitable during the construction phase as the parties cannot anticipate everything, design may be fully coordinated after the contract and frequent changes occur due to various factors/reasons (Ibbs et al., 2001). Variation causes the highest amount of disputes, negative effects and has a huge impact on project performance, time, and cost (Wright, 2016). Keane et al. (2010:89) defines variations as “any type of deviation from an agreed upon, well defined scope or schedule of works.” The definition of variation for this research is any changes made by either party (contractor/client) for any reason (intentional /unintentional or mandatory/non-mandatory, etc.) to the scope and impacts on cost, time or quality of works. This definition is reached as it incorporates majority causes and impact of variations on a project during the construction phase. The causes of variations can be grouped based on the contracting parties’ involvement (Keane et al., 2010).

2.3.1 Client Led Variations

Client led variations arise due to insufficient detail provided by the client at contract and a lack of participation during the design stage (Arian et al., 2004). The changes also arise from the client’s financial circumstances (Clough and Sears, 1994), value engineering design which cannot be achieved during the construction, change of material requirements (Chappell and Willis, 1996) and changes in design (O’Brien, 1998). In NEC, client led changes are dealt through Compensation Events (CE).

2.3.2 Contractor Led Variations

Contractor led variations can be due to changes during detailed design stage (Keane et al., 2012), a lack of availability of workforce, equipment, or materials (Arain et al., 2004) and contractor's cashflow issues. Further, changes arise from a contractor's lack of local site and technological knowledge (Clough and Sears, 1994). Contractors may promote variations as it leads to additional profit (O'Brien 1998). Finally, changes in the economic climate may lead to procurement delays (Fisk and Reynolds, 2010).

Contractor led variations are usually a contractor's risk resulting in no impact to the Target Price. However, contractors can raise a CE if they believe that the variation is caused by client's action. The contractor may propose value engineering options in NEC4 (option C) which allows to keep savings within the project for a sharing the gain or a reduction in pain.

2.3.3 Design Led Variations

Design led variations arise from changes in design for improved methods of working (Arian et al., 2004), variances to the product/material during offsite production/modular construction and prominent changes in design during the construction stage (Fisk and Reynolds, 2010). The discovery of errors and/or omissions in design (Arian et al., 2004), a lack of design co-ordination (Arian et al., 2004) and complex design leading to variations in one or more part of the design (Fisk and Reynolds, 2010). Finally, incorrect drawings issued to subcontractors, discontinuation of material and equipment stated within the scope (Geok, 2002) and inadequate and ambiguous designs provided to the contractor (Fisk and Reynolds, 2010).

Within NEC, contractor led design change processes are incorporated within clause 21. If the client's design has errors, it will be dealt through a CE. If the contractor's design does not comply with the client's requirement within Scope, it will be a defect.

2.3.4 Variation due to unexpected conditions and other causes

Some variations on projects can be due to unexpected conditions such as adverse weather (Fisk and Reynolds, 2010), site conditions (Motawa, 2005), Covid 19, riots, civil commotion, etc. Other causes of variations are omissions in contracts, ambiguity and inconsistency in contract documents, (Arain et al., 2004) and non-compliance of regulations (CIOB,2020).

Within NEC4, unexpected weather conditions are defined within Contract Data. Prevention events are captured within cl 19 and processes to resolve ambiguity and inconsistency are included within cl 17.

2.3.5 Impact of variations

Most variations will lead to a delay in completion, higher cost implications and/or quality (Motawa et al., 2007). The financial impact of variations can be increased costs of implementing variations, administration cost (overhead cost of dealing with variation, agreement of cost, etc) and increased OH&P (O'Brien, 1998). Other impacts can be delayed completion, resulting in a direct impact on the increased costs in the project or cost to the client for paying additional rent on the existing facility or cost to the contractor (Assaf and Al-Hejji, 2006).

Variations may have an impact on quality as the contractor may have to keep changing the scope, creating confusion among subcontractors. The contractor may try to recover the costs of variation by taking short cuts (CII, 1995), reworking and demolition resulting in increased cost and time (Clough and Sears, 1994) and changes in construction methods leading to safety issues (O'Brien, 1998).

Other impacts include damage to reputation and professional relationships, disruption leading to lower productivity, overtime working, increased workload and delays in procuring materials/equipment due to longer lead in period or logistics delays (Hester et al., 1991).

2.4 VMP UNDER NEC

The Latham Report (1994) highlighted the importance of avoiding variations within condition 7. However, it is very challenging to avoid variation completely due to the nature of the sector and the causes. Voropajev (1998:17) defined VMP “*as an integral process related to all project internal and external factors, influencing project changes; to possible change forecast; to identification of already occurred changes; to planning preventive impacts; to coordination of changes across the entire project*”.

Wang et al. (2019) stated that a coordinated approach and the explicit drafting of a contract helps to avoid contractors’ opportunistic behaviour during VMP. Gerrard (2005) stated that VMP in NEC is clearly defined, roles and responsibilities specified, clear timescales and client’s risk allocated leading to less disputes and cost saving. However, it faces challenges such as unclear scope, missing/insufficient information, contractor withholding information to create crisis (Chang et al., 2007; Pang et al., 2015). There is resistance to change in adopting VMP (Finch, 2011), a lack of training and awareness and long-term relationships are challenging due to high staff turnover (Mason, 2007).

2.4.1 Early Warning (EW)

The first step within VMP is for either party (contractor or PM) to notify each other of a matter which has an impact on price, time, delays in meeting Key Dates and quality through EW (Broome and Hayes, 1997). PM to arrange EW meetings to discuss variations and mitigate the issue (see figure 2.3). There is no direct relationship between EWs and CEs (EWs may convert to a CE, EWs may be mitigated, or CEs be raised without an EW) (Klein, 2017). The sanction to a contractor for not notifying an EW is that the CE is then assessed taking into consideration the mitigation that parties would have taken if the EW were given, the disallowable cost or inability to claim an extension of time (NEC4). If the client team does not notify an EW in a timely manner, this could lead to higher cost/time or have an adverse quality impact to the project (Broome and Hayes, 1997)

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2.4.2 Compensation Event (CE)

The next step is to notify a CE for the items which cannot be mitigated through an EW or items within Contract Data Part One.

Risk allocation - NEC encourages parties to allocate variations fairly between the parties (Rahman & Kumaraswamy, 2002). Known variations are added within Contract Data Part one as 'additional CE' (NEC4). This allocates the risk to the client which reduces disputes and clarifies the position (Patterson, 2019). However, the client may resist in accepting certain risks with the belief that under traditional contracts these risks can be transferred to the contractor. The risk may be allocated clearly but if it is not defined clearly then it may be subject to misinterpretation leading to disputes and higher costs (Piney, 2012).

Notification Timescale – A CE is the only remedy and single mechanism through which all variation events are covered. If the client breaches the contract, the contractor should notify CE. This is to ensure that parties do not avoid the time limits and processes in the contract. A PM may notify a CE if variations are client led or the contractor should notify a CE within 8 weeks of an event otherwise it may be time barred leading to disallowed costs or not being able to claim for delays (NEC4). A PM should respond to a CE notified by a contractor within one week, otherwise the contractor may notify of their failure leading to deemed acceptance of the CE (NEC4).

This strict timescale is realistic and required, to encourage parties to resolve issues quickly, in a collaborative manner (Cox and Thompson, 1996). However, timescales may not be realistic when the full extent of a CE is not known (Russo, 2020). There are different interpretations of the 8-week time bar and it differs in court judgements (Kingston, 2015). This leads to a halt in VMP (Heywood and Nobbs, 2019), a loss in contractor's entitlement to a CE, creating a negative relationship between parties and the contractors/subcontractors involving lawyers to ensure that contractual entitlement is not lost. To avoid this, contractors should notify of a CE as soon as they become aware of it (Russo, 2020). Further, in *Northern*

Ireland Housing Executive v Healthy Buildings (Ireland) Ltd [2014], the judge held that the Employer cannot rely on the other party to confirm a CE. This puts the onus on the PM to ensure that an client led CE is notified to the contractor in a timely manner. Parties may frustrate the VMP process by extending timescales for responding to a CE or quotation (clause 61.3, 62.5).

CE Communication and administration - NEC requires each communication to be notified separately, this leads to three separate communications for raising a CE. The intentions of the separate communication is to ensure that important contractual notifications are not buried and missed by parties with other regular communications (Walker, 2016). This requires extensive professional and managerial involvement for effectively notifying and implementing a CE (Wright and Fergusson, 2009), leading to a requirement of more administrative tasks and resources (Pinsent Masons, 2011). However, it is argued by Gerrard (2015) that NEC defines the process clearly and takes a sensible approach to dealing with variations, which reflects modern project management as opposed to the traditional form where changes were communicated through various channels, and nothing was agreed until the works are complete creating confusion. Further, Clarkson (2013) argues that it is a misconception that VMP is admin heavy as efficient VMP will ensure less disputes and timely agreement of the final account.

To address the admin heavy issue, Clarkson (2013) stated that efficient software that imitates the NEC workflow process should be used. It would be prudent to use software for effective VMP resulting in less human error and time savings (Hastings & Kerr, 2018). Further, Sun and Oza (2008) research demonstrated a high rating for the CCM system that assisted with VMP. However, the construction industry is known for resistance towards adopting new technology (Kassem et al, 2012). A lack of initial capital investment for software and resistance from senior management would result in delayed decisions about software adoption (Assaf and Al-Hejji, 2006). The cost of any software can be mitigated by savings on employment costs and additional resource requirements (Hastings & Kerr, 2018).

CE Drafting – CE drafting is very important for all parties as it provides clarity and enables other parties to decide about the CE. Due to a lack of training and limited case precedence, parties may seek legal advice to draft a CE (Lau et al., 2019). This can be addressed by providing training to employees, adequate support to junior members for efficient VMP (Heaphy, 2013). However, NEC training and lawyer’s involvement is expensive and time consuming (Lau et al., 2019). Dickson (2013) argues that training costs are compensated by the achievement of the overall project being completed on time, within budget, to adequate quality, and collaborative working.

Z clauses – Z clauses are clauses through which the standard form of NEC can be amended. This gives flexibility to parties to tailor clauses as per the project requirements (Higgins, 2014). However, Broome (2015) stated that excessive use of poorly drafted Z clauses leads to disputes and brings uncertainty to a project. Higgins (2014) stated that only some Z clauses are valid, others are used to change the risk profile and creates ambiguity. Parties may interpret clauses differently and use Z clauses to differ the original intent (Broome, 2015).

2.4.3 CE Implementation

The final stage in VMP is implementation of a CE, either by accepting the contractor’s quotation or carrying out a PM assessment.

Deemed Acceptance and PM Assessment - The contractor may notify of a PM’s failure to respond to quotation leading to a deemed acceptance. This may lead to accepting liability on behalf of the client. A PM may assess the cost and time of a CE if the contractor fails to respond or agree the variation cost/time within set timescales. This demonstrates that the client through a PM has more responsibility and control for a project during the contractor’s failure to respond to ensure that the VMP is continuing (Fox, 2006). This ensures that final accounts are agreed in a timely manner as opposed to JCT where agreement of the final account takes place months after completion (Fox, 2006). However, a PM assessment may

have a negative impact and adversely affect the reputation and relationship as costs and delays are implemented without parties' agreement (Fisk and Reynolds, 2010).

CE Valuation - The positive aspect about a CE is that the impact of cost and time are valued together before the implementation of a CE (Wright and Fergusson, 2009) and once implemented a CE cannot be revisited unless there is a PM assumption. This leads to clarity and decreases disputes (Barnes, 2002) and ensures quicker valuation of final accounts. However, there are complicated issues where it may be difficult to forecast costs and time within the timescale. To address this NEC has a provision where a PM can make assumptions on certain items in the quote before implementation (clause 61.6). If the assumptions are incorrect, then a new CE is raised which means the employer continues to hold the risk on the item and this brings uncertainty. It requires additional resources to update the programme regularly and to ensure that cost and time are submitted as part of the CE. The belief that traditional methods have worked well so far (Dickson, 2013) and resistance to change from parties may mean resistance to sharing information for agreeing a CE, leading to disputes and adverse relationships (Fenn, 2007). To address this, it is important that all stakeholders are trained in the programme as suggested by (Keown, 2012) and open accounting information will create open contracting culture and collaboration (Tan et al 2017).

Governance – Before implementing a CE, the client and PM usually have to follow internal governance processes. This has a specific impact if there is a lengthy internal governance process leading to delays and a vulnerable position (Gray and Hughes, 2001). This is addressed in NEC by agreeing internal governance processes precontract to comply with tight timescales (Bennett and Baird, 2001; Weld, 2017). However, the governance team/structure may change after contract which may require agreement of the governance process again (Lappi and Aaltonen, 2017).

2.4.4 Project Manager's Role

The PM is a named individual in the NEC and administers the contract (Bingham, 2010). The PM can be the client's inhouse expert or an external consultant. Bingham (2011) highlights that the PM is hired by the client leading to biased decisions and conflicts of interest. Judge Humphrey in *Royal Brompton Hospital NHS Trust v Hammond* (2002) stated that the PM's role is "of a coordinator and guardian of the clients' interest". Mackay (2017) argues that a PM is required to play an independent role in the contract leading to making unbiased decisions throughout VMP and abide by professional standards. The challenges faced by a PM whilst implementing VMP:

1. Usually, the PM has a delegated restrictive authorisation limit by the client and needs to impose the client's corporate governance procedure. This may restrict a PM to effectively comply with VMP timescales. This can be addressed by agreeing the arrangement pre-contract (Wooldridge-Irving, 2021). However, if internal policy changes within the client organisation, this may need to be agreed again.
2. VMP puts the onus on the PM to make a PM assessment and assumption on behalf of the parties. However, employers may choose to restrict the PM through Z clauses. The PM must ensure that the result of a Z clause does not compromise the PM's ability to act independently (Taylor, 2019).
3. Parties may choose to challenge the PM's decision on assessment, assumptions, or CE decisions and as soon as it is done a dispute arises (Bingham, 2011)

2.5 SUMMARY

There is a wealth of literature that provides evaluation of a NEC contract and its principles. However, there is hardly any literature that focuses on the entire VMP in NEC within UK, so this research focuses on this subject. This section will summarize the knowledge gap.

Firstly, there are two differing views regarding the implementation of VMP in NEC. The first group states that the VMP process within NEC is implemented efficiently as it is clearly defined, easy to understand, has clear risk allocation and clearly defined roles and responsibilities which supports collaboration. However, others believe that VMP is not implemented efficiently as it faces issues such as lack of training, lack of awareness, limited case precedence, cultural mindset and resistance to change, leading to disputes, being expensive and time consuming. Even though risks are allocated clearly, they may not be defined clearly which then leads to disputes and Z clauses may imbalance the risk allocation between parties.

Secondly, there are two contradicting views regarding the EW process. Some believe that an EW works as it supports the VMP by mitigating risks at an early stage which in turn promotes collaboration and flexibility in managing risks. NEC strongly promotes EWs as they are unique to NEC contracts and an efficient VMP tool. However, others believe that EWs do not work due to an adverse contracting culture such as EWs used by parties to allocate liabilities, sanction on contractors for failure to notify but no sanction on client teams. There is a lack of awareness and training so parties may assume that a CE does not need to be notified, as an EW is notified. To address this, adverse contracting culture needs to change and an increase in training and awareness is required.

Thirdly, it is acknowledged that VMP in NEC is administrative heavy and there is a strict timescale to be followed by parties including the 8-week time bar for notifying a CE. Some believe this is realistic and is required to ensure that variations are implemented on a

progressive basis leading to less disputes and timely final accounts with emphasis on the drafting of CEs. However, others believe this is not realistic as it requires additional resources to manage, not knowing the extent of a CE at early stage and different interpretations of the 8 weeks leading to loss of entitlement, negative impact, increased lawyer's involvement, and a halt to the VMP process. To address the issues, parties may decide to use software which leads to less human error and time savings. There is resistance in adopting technology by parties, lack of capital investment, training costs. However, the cost can be mitigated by saving admin costs and employment cost of parties. To address the issue of timescale, parties should notify of a CE as soon as possible and amend the contract through Z clauses to clarify the 8-week time bar period.

Finally, assessment of a CE has contradicting school of thoughts along with questions around a PM's role in assessment. Some believe that CE assessment and implementation happens on an ongoing basis and is quicker as cost and time are assessed together and PM assessment ensures the VMP is continued if the other party has failed to respond within the timescale. It also encourages the client to agree internal governance with the PM prior to the contract commencement. This brings clarity, reduces disputes, ensures timely valuation of final accounts and payment to the contractor. However, some argue that the CE assessment does not necessarily happen on a progressive basis as it is difficult to submit cost and time together due to difficulty in forecasting the time element. Further, a PM assessment gives the advantage to the employer as the assessment is done by the PM who is a client representative, and CE is implemented without the contractor's agreement which creates a negative impact such as reputation and relationship between parties. Finally, client internal governance changes during the contract creates delays in implementation. To address these elements, NEC has incorporated PM assumptions, which means that parties are allowed to revisit certain elements of the CE later and it works on the principle of transparency and sharing accounting information. This can be an issue as the employer continues to hold the risk for certain item. Further suggestions include more discussion and agreement between the parties, with the PM to be given delegated authority and an increase in training and awareness.

The following section will include and justify the use of the methodology and obtain views from practitioners about the knowledge gap and best practice in implementing effective VMP.

CHAPTER 3 - RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter focuses on the research methods that are available and were used to conduct this research. It explains how similar research has been conducted and provides justification of the research methods. Further, research design includes sample criteria, interview design and interview topics. Finally, it details research ethics utilised by the researcher.

3.2 RESEARCH METHODS

The nature of research can be scientific leading to positivism or social which is based on constructivism or by using a mixed method. To fulfil research aims, it requires an understanding of social reality i.e. the challenges and barriers faced by professionals whilst implementing VMP and the recommendations for overcoming these challenges. This requires subjective data relating to professionals' opinions, behaviours and interpretation of contracts whilst implementing VMP. Thus, a research method that fulfils subjective reality is required to obtain the data.

Positivist research is based on objective reality where information is based on validity, reliability, and can be generalised. Quantitative methods can be used to capture objective reality as it enables the single truth, it is knowable and empirical (Sale et al., 2002). This method is not suitable for this research as it does not deal with subjective views of people, does not capture complex human behaviours and relationships, and is restricted to a limited range of predetermined responses as stated by Carey, (1993).

The mixed method is where qualitative and quantitative methods are combined. The benefit of a mixed method is that it benefits from both methods, by considers the complexity of human behaviours and obtaining data from a larger sample size (Clarke and Yaros, 1988). However, this method is very time consuming, costly, and complex in analysing (Sale et al., 2002). Due to time constraints and with no funding available, it is not possible to carry out the mixed method.

Constructivism research is based on social reality where information is obtained based on people's subjective views, such as their beliefs, culture, mindset, inspiration, values, and interpretations (Guba and Lincoln, 1994). A qualitative method is selected for this research as it allows to achieve the research aims by capturing the subjective views of professionals' regarding the challenges and barriers faced whilst implementing VMP and their recommendations for overcoming these challenges.

Qualitative research methods cannot achieve as much as a higher sample size as quantitative research method (Thomson, 2011). To address this, during the sampling process concept of "information power" was utilised, where the selected sample has more relevant data, so research aims can be achieved with a lower sample size (Malterud et al., 2016). Analysis of qualitative research is more time consuming (Flick, 2011). To address this, the researcher has utilised software for automated transcription to allow more time for analysis.

3.3 RESEARCH ON SIMILAR TOPICS

Researchers on similar topics have adopted qualitative research methods as they wanted to capture subjective experiences to explore the attitudes, values, and beliefs of construction professionals (Shepherd et al., 2021; Chan et al., 2014; Love et al., 2015). They successfully achieved their research aims as the results from their research helped to answer crucial elements of the study. It was an appropriate way of conducting research as it allowed to capture the professionals' views and understand construction culture within the allowed time. Some researchers have also adopted a mixed method as the limitation of each method is

addressed and it encourages multiple sources of data to provide back up (Lau et al.,2019; Javed et al.,2018;). They achieve their research aims and were appropriate, but they were funded, larger timescales to carry out the research and there was more than one researcher for data collection and analysis. Due to time restrictions and a lack of funding, the mixed method was not possible for this research.

3.4 JUSTIFICATION OF THE CHOSEN RESEARCH METHOD

Qualitative research methods include case studies, interviews, focus groups and others (Hamilton and Finley, 2020; Rosenthal, 2016). The case study approach allows in-depth explorations of complex issues in real-life (Crowe, et al.,2011). However, this method is not suitable for this research as it requires considerable time to gather data for each case, permission from various seniors to collect data and involvement from various professionals.

A focus group is used to reach wider participants by arranging meetings online. However, this method is time consuming, and it is challenging to arrange for relevant people to attend an interview at the same time (Krueger and Casey, 2014). This method is not suitable for this research as it would have required a restricted sample size and some groups of people (subcontractors) may not feel comfortable enough to share their views openly in the client or contractor's presence.

Individual interviews are flexible, have a better response rate, enables the researcher to judge non-verbal behaviours of participants and captures data by interviewing key stakeholders who provide in-depth information (Hamilton and Finley, 2019). However, it faces criticisms of being time consuming and costly. To address this, due consideration needs to be given when selecting a sample size and individual participants. Individual interviews were most suited for this research, due to professional contacts, the researcher was able to arrange interviews with key stakeholders within a tight timescale to obtain relevant data, which fulfils the research aim.

The three types of interviews are structured, semi structured and unstructured. Structured interviews have a strict guide which the interviewer follows to allow standardised answers and it is used where different interviews are involved (McLeod, 2014). This interview method will not be suitable as professionals for this research are required to give a wider overview and not restrictive narrow views.

Unstructured interviews do not have any set questions, the interviewer may think about themes or some basic questions prior to the interview and are subject to biases (Fox, 2009). These are carried out during early stages of the research to gain an understanding of a subject (Taylor and Bogdan, 1984). This interview method will not be suitable as this research is not just to gain an understanding of a subject but requires a greater understanding of a subject. The researcher wants to prepare prior to the interview to ensure that all relevant questions are captured, with the flexibility to change the order as per the conversations.

Semi-structured interviews were chosen for this research as it adopts a flexible approach by ensuring that the questions are prepared based on the research aims but the order can be changed based on the participants' responses. This interview method ensures that the discussion is kept within research parameters, which helps to compare the responses received from various participants (Fox, 2009). It also allows the interviewee to be spontaneous without any extended reflection, any doubts or queries can be clarified directly (Opdenakker, 2014). It is argued that these interviews are time consuming, costly, it faces criticism of the interviewer's bias and dishonest responses from interviewees if they believe it will impact on their personal performance (Grindsted, 2005). To address time element, the "information power" concept was used which ensured that a restricted sample size of 15 allowed relevant data to be collected. To avoid cost, interviews were carried out online via Teams. The issue of biasness and dishonest responses is answered within the next section.

3.5 RESEARCH DESIGN

3.5.1 Sample Selection Criteria and Size

Malteruda et al. (2016) introduced the concept of “information power” during the sampling process, it means that if a sample has more relevant data, then a lower number of participants are required. Purposive sampling will help to identify key stakeholders whose views will help to inform and guide research (Palinkas et al.,2015). For this research, sample selection criteria were restricted to participants with NEC3/4 experience as it allowed identification of key stakeholders who were able to share their experiences and provide relevant data. This ensured the capture of relevant data with a sample size of 15. If the sample size was too small (i.e. under 10) then it would not have captured the required information. There were no other qualification criteria placed as the researcher believes that diverse professionals help to capture wider views and makes the data rich. Virtual interviews ensured that experienced participants from various geographical locations were able to participate and was time effective.

To make the data richer, equal representation was given by requesting participation from each category of client, consultant, contractor, and subcontractor. This is to ensure that views and experiences from both contracting parties (i.e client side and contractor side) were captured and helps to understand if there is a theme of the challenges faced by a specific party. Please refer to table 3.1 for the participants’ profile and other details.

Table 3.1: Participants' Profile

| Nr | Participants' Detail | When | Where | How Long | Comment |
|----|----------------------|------------------------------|------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Client – CL1 | 18-June-2021 21-June-2021 | Teams Video Call | 18-June -2021 – 1 hour 21-June-2021 – 20 minutes | Due to other commitments on 18 th June 2021, CL1 requested to finish the remainder interview on 21st June 2021. |
| 2 | Client – CL2 | 03-June-2021 | Teams Video Call | 58 minutes | No further comments |
| 3 | Client – CL3 | 11-June-2021 | Teams Video Call | 1 hour 5 minutes | No further comments |
| 4 | Consultant – CO1 | 25-June-2021 | Teams Video Call | 1 hour 30 minutes | |
| 5 | Consultant – CO2 | 04-June-2021 | Teams Video Call | 38 minutes | |
| 6 | Consultant – CO3 | 04-June-2021 | Teams Video Call | 47 minutes | |
| 7 | Consultant – CO4 | 22-June-2021 | Teams Video Call | 41 minutes | |
| 8 | Consultant – CO5 | 11-June-2021 | Teams Video Call | 1 hour 10 minutes | |
| 9 | Contractor – CT1 | 11-June-2021 | Teams Video Call | 1 hour | |
| 10 | Contractor – CT2 | 11-June-2021 14-June-2021 | Teams Video Call | 11-June-2021 – 40 minutes 14-June-2021 – 35 minutes | Due to other commitments on 11 th June 2021, CT2 requested to finish the remainder interview on 14 th June 2021. It took longer as technical issue was faced by both interviewer and interviewee. |
| 11 | Contractor – CT3 | 18-June-2021 | Teams Video Call | 1 hour | |
| 12 | Contractor – CT4 | 15-June-2021 | Teams Video Call | 55 minutes | |
| 13 | Contractor – CT5 | 18-June-2021 | Teams Video Call | 1 hour 20 minutes | |
| 14 | Subcontractor – SC1 | 18-June-2021 | Teams Video Call | 58 minutes | |
| 15 | Subcontractor – SC2 | 17-June-2021 | Teams Video Call | 1 hour 7 minutes | |

3.5.2 Interview Design

A guide was prepared as per the requirement of semi-structured interviews. The questions were prepared based on research undertaken within the literature review to ensure that information required to achieve the research aims was collected. The researcher prepared the questions that are open ended, interesting, familiar and analysable as suggested by Maietta and Hamilton (2018). The questions were sent to their supervisor and two industry experts for their feedback. The feedback was taken into consideration and addressed before commencing the interviews. Biasness was restricted by ensuring that the wording of the questions did not approve or disapprove of anything. Also, ensured that each question covered a singular topic and were in the correct order as suggested by Rosenthal (2016).

Hamilton and Finley (2020) stated it is important the beginning of the interview sets the correct tone as it impacts on data collection. Thus, the interviews were facilitated by adopting a 'learner role' as suggested by Lofland and Lofland (1995) by building rapport and putting participants at ease. As suggested by Salazar (1990), the interviewer kept the following points in mind during the interviews to avoid interviewer biasness:

1. To ensure that when summarising a response not to bring new content or approve or disapprove.
2. To ensure that correct time is spent on the chosen themes and not to spend longer or shorter on a specific topic for participants to think that a certain theme is more or less important.
3. Participants' language skills and background was taken into consideration. Thus, more time allowed to explain the questions for clarity (when required).

3.5.3 Interview Topics

The interview covered the following themes by asking various questions. Please see Appendix A for a list of questions including the narrative and what the researcher wanted to achieve by asking the questions.

- Participants' Experience whilst implementing VMP – to understand the challenges faced by participants whilst implementing VMP.
- EW Process – questions were asked about the challenges faced whilst implementing EW processes and recommendations to overcome these.
- CE Notification Process – questions were asked to understand the challenges faced by participants whilst notifying a CE and recommendations to improve the process. This covered timescales within VMP, CE drafting, communication/administration of CE and Z clauses.
- CE Assessment and Implementation – questions were asked to understand the challenges faced by participants whilst implementing a CE and recommendations to address these challenges. This covered CE assessment, PM assessment and client governance.

3.6 RESEARCH ETHICS

Research ethics were given the utmost importance during this research. Diener and Crandall (1978) stated that there are four important areas for ethical consideration ‘no harm to participants, informed consent, invasion of privacy and deception’.

Before commencing an interview, the participants were assured that their responses will be kept anonymous by removing their name from transcripts and replacing with an acronym based on the contracting party that the individual represents. The researcher sent a signed access letter confirming that the research will be treated as confidential in line with university guidelines. Confidentiality and anonymity ensured that no professional harm was done to participants and the privacy of participants’ is maintained.

The researcher ensured that the signed consent form was received from participants prior to interview, and it was verified with participants if they gave permission to record and transcribe the interview before commencement, as suggested by Saunders et al. (2012). This ensured that an informed consent was received.

As suggested by Bryman and Bell (2011), the researcher gave an opportunity to participants to withdraw from the process at any stage and to not answer a specific question. Participants were provided with the contact details of researchers’ supervisor for obtaining more information in line with The Data Protection Act (DPA) (2018). Participants were provided with a summary of the research topic to explain the aim of the research and confirmed that the final report can be made available to the participants once the research is graded. This ensured transparency and honesty during process with no deception at any stage.

Data storage was conducted in line with DPA (2018) as well as university guidelines. The collected data was stored in a password protected folder on a laptop. The laptop is also password protected and no other individuals have access to the laptop. For further security,

the password on the laptop is changed every month. The collected data will be destroyed at the end of this study as per the university guidelines. This ensured that the privacy of participants is maintained.

3.7 SUMMARY

A qualitative research method was selected for this research as a subjective view from professionals was required to achieve the research aim. Researchers on similar topics have adopted a qualitative or mixed method, but due to time constraints and with no funding available a mixed method was not selected. The data was collected through semi-structured interviews as flexibility in asking questions was required to obtain a wider view, but ensuring that discussion is not extended outside the research parameters.

For the sampling process the “information power” concept was used to ensure that relevant data was obtained with the restrictive sample size. Purposive sampling ensured that key stakeholders with NEC experience were invited for interview. Equal representation for both contracting parties was given to ensure richer data is obtained. Due consideration was given to the wording of interview questions by ensuring that they were open ended, familiar, interesting and analysable. Interview biasness was reduced by ensuring that new content was not introduced whilst summarising, relevant time was spent on each topic and participants’ background was taken into consideration. The research interview topics covered the participants’ experience whilst implementing VMP and recommendation to overcome challenges.

Research ethics was given due consideration by ensuring no harm to participants, maintaining participants’ privacy, consent form and transparency maintained throughout the research. Data storage is done within a password protected folder and laptop. The data is to be destroyed at the end of the study as per university guidelines.

The next chapter will focus on data presentation and analysis of the collected data through interviews with experienced participants involved in VMP.

CHAPTER 4 – DATA ANALYSIS

4.1 INTRODUCTION

This chapter will present the primary data collected through semi-structured interviews and analyse the collected data by linking it to the literature. It will also provide the proposed improvement of implementing efficient VMP in NEC. The detail of each interview was recorded and transcribed with an opportunity to review a sample transcript within Appendix B. All transcripts and recordings are available on request, but it is not included within Appendix B due to its size.

4.2 VMP IN NEC

Data Presentation

Most participants stated that VMP is effective in principle. CL2 stated VMP is *‘User friendly and straight forward and easy to use and logical’* and other reasons by participants were being simple, clear, well intended, in plain English and proactive. However, CO1 stated *‘It works if both parties are switched on’*. Others commented that it works in theory but not in practice as people do not understand, manage, and implement.

The participants stated that main reason for ineffective implementation of VMP is the lack of understanding and awareness of the contract and process. CL1 commented that *‘Insufficient training and knowledge within contractor teams among senior members’*. Other reasons given by participants were risks not clearly defined, misalignment of procurement strategies and a lack of training. Most participants (13 out of 15) confirmed that training was provided to them. However, most client participants and consultants stated that even if training was provided there is resistance to change and adopt the process. Subcontractor participants stated that there is a need for behavioural change by increasing awareness and training. Most participants recommended the need for a familiarisation workshop and commercial induction to increase understanding and awareness of VMP. Finally, SC1 stated *‘need more women to drive cultural change in the industry as they tend to listen and empathise’*.

Data Analysis

The findings support Broome (2019) and Gerrard (2005), that VMP is effective in principle due to various reasons. However, participants stated that it only works if VMP is followed. The participants stated that VMP is ineffective in practice due to the lack of understanding and awareness of the contract and process and there is resistance to change in adopting VMP. This suggests that the issues highlighted by Finch (2011) and Mason (2007) such as lack of understanding, awareness and cultural mindset persist. This is noted during each phase of VMP and addressed in this section.

Lau et al (2019) suggested to improve culture and mindset change through increased familiarisation and awareness. This was supported by most of the participants who suggested to have familiarisation and commercial inductions at the start of the project. This works as it encourages collaborative working by joint discussions and understanding of VMP from the commencement of the project (Gerrard, 2015) leading to less resistance to adopt the process. This also ensures that necessary paperwork is notified resulting in less administrative cost. However, it may not work if the right people are not attending the workshop, which can be addressed by ensuring correct stakeholder identification (Baiden et al., 2006) and seniors ensuring that relevant members attend.

Hanna (2016) recommended to adopt a collaborative procurement approach. This is supported by UK government construction strategy (2011) which promotes and aims at procuring construction contracts through collaborative contracts. This works as it will increase the use of NEC and give hands on experience to professionals leading to greater understanding and awareness of the process. It is important that there is consistent procurement within the entire chain (upstream and downstream contract) and involving subcontractors from the early stages leading to shared goals and a defined scope.

The recommendation of bringing more women within the construction industry as they have better listening and empathy skills. This was supported by a CIF report (2018) which stated that women in construction will provide a different perspective, new skill sets, the ability to improve decision making and others. This will lead to a change in mindset and drive cultural change. Morgan (2015) stated that there is a government initiative to encourage more women to join the industry. To encourage women to join construction as per the Ranstad report (2018) there requires cultural change, equal pay, flexible working, better childcare, etc. However, at present women only represent under 20% of the direct employer construction workforce (Randstad, 2018). There will need to be a huge drive from organisations to improve this number.

The recommendation about clearly drafted risks needs to be considered as suggested by one participant and Piney (2012), otherwise it creates disputes and impacts on culture. The risks can be clearly drafted by defining the risk, providing details of why the risks exist, what happens if risks materialise and when it is considered that risks are addressed (Patterson, 2019). This will work as it brings clarity and if discussed as part of familiarisation workshops then it increases awareness. It is important for parties to include the risk details within the contract as opposed to just including a summary of risks.

This study suggests that the majority of participants were trained. This contradicts Finch (2011) and Mason (2007) finding that there is a lack of training. This may be because the study is restricted to participants who had NEC experience, but wider organisation training and awareness may still be lacking. Thus, the recommendation of providing free training across the industry should be taken into consideration. This will work as it will increase the number of trained professionals who would understand VMP and will provide additional support to junior members leading to efficient VMP (Heaphy, 2013). This leads to positive culture change and breeding right behaviours. However, it may face the challenge about who pays for the training. This can be addressed by government running training schemes or by all parties contributing towards training, considering there is a drive to procure public sector construction projects through collaborative contracts. Dickson (2013) argues that training costs can be compensated through projects completing on time, within budget, to a good quality and through collaborative

working. Finally, training is important but more than that willingness from practitioners to adopt VMP is more important. To address this, increasing awareness through familiarization induction is recommended.

4.3 EW PROCESS

Data Presentation

Most participants stated that the principle of the EW process works, however, in practice the process is not followed. C05 stated *'It is powerful and works if it is done in a timely manner'*. CL2 stated *'principles work as issues are highlighted early'* however in practice *'EW comes very late and the right people do not attend the EW meetings'*. CO2 stated *'some people use it as an adversarial, confrontational and positioning tool'*. Other comments include EWs raised to avoid sanction, not drafted clearly and gives a bad flavour to the client team.

Most participants stated that the EW process does not work in practice. SC1 stated *'it is more about blame apportionment'*. The other reasons included were contractors having JCT attitude, EWs abused by contractors, EW meetings used to discuss liabilities and perceived as a commercial stunt.

The client and consultant participants recommended that EW drafting should ensure that it is not adversarial, but it aims at clearly highlighting the issues and solutions. A recommendation by CL2 was that *'NEC should collate end of the project relevant EW/CE, have them centralised for other projects to use as lessons learnt.'*

Data analysis

The findings above support the principle of EWs as stated by Chan et al (2011) and Zhang et al (2016). However, it suggests the EW process does not work in practice as participants face challenges during the administration of the process. This supports the finding in the literature as stated by Klein (2017). EW do not work in practice because adversarial behaviour due to poor drafting and professionals continue to have behaviours like traditional contracts of leaving issues till the end to resolve as stated by Moore et al. (1992). See section 4.3 about recommendation for resistance to change.

This study recommends paying attention to the drafting of EWs. This can be done by ensuring that the content of an EW includes the issues faced on the project and proposed solutions to resolve the issues as suggested by Boyling (2010). This works, as clearly drafted EWs with proposed solutions shows a willingness to resolve issues and addresses the negative perception by the client team, encourages parties to come up with an agreed resolution during EW meetings whilst also encouraging parties to take necessary actions.

Recommendation for NEC to centralise a platform and capture lessons learnt from the previous project. This will help with drafting and cultural change. This works as knowledge sharing leads to collaborative working, commitment from professionals and increased engagement as stated by Corbett and Spinello (2020). RICS (2018) noted the importance of the construction industry learning from previous projects and implementing lessons learnt on new projects. This will work as it will provide additional support and increase awareness among junior members as stated by Heaphy (2013) and it will also assist industry professionals.

4.4 CE NOTIFICATION PROCESS

Data presentation

All participants confirmed that the CE process is very administrative heavy. The majority stated that it works as it deals with the issues on a progressive basis. CL3 stated '*it helps with the audit process and tight budget management*'. To address the concern of admin heavy, most participants suggested to use software and confirmed that they have used software to administer the contract. CT5 stressed that '*you cannot administer NEC without software-it would be a disaster*'. Many participants highlighted that the use of software depends on the scale of the project due to cost and there is a need to standardise a list of NEC approved software for efficient use.

Most participants agree that the timescale within the CE process is realistic including an 8-week time bar. CT5 stated that '*time element helps to sort out final accounts quicker*' and CL1 stated that '*...8-week time bar drives the right behaviours*'. However, CT5 and C01 stated that '*the 8-week time bar works but drafting needs to be made clearer*'. Some participants recommended that the interpretation of the 8-week time-bar can be clarified through NEC by including more details within the guidance notes or parties may choose to use the Z clause to clarify it.

Subcontractor participant stated that timescales '*are not realistic as timescales are reduced through Z clauses*'. When asked about the impact, SC1 stated it leads to the loss of entitlement in some cases, but they do not involve lawyers until there is dispute due to the cost and time. SC2 stated that they usually agree informal extension with the contractor and '*good thing is most contractors do not time bar us*'.

Most participants stated that Z clauses are important, but it must be used for clarification and not changing the intent of the contract. Subcontractor participants and some contractor participants stated that Z clauses have a negative impact as it creates ambiguity and confusion and it may compromise one of the contracting party's positions. CT1 stated '*Including too many Z clauses goes against the ethos of the contract*'

Data Analysis

The finding supports the literature that the CE process is admin heavy, but it can be addressed through the use of software. It further supports Hastings & Kerr (2018) by stating that software helps with time saving and addresses the issue of human error. Most participants did not face the issues highlighted by Kassem et al (2012) and Assaf and Al-Hejji (2006) such as resistance in adopting technology, lack of investment and training cost. This may be because it is acknowledged within the construction industry that VMP in NEC is admin heavy, resulting in many projects already administered through software. This allowed parties to realise the benefit and opportunity to weigh up the benefits against the cost. The benefits include automated reminders, analytical tools, creation of automated notifications, reduction in administration and others (Wilkinson, 2017). Further, it must be noted that many consulting firms, contractors and public sector clients have signed contracts with various software companies to administer the contracts (Willans, n.d.). However, it may not work if different software is adopted for different projects, this leads to a training need every time different software is used leading to increased cost and time. Thus, it is recommended that a standardised list of NEC approved software should be used by the industry to administer VMP. This maintains competition but also ensures familiarisation.

The findings support the Cox and Thompson (1996) study that timescales within a contract is realistic ensuring timely final accounts. This was due to most participants (client, consultant, and contractor) who stated that the timescale is realistic did not have timescales amended through Z clauses in their contracts. Where the timescale was amended through Z clauses, subcontractor participants stated the timescale was unrealistic. To address this, participants recommended extending the response time with joint agreement. However, parties may misuse extensions, so it is recommended to agree extensions and ensure that this deadline is met. This works as realistic timescales can be agreed between parties as per project requirements.

The literature suggested that unrealistic timescales result in loss of entitlement of CE leading to lawyers' involvement. However, this study contradicts as none of the subcontractor

participants involved lawyers, one participant faced a loss of entitlement in some instances only and others did not face any loss of entitlement as the contractor did not implement a time bar. As a best practice and to avoid getting to this stage as suggested by Russo (2020) a CE must be notified as soon as parties become aware of the event. This ensures that entitlement is not lost.

Some participants stressed the importance of clarifying the interpretation of an 8-week time bar as suggested by Kingston (2015). This can be done by parties including further clarification through Z clauses. This works as it can be included during the contract negotiation stage by parties to bring clarity to the contract. Additionally, NEC can clarify the interpretation of the 8-week time bar through inclusion within NEC guidance. It may take time for NEC to standardise this as it goes through various approvals before release (Gerrard, 2005).

In terms of Z clauses, this study states that they are important but some suggested that it creates a negative impact. This was supported by Higgins (2014) who stated that poorly drafted Z clauses have a negative impact. Further, Broome (2015) stated Z clause creates a negative impact if parties use it excessively to change the intent of NEC. This was strongly supported by a minority of participants where Z clauses were used to change timescales as it led to a challenge in administering the contract. To address this, most participants recommended using Z clauses to clarify the contract and not to use it to change the original intent. This works if parties use Z clauses to address complex issues faced on specific projects and/or to clarify the interpretation of certain clauses.

4.5 CE ASSESSMENT AND IMPLEMENTATION

Data presented

Most participants stated that assessment and implementation of a CE happens on a progressive basis leading to timely final accounts and payment to the contractor.

Everyone except subcontractor participants stated that the principle of assessing time and cost together is good. However, majority stated that time is submitted and addressed as part of a quotation only on some instances. Reasons provided by subcontractor participants for not supporting the principle were the additional resource required for programme updates and contractors do not accept programmes in a timely manner. To address this, it was recommended to increase training and awareness. Further, some participants stated that they hardly receive a time element from contractors within their quotation. CO1 stated '*contractors struggle with submitting the time element*' and CT1 stated '*it stops implementing a CE if one element is not agreed*'. Most participants recommended that there is a need to change the mindsets to ensure that cost and time elements are dealt with in each CE and some also suggested keeping better records to justify cost and time.

In terms of PM assessment, there were divided responses from participants, where half stated it is good and others stated it is negative. There were three participants who did not experience PM assessment. Most client-side participants stated that PM assessment is good as it progresses issues. However, two consultant participants stated it is a negative reflection on parties as it should not get to this stage. Most contractor participants stated it has a negative impact as it leads to disputes. CT1 stated '*PMs may play games as well*' and CT2 stated '*PMs miss things out and there is negligence due to lack of experience*'. This questions a PM's role and integrity on the project. To address the negative impact, most participants recommended to use it as a last resort and have ongoing discussions. Further, CL1 stated '*a PM assessment should be a scientific exercise to avoid negative impact on the project*'.

Most participants stated that contract timescales and client governance are not aligned with each other even though it is discussed with the client pre-contract. The client participants stated

that internal governance that aligns with the contract is discussed with the public sector board but due to team changes it no longer aligns. CL3 commented '*Best endeavours to agree precontract, but situations change. Given public sector and fixed contingency, once used everything needs to go through board approval*'. Consultant, Contractor and subcontractor participants highlighted that this causes massive issues with the implementation of a CE. SC1 stated '*there are instances where a project has lost 3-4 weeks as contractor only gives partial instructions to subcontractors which is longer and more expensive*'. To address this, individual recommendations were to provide delegated authority to PMs, increase awareness and education within client teams, agree realistic extensions of time and timescales amended through Z clauses as per governance requirements. SC2 stated '*maintaining relationships is more important than contracts*'.

Data analysis

This study supports the literature in stating that CE assessment and implementation happens on an ongoing basis in NEC due to the assessment of costs and time together and/or PM assessment and/or internal client governance. However, after a closer look, it can be noted that each element has its challenges.

This study supports Wright and Fergusson (2009) and Barnes (2002) in stating that assessing time and cost together is good. The reasons for supporting principles were timely final accounts and no delay in claiming at the end. However, the majority stated that the time element is considered on some occasions only due to challenges in forecasting time and updating the programme regularly. To address forecasting of time, PM assumptions can be used as stated in NEC, but only two participants considered using PM assumptions. This supports the study done by Lau et al (2019) and Fenn (2007) where it was highlighted that there was not enough trained staff to update the programme regularly and a lack of understanding of the contracts. To address the issue, it is important that all project stakeholders including the supply chain and subcontractors are trained to update the programme as suggested by Keown (2012) and keeping better records to justify cost and time as suggested by participants. The open book environment for sharing accounting information will help to assess CEs quicker, reduce disagreements and

encourage collaborative working (Lau et al., 2019). This works as it will create better a contracting culture, change in mindset and relationships as stated by Tan et al (2017).

Even though there is dividing opinion regarding PM assessments being good or negative, it is noted that client participants consider PM assessments to be good. This may be because the client through a PM has more responsibility and control for a project as stated by Fox (2006). However, as noted by Fisk and Reynolds (2010) and Bingham (2011) that PM assessments may have a negative impact, half of the participants believe it has a negative impact as parties do not agree with the PM's decision leading to disputes. To address this, participants recommended having an ongoing discussion which ensures that PM assessments are used as a last resort and taking scientific approach during PM assessment. This works as it ensures the PM assessment can be backed up with scientific approach and effective communication between the parties allows the PM to continue with assessments if necessary but both parties are still informed leading to less disputes (Olanrewaju et al., 2017). Further, some participants questioned a PM's role and integrity. Bingham (2011) argues that a PM is hired by the client leading to biased decisions and conflicts of interest. However, it must be noted that as per NEC, a PM has the obligation to act independently with integrity and has a duty towards their professional membership and their organisation of acting independently. This is further stressed by Taylor (2019) and Mackay (2017), that a PM has an obligation to act independently and make unbiased decisions.

Bennett and Barid (2001) and Weld (2017) stated that issue of delayed approvals due to client governance is addressed by agreeing internal governance precontract and to comply with tight timescales. This study contradicts with this as most participants have stated that contract timescales and client governance in NEC are not aligned even though it is discussed with the client pre-contract. Further, participants noted that this created similar issues to traditional contracts such as delays in implementing CEs as noted by Gray and Hughes (2001). To address this, consultant participants recommended that PMs should be given delegated authority. This works as it will ensure timely approvals as per pre-agreed authority levels as stated by Wooldridge-Irving (2021). However, the issue of clients internal policy changes remain, then delegated authority levels may need to be agreed again. To address this, increased awareness

and education in the client team was recommended by participants through familiarisation workshops and lessons learnt as discussed above. This works as client teams are aware of contract requirements and any policy changes being addressed in advance of it being implemented on the project. It is interesting to note that one recommendation was that maintaining relationships is more important than the contract as this will allow effective implementation of contracts and better a contracting culture. This works as it will create a collaborative approach which Latham (1994) and Egan (1998) aimed at achieving.

4.6 SUMMARY

This section summarises the key findings and recommendations. Firstly, this study suggests that VMP in NEC is effective in principle but in practice it is ineffective, due to adversarial culture and mindsets. To address this, recommendations are to arrange familiarisation and commercial inductions at the start of the project, government drives in adopting collaborative procurement, consistent procurement strategies, encouragement for women to join the industry, clearly drafted risks, and free training across the industry. It is also highlighted that the importance of maintaining relationships is important which leads to a collaborative culture.

Secondly, this study suggests that attention to drafting of EWs and CEs is important to address traditional contract mindsets. The recommendations are to use lessons learnt from previous projects or NEC centralising the lessons learnt leading to knowledge sharing, positive drafting of CE/EW, increased understanding, and a positive culture.

Thirdly, the study emphasises that the issue of admin heavy within VMP can be addressed using software. To increase efficiency of software it is recommended to standardise a list of NEC approved software. For the interpretation of the 8-week time bar, it is recommended to clarify the interpretation through Z clauses or standard clarification by NEC within the NEC guidance notes. It is strongly recommended to use Z clauses to clarify the contract position and not to alter the original intent.

Finally, this study suggests that for effective CE assessment and implementation, there is a requirement for increased programme/NEC trained professionals, creating an open environment by sharing accounting information and improved record keeping. To ensure that contract timescales and client governance are aligned, it is suggested to give delegated authority to PMs and increase client understanding of the contract requirements. Further, to address the negative impact of PM assessments it is recommended to have effective communication by ongoing discussions between parties and use PM assessments as a last resort. PM to ensure that scientific approach to PM assessment is taken to reduce disputes. The PM's integrity during PM assessments was questioned, but it must be noted that a PM has an independent role to play as per the contract requirements and their professional standings.

The following section will summarise the reasons for the research and methodology. It will conclude by providing recommendations, contribution to existing knowledge and limitations of the research.

CHAPTER 5 - CONCLUSION

5.1 REASON FOR THE RESEARCH

There is an increase in use of NEC contracts, specifically within the public sector, as the UK government is aiming towards more collaborative contracts and variations are unavoidable on any project leading to the increased use of VMP in NEC. Variations are inevitable during the construction phase due to a project's unique characteristics. It causes the highest amount of disputes, negative behaviour and impact on project performance leading to time, cost and quality implications. To avoid these impacts, it is important to have efficient VMP which brings clarity to the contract, a well laid out process, clear roles and responsibilities, timescales, communication, assessments etc. Further, it is important to investigate the challenges faced by professionals whilst implementing VMP and recommendations to overcome these. This research topic was selected due to the importance of VMP in a construction project, the significant impacts it has on a project and the limited research on the topic within the UK.

5.2 RESEARCH METHODOLOGY

The aim of this investigation was to critically evaluate the implementation of VMP in NEC3 or NEC4 within the construction industry in the UK during the construction phase. This was achieved by following the below steps stated within the objectives.

- To investigate the causes and impacts of variations on a construction project - this was achieved by undertaking secondary research via the literature review.
- To establish the challenges faced during the implementation of VMP – this was achieved through a comprehensive literature review on each phase of VMP
- To examine the barriers in implementing VMP – this was achieved by undertaking primary research through semi-structured interviews. Fifteen semi-structured interviews were carried out to investigate the challenges and barriers faced by client participants, consultant participants, contractor participants and sub-contractor participants. The participants were experienced NEC professionals (PM/QS), which ensured that rich data was collected.

- To analyse the data and compare these with the literature review to investigate the effectiveness of implementing VMP – data was collected through recording and transcription of the semi-structured interviews, which allowed the researcher to analyse the data and compare it with the literature review. This objective was achieved by concluding the findings of the research.
- To provide recommendations for effective implementation of VMP which supports collaborative working and mitigates the impacts on time, cost and quality – this objective was achieved by co-ordinating recommendations of best practice from participants and researchers.

5.3 CONCLUSIONS

VMP in NEC is effective in principle but in practice it is ineffective, due to adversarial cultures and mindsets. Further, the EW process does not work in practice as there is resistance to change and in adopting this process. Many professionals do not follow the EW process and continue to have traditional contract behaviours of leaving issues to be resolved nearer to completion. The timescale within VMP is realistic, however if Z clauses are used to amend timescales, then it becomes unrealistic. The various interpretations by professionals regarding the 8-week time bar leads to disputes and drives the wrong behaviours. The VMP is admin heavy as noted by researchers. Whilst assessing CEs, time element is not always considered due to the lack of programme trained professionals and the lack of contract understanding. PM assessments are being favoured by client teams; however, it is perceived to be negative by contractor teams. The PM's integrity in doing PM assessments was questioned by some professionals. Finally, it is concluded that client governance within the public sector is not aligned with contractual timescales.

5.4 RECOMMENDATIONS

This study highlights participants appreciate and consider that the principles of VMP in NEC are effective and anticipate that it can work in practice, once there is a shift from adversarial culture and mindset to a collaborative approach. The main reason for this is resistance to adopting the process, a lack of understanding and awareness of VMP. The following recommendations are provided to effectively implement VMP leading to improved quality, cost and time savings.

1. Pre-contract – it is recommended that during the pre-contract stage a consistent procurement strategy is adopted within the entire supply chain (upstream and downstream contracts), restrictive use of Z clauses (only to clarify the contract or amend as per project requirements) and ensuring client governance align with contract timescale. Further, interpretation of the 8-week time bar clarified through Z clauses or NEC clarifying within NEC guidance notes. This will work as it will ensure that there is a common project goal and clarity within the contract. This leads to collaborative working, breeding the right behaviours among the contracting parties and less disputes.
2. Induction –Familiarisation and commercial induction is recommended at the start of projects to have a common understanding of the project risks, Z clauses and requirements of sharing accounting information. This will increase awareness between parties including roles and responsibilities of professionals involved in VMP and create a transparent commercial environment leading to collaborative working. It will also ensure that unnecessary administrative time and costs are reduced.
3. Encouraging more women into the construction industry – is recommended as it will bring new skill sets, different perspectives and improved decision making. This will help to positively change the contracting culture whilst implementing VMP.
4. Free NEC training – it is recommended to provide free NEC training across the industry to increase trained professionals who have a deeper understanding of VMP. This will increase trained professionals leading to time element submitted as part of CE and professionals following VMP effectively. This will ensure that overall cost and time in administering VMP is reduced as all parties will be working in line with the contract.

5. Lessons Learnt – It is recommended that NEC should centralise a platform for professionals to include lessons learnt from the previous projects. This will increase knowledge sharing and will help with EW/CE drafting leading to improved behaviours during the implementation of VMP and avoids unnecessary administrative work.
6. Standardised Software - A list of standardised NEC approved software is recommended for administering VMP. This will reduce the need for repeated training for different software leading to cost and time savings but ensuring that competition among software companies is still maintained.
7. PM's role – it is recommended that PMs are to be given delegated authority to ensure effective CE implementation is done within contractual timescales and the PM is to undertake PM assessments as a last resort. This will ensure that contractual timescales are met whilst encouraging a collaborative working environment leading to timely implementation of CEs and payment to contractors and the supply chain. During PM assessment, PM to take scientific approach to assessment, act with integrity and play an independent role to reduce disputes.

5.5 RESEARCH CONTRIBUTION

This research has contributed to the finding that the principles of VMP are efficient, however, the construction industry in the UK is not fully prepared for adopting VMP yet. Thus, the recommendations of this research will aide clients, consultants, contractors, and sub-contractors with ways to effectively implement VMP. This can be used by private sector projects as the principle of VMP remains the same. Further, the recommendations will equip professionals to address issues prior to project commencement and points that are required to be noted during contract drafting and the negotiating stage. The research can be used to cross refer with existing literature about changes in culture and mindset since introduction of NEC and the challenges that persist in implementing VMP within the industry.

5.6 LIMITATIONS

This is preliminary research, and its recommendations should be used with caution as there are limitations. The participants for this research were mainly Midland based and has not covered the entire nation. It would be beneficial to extend the study to the entire nation as it will help to understand the challenges in more detail, and it may also provide further recommendations of best practice to ensure effective implementation of VMP.

This research is based on NEC experienced participants in their role as a QS or PM. To progress the research, it is advisable to extend the interviews to cover more professionals and extend it to other construction roles such as designers, architects, engineers, technical supervisors, etc. as these professionals may have different experiences/challenges faced during VMP implementation and further opinions/suggestions of effective implementation of VMP.

The research participants were mainly working on public sector projects. Thus, the experience of administrating VMP within private sector projects may be significantly different or the challenges faced may not be as significant as the public sector. Thus, the recommendations may be quite different to that as suggested in this research. It is advisable to extend the interviews to private sector project professionals to understand the depth of the challenges faced whilst implementing VMP.

CHAPTER 6 – REFERENCES

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APPENDIX A – INTERVIEW QUESTIONS

Interview Questions (Semi Structured Interview)

Your Role:

Client/Contractor/Consultant/Subcontractor

1. As you have used NEC on your projects, what aspect do you like about Variation Management Process (VMP) in NEC? And What aspects you do not like about VMP in NEC? Why? What can be done to improve? Or what was done for the effective implementation of VMP in NEC.

Narrative: The reason I am asking this question is to understand why professionals like VMP in NEC and what challenges they face whilst implementing VMP in NEC.

Achieve: By asking the above question I want to see if the VMP in NEC supports collaboration or not and the reasons.

2. What is your experience of VMP in NEC in terms of administration? Have you experienced any issues? What can be done to address this issue? If it is not an issue, can you make it even more efficient?
 - a. If yes, how do you manage VMP?
 - b. If not, why and what was/is done on a project for efficient VMP?

Narrative: The reason I am asking this question is to gather the views about practitioner to establish if VMP in NEC is administrative heavy.

Achieve: I want to understand if it is administrative heavy then what can be done for its efficient implementation. If it is not heavy then what is done by practitioner to ensure there is less paperwork.

3. According to your experience, do you think the EW process works in practice? (hint: add value/blame game) why /why not?

Narrative: The reason I am asking this question is to understand if professional believe that this process helps mitigating issues collectively and gives early opportunity to each other to arrange funding if necessary.

Achieve: I want to see if EW process supports proactive approach of NEC, mitigation of risk and collaboration.

4. As per your experience, how does the timescales of variation (quotation request, notifying CE) in NEC impact on you and the other parties/projects? Reasonable or not?
 - a. If go through many extensions, what can be done to avoid this? Or
 - b. Parties abide by tight timescale, did you see positive impact on the project?

Narrative: The reason I am asking this question is to understand if the project team abides by the tight timescale or bypasses these tight timescales by requesting continuous extensions.

Achieve: One of the main benefits of NEC is that things progress continuously on the project rather than issues festering long. By asking this question I want to see if the tight timescale are met by the parties or not.

5. What is your experience of internal approval processes (governance) for notifying CE/CE implementation to the other party? Are these processes being agreed prior to the contract? Or after the contract?

- a. If it is agreed prior to the contract, does it help in quicker CE implementation? If yes, what was done on a project to make it efficient?
- b. If it is not agreed prior to the contract, how long did it take to agree internal approval process? Does it had delay in implementing CE?

Narrative: The reason I am asking this question is to understand if the approval process is being undertaken by parties pre or post contract and understand if this makes the CE implementation process more efficient.

Achieve: I want to see if the claim of VMP in NEC being proactive is correct or not?

6. What is your opinion of submitting a quotation which assesses cost and time for a particular CE together?

Narrative: The reason I am asking this question is to understand if the impact of cost and time are assessed together then does it support quick CE implementation or not?

Achieve: I want to see if the parties if the assessment of cost and time together has positive impact such as quick valuation of final accounts, increase clarity and reduction in dispute.

7. What is your experience of using PM assessments during VMP and its impact on a project?

Narrative: The reason I am asking this question is to gather the views from practitioners about using PM assessment on a project.

Achieve: I want to establish if PM assessment has negative or positive impact.

8. Not used

9. What is your opinion on the lawyer's involvement in VMP in NEC – too much, too little, just right? Why? What can be done to reduce lawyer's involvement? Or what was done on the project for less or just right lawyer's involvement?

Narrative: The reason I am asking this question is to understand if the lawyer's involvement was required or not. If yes, then what were the reasons for lawyers involvement.

Achieve: I want to see if the claim of VMP in NEC is simple and easy to understand is correct or not and also understand its impact on the project.

10. In your opinion what is the reason for limited or more case precedence (NEC related litigation) for NEC? If there are limited case precedence, then does it impact on drafting a CE or CE decision making process?

Narrative: The reason I am asking this question is to understand if the reason behind limited case precedence in NEC. Further, if a practitioner believe that limited case precedence creates issues during drafting a CE or making the decision if the CE is notified correctly or not.

Achieve: I want to establish if the limited case precedence is due to efficient VMP in NEC or the industry have not understood the depth of the issue

11. Have you attended training sessions or accreditation course on NEC? How long was the training? Is the training effective? Why/why not? What can be done to improve? What was done that it was effective?

Explore: positive or negative impact?

- c. What did you do on a project for efficient implementation of VMP?
- d. What can be done to improve the efficient implementation of VMP?

Narrative: The reason I am asking this question is to understand if there is link between efficient VMP and training.

Achieve: I want to see if training has impact on implementation of VMP.

12. What is your experience of software used for VMP in NEC? If not used, what are the reasons for not having software on a project? How are the cost associated with the software justified?

- e. If yes, how easy or difficult it was to implement this technology? If easy, what did you do to ensure that everyone was using the system efficiently.
- f. If not, what can be done to improve efficient VMP on a project.

Narrative: The reason I am asking this question is to gather the views from practitioner about software use on a project and if the cost of using software is justified.

Achieve: I want to establish the importance of software on a NEC project and the cost associated with it.

13. In your experience, have you always had many Z clauses in the contract? If yes, what impact did it have on a project and why use excessive z clause?

Narrative: The reason I am asking this question is to gather the views from practitioner about use of Z clause on a project

Achieve: I want to establish if excessive use of Z clause has negative impact or not.

14. Whilst implementing variations, usually there may be disagreement between the parties. According to your experience, what are the main sources of disagreements in VMP? How do you deal with the disagreements? What works and what does not?

- g. If yes, what can be done to improve?
- h. If not, what are you doing to motivate the people towards this change?

Narrative: The reason I am asking this question is to gather the views from practitioner about how disputes are being dealt in NEC.

Achieve: I want to establish if the disputes are dealt better in NEC compare to other contracts or it causes more confusion.

APPENDIX B – TRANSCRIPT (EXAMPLE)

22.06.2021 – CO4 – Project Director

00:00:00.000 --> 00:00:02.980

NP

Anonymous for the purpose of the dissertation.

00:00:04.600 --> 00:00:07.820

NP

And thank you very much for agreeing to participate.

00:00:08.860 --> 00:00:09.410

CO4

That's OK.

00:00:09.950 --> 00:00:30.700

NP

OK cool. So the first one is just because my dissertation is on variation management process in NEC just from your experience wanted to understand what aspects that you like about variation management process in NEC and what aspects you don't.

00:00:32.060 --> 00:01:02.290

CO4

Then for the for the things I like, I think the NEC really supports the variations being managed proactively instead of being left to build up until the end, so that continuous review and you know the collaborative approach. The NEC that I think really supports, as I say, not leaving issues till the end, but working through them. And I think that's really positive because it helps with the program. It helps with cash flow.

00:00:43.920 --> 00:00:44.300

NP

Yeah.

00:01:02.340 --> 00:01:10.180

CO4

It helps clients, expectations, contractors, final accounts, etc. So it's beneficial to all parties, not just one.

00:01:10.910 --> 00:01:13.230

CO4

And the bits I don't like.

00:01:13.460 --> 00:01:14.560

CO4

Uh.

00:01:18.180 --> 00:01:28.550

CO4

I don't think I can think of any really, but I did like, yeah, I think it works well. I really you know, I really like the NEC really support it. So yeah, I can't think of anything that I don't like about it.

00:01:29.030 --> 00:01:29.610

NP

00:01:31.360 --> 00:01:48.080

NP

Just moving on in terms of the administration of variation management process in NEC, some believe it's quite admin heavy. Some believe it's just right and it needs admin heavy because there is process defined. What are your thoughts about it?

00:01:49.000 --> 00:02:10.980

CO4

I think it's the right level. I think it is a very good level of administration that puts the onus on dealing with issues dealing with the variation of process that goes with it rather than leaving it so it is probably administration heavy compared to other forms, but because it's proactive in its approach it it will end up being a more efficient process in the end.

00:02:13.410 --> 00:02:21.200

NP

OK, and is there anything that we can do to address it or is it in terms of administration, heavy side of things?

00:02:22.280 --> 00:02:48.260

CO4

I think any sort of collaborative tools and thinking of software they systems that can support the processing of any of the contract admin needed for the NEC would be useful. It provides you know all is providing the reminders rather than us having to do that ourselves and put notes in their Diaries and all sorts you know and to allow digital technology to help that would be is always useful.

00:02:50.280 --> 00:02:51.860

NP

OK, thank you.

00:02:53.480 --> 00:02:59.920

NP

In terms of the early warning process itself, what is your experience about it?

00:03:01.410 --> 00:03:03.430

NP

Does it add value, does it not?

00:03:01.740 --> 00:03:02.330

CO4

And.

00:03:04.150 --> 00:03:34.820

CO4

It I think it does add value, although I think it is quite a misunderstood process. I think people see it is quite negative, and you know my goodness, there's an early warning and it's that mindset change that often we have to do it at the start of the project. If we have the luxury of being at the start of the project of changing the hearts and minds to allow, then you know for us to say that early warnings aren't negative. They're not necessarily a bad thing, but it does give us the opportunity for us to collectively think about issues that may be on the horizon. So I do think it's positive.

00:03:34.870 --> 00:03:35.820

CO4

I think that the.

00:03:36.070 --> 00:03:37.940

CO4

An the.

00:03:38.550 --> 00:03:41.330

CO4

So cultural response to it isn't always positive.

00:03:41.850 --> 00:03:51.870

NP

Yeah, So what do you do in your projects to make sure that you know it's not perceived to be negative and it is worked as it is meant to be?

00:03:52.720 --> 00:04:22.240

CO4

Yeah, so I mean [REDACTED] We did quite a lot of training on this, so it's or familiarization with the client and the contractor. We started utilizing it very early and probably over utilized it but showed in a way that the early warning process was there to help us rather than it is always just a big issue coming to the party. So as I say training how it supports the overall contract admin process. You know seeing that timeline and how it all fits together was helpful for the client.

00:04:23.350 --> 00:04:29.440

CO4

And then using it from day one. Being quite you know, really instilling that practice from day one was important.

00:04:30.960 --> 00:04:31.460

NP

Perfect.

00:04:34.300 --> 00:04:49.800

NP

Practice OK, thank you in terms of the time scales of the variation management overall in so it be the eight weeks' time bar or providing the quotation etc. In your experience, do you believe it is realistic?

00:04:51.210 --> 00:04:55.830

NP

Or what is your experience generally with the time bars and the quotation requests?

00:04:54.030 --> 00:04:54.500

CO4

Yeah.

00:04:56.820 --> 00:04:58.910

CO4

I think it is realistic. I think it does.

00:04:59.110 --> 00:04:59.490

CO4

And.

00:04:59.900 --> 00:05:27.990

CO4

Uh, put pressure on teams to perform though, but that performance isn't a problem. If the times dictated by the NEC that pressure should be there performing for the project anyway to drive the program. So I think I don't think they're onerous. I think they're fair and I think they're equitable and it supports them that we continually move things forward instead of leaving things to fester, which can sometimes happen.

00:05:14.540 --> 00:05:14.980

NP

Yeah.

00:05:29.940 --> 00:05:49.900

NP

So when I spoke to other people or other group of individuals, and they believed that eight week time bar is not fair in this. From the contractor's point of view, all these misinterpretation of when that eight weeks start from the trigger point sort of thing.

00:05:50.670 --> 00:05:55.800

NP

So what? What are your thoughts in relation to that? Have you had issues with the eight-week timebar?

00:05:57.570 --> 00:05:59.790

CO4

So yes, will happen on projects where.

00:06:00.040 --> 00:06:06.330

CO4

And contractors have been involved because they haven't unsubmitted within that eight-week time frame.

00:06:07.560 --> 00:06:29.400

CO4

It's unfortunate and I think I'm one of the projects I was brought in to do a bit of sort of tidying up and helping them. I think the project manager could have done more to help them to say, you know, don't forget that if you don't. If you don't keep on top of this that you're going to be barred so you know that collaborative approach was probably missing, but the overall it being there.

00:06:20.470 --> 00:06:20.880

NP

Yeah.

00:06:29.810 --> 00:06:35.790

CO4

I, as a provision I don't see is an issue. I don't think that is, that is.

00:06:35.840 --> 00:06:39.980

CO4

Yeah, and prohibitively hard close to it here too.

00:06:41.700 --> 00:07:04.730

NP

OK, and in terms of the quotation request of three weeks, some of the subcontractors that I spoke with, they said that when it cascades down to them, it's two weeks or a week, and that's not realistic, specially if it's a complicated issue. What what would you recommend? Or what would we do differently in those situations?

00:06:55.250 --> 00:06:55.710

CO4

Yeah.

00:07:06.040 --> 00:07:39.180

CO4

So I think the three weeks is sufficient as the overall if there are. If you know there's been a high volume of quotations being requested, or somebody who's been off sick, and you know if things got lost in the ether, I'd much rather the contractor team come forward and say, can I? Is there a way that I can have some further time and we work together to look at what that could be? What that impact could be if you know it? It looking at any further time being granted, so I'd rather it. They come forward and look at how we could help them rather than just.

00:07:20.540 --> 00:07:20.840

NP

Yeah.

00:07:39.370 --> 00:07:59.190

CO4

Possibly put pressure down the supply chain and then we get you know inaccurate figures back or really high figures back 'cause they haven't had time to properly price something. I'd rather them come forward and talk to me about it to say, you know, as I say, is there an opportunity for an extra period of time to allow me to give some time to the supply chain?

00:07:49.640 --> 00:07:50.000

NP

Yeah.

00:08:00.280 --> 00:08:01.800

NP

OK, thank you.

00:08:02.840 --> 00:08:13.630

NP

In terms of the governance from the clients perspective, specially what has been your experience, has that been agreed pre contract or?

00:08:13.740 --> 00:08:14.190

NP

Uh.

00:08:15.320 --> 00:08:19.520

NP

How is that managed with the time scales of the contract itself?

00:08:20.500 --> 00:08:27.850

CO4

Without health care clients in particular, or more widely public sector clients, it is an issue for them to have.

00:08:27.900 --> 00:08:28.600

CO4

And.

00:08:30.460 --> 00:08:44.470

CO4

To be able to respond in those time frames is generally in issue, and that's then when we come down to also them understanding the role of the any CPM that actually PM is the deciding point, not the employer in that in that sense.

00:08:34.420 --> 00:08:34.950

NP

Yeah.

00:08:44.940 --> 00:09:09.230

CO4

And but to have then the governance set up to allow delegated authority for the PM to work within a range of limits, and I think it will be is very useful. It wasn't something we did First off at the [REDACTED], but it was something we did get going on, and that was more because the client was just quite immature. They didn't know what to do, and therefore it felt like a big step for them. But they knew they had to get there in the end.

00:08:52.640 --> 00:08:53.140

NP

Yeah.

00:09:09.280 --> 00:09:38.340

CO4

And and so I think yeah, providing the PM with actual delegated authority to to make the contract work and then also sharing with the client team. This is normally, you know, the exact sort board level where we need to share with them, why it's important that we work these time frames because of the knock on effect it has and what that means to the overall time frame. You know for the project for completion for commissioning, whatever it is. And I think it's important we explain that so they see the context.

00:09:33.990 --> 00:09:34.330

NP

Yeah.

00:09:39.380 --> 00:09:40.420

NP

OK, thank you.

00:09:42.140 --> 00:09:57.080

NP

Have you had a situation where because you had to make a decision within a week, say whether something is succeed or not and you haven't got the authority, what ~~what~~ have you done in that situation? I mean, yeah.

00:09:58.930 --> 00:10:22.690

CO4

And so we used a couple of provisions when we were using PMI's. Either you know instruct to change the works information, i.e. Get on with it, or instruct for a quotation. So sometimes we just get on with it because we know that the impact on the program would be so much that it would outweigh the quotation process. So we'd use the provisions that were allowed a us.

00:10:14.470 --> 00:10:14.790

NP

Yeah.

00:10:20.150 --> 00:10:20.590

NP

Yeah.

00:10:22.990 --> 00:10:40.130

CO4

and other times there were needs where we got extra special come and sign off from the exact directory etc. Say that we recovered from a governance perspective to keep things moving. And as I say, being up front as to I know this sits outside of say there.

00:10:34.330 --> 00:10:34.670

NP

Yeah.

00:10:41.350 --> 00:10:50.320

CO4

The program border, the project group approval process that is needed because of this and we were very upfront and with that was quite a lot of what we must do in response to COVID actually.

00:10:51.540 --> 00:10:56.980

NP

OK, so continuous communication and keeping client up to date.

00:10:57.980 --> 00:10:58.860

NP

OK, thank you.

00:10:58.020 --> 00:10:59.370

CO4

Yeah, absolutely.

00:11:00.620 --> 00:11:09.110

NP

What is your opinion of submitting the quotation that you know the contract also has to do cost and time element together?

00:11:11.520 --> 00:11:13.360

CO4

What's my opinion? Did you say?

00:11:13.590 --> 00:11:14.630

NP

Yes please yeah.

00:11:16.690 --> 00:11:27.940

CO4

I think that's fair. I think it's reasonable. I don't think we can do one without the other. I don't think we should only look at cost or we should only look at program. We need to look at in both, so I think it's fair that we ask for it.

00:11:28.330 --> 00:11:58.830

CO4

And and my experiences taught me that it's better, better that we do that together in that quotation process rather than wait until the end of the time period to then come to me. And then I don't understand it. I actually what I got two at [REDACTED] was that we'd work together from day one of that quotation process with the contractor, so that we were kept up to date. So by the time it came to me, for you know, the formal paperwork came to me. I was fully appraised about. I knew what was in there. I understood what was in there.

00:11:58.820 --> 00:11:59.270

NP

Yeah.

00:11:58.880 --> 00:12:02.020

CO4

And therefore it was easier for me to process that through.

00:12:04.180 --> 00:12:15.740

NP

OK, and in terms of the PM assessment during the variation management process, what is your experience and what impact does it have on a project?

00:12:16.960 --> 00:12:20.490

CO4

Yeah, it it can be quite tricky because it's basically.

00:12:21.350 --> 00:12:31.350

CO4

I think for one to better way saying it that you're not trusting their assessment and you want to do your own and that can put a divide in the in the team and.

00:12:26.760 --> 00:12:27.210

NP

Yeah.

00:12:30.340 --> 00:12:30.820

NP

Yeah.

00:12:31.940 --> 00:13:00.030

CO4

I can see why it's there or there. I do think that it doesn't quite fulfill the in the spirit of mutual mutual trust and cooperation 'cause it feels like it's sort of Big Brother coming in and going well known. I don't like what you've done and I'm gonna do anything. Yeah, so I think there probably is an alternative way. Do I know what that is? No, not off the top of my head, but I don't think that fully is attuned to the rest of the way. The NEC is operating.

00:12:42.580 --> 00:12:42.920

NP

Yeah.

00:12:45.730 --> 00:12:46.380

NP

This is it.

00:13:01.000 --> 00:13:15.230

NP

So in your projects, if you haven't received quotation, or if there's a situation where there's not a last accepted program and and you aren't left with a choice other than doing the PM assessment.

00:13:18.140 --> 00:13:24.210

NP

How is that being perceived from the parties or you haven't come across that situation?

00:13:24.970 --> 00:13:27.630

CO4

So from the contractor parties.

00:13:27.680 --> 00:13:39.770

CO4

And it's negative. You know that they don't like it. They first of all, I think will question will, how do you know how can you do this when you're not the one driving the program to build?

00:13:32.820 --> 00:13:33.200

NP

Yeah.

00:13:39.880 --> 00:13:44.920

CO4

And the second part is then I think it it puts.

00:13:39.880 --> 00:13:40.410

NP

Yeah.

00:13:44.970 --> 00:14:19.310

CO4

And negativity into the client group that actually will hang on a minute. While I haven't, I had a program. Why haven't you been chasing the for doing it so it puts questions into the client as to exactly what the team have been doing, so thankfully I haven't had to deal with that on any of the projects I've been responsible for. All be it. I have, as I mentioned, been asked to go into projects

later when things are going awry like this to help and advice. So it's it's definitely not an easy situation, and I think it's filled with quite a lot of negativity and probably.

00:14:19.360 --> 00:14:27.510

CO4

An some server it's quite standoffish. Normally. At that point people don't aren't really working together, I don't think.

00:14:28.510 --> 00:14:29.950

NP

So you've passed that hurdle.

00:14:30.600 --> 00:14:32.720

NP

Haven't we in terms of collaboration?

00:14:31.260 --> 00:14:32.040

CO4

Yeah, yeah.

00:14:33.230 --> 00:14:33.820

NP

I'm.

00:14:33.520 --> 00:14:34.120

CO4

Indeed.

00:14:34.670 --> 00:14:57.310

NP

What what, what can be done to better that position so at the same time moving the project forward rather than stalling it on one CE? What can we do differently to keep going as well as trying to have that balance not having too much of a negative impact either?

00:14:59.720 --> 00:15:23.160

CO4

I think there's got to be something around what's causing it. Why hasn't the program been accepted work? What's the worry? Where's the issues coming from? And of course, in that situation that we've just described, people are quite entrenched in their own camps at that point, and they won't always want to come forward and say, well, I cocked up on X and therefore I don't want to tell you. And but at some point it's going to come out, isn't it so?

00:15:19.950 --> 00:15:20.480

NP

Yeah.

00:15:22.910 --> 00:15:23.280

NP

Yeah.

00:15:24.810 --> 00:15:44.310

CO4

It's easier said than done, but we that's what you need to tease out. Well, why is this been allowed

to happen and what is that? What is causing the issue? Why don't we know when commissioning started or when the dry lining was happening or whatever it was and what's causing it? And like I say it comes to quite frank discussions at that point.

00:15:39.140 --> 00:15:39.510

NP

Yeah.

00:15:45.640 --> 00:16:01.460

NP

OK sorry, moving on to the specific clauses in the contract in terms of clause 17, ambiguity and inconsistency, do you believe the that particular clause helps to reduce the dispute?

00:16:01.510 --> 00:16:07.360

NP

An an clarifies the position a bit more in compared to other contracts.

00:16:08.360 --> 00:16:37.790

CO4

I do because it puts onus on both parties to be proactive in looking an understanding that contract because, you know, I know plenty of project project managers and contractors that go into a a project actually not knowing what's in the contract, not knowing what they're there to deliver and work too. So I think it does put owners on even if you bought in midway through to pick up the contract and read it, what's in the scope? What's the dates? You know? What's the budget? All those things?

00:16:26.240 --> 00:16:26.660

NP

Yeah.

00:16:37.850 --> 00:16:45.120

CO4

And then to delve into it. If there are inconsistencies, it puts it on both parties, not just one. And I think that's important.

00:16:46.150 --> 00:16:46.610

NP

OK.

00:16:47.630 --> 00:17:06.590

NP

In terms of unexpected conditions, there are few clauses in the contract and also it allows in contract data part one to clarify the position. Do you think these things help to clarify the position so when we are administering the contract it reduces the dispute?

00:17:10.290 --> 00:17:13.950

CO4

I can't remember what clauses they are, which ones are they nearly? Did you got it there?

00:17:14.290 --> 00:17:20.030

NP

I think 62.6 so it says weather conditions one in 100.

00:17:15.630 --> 00:17:16.050

CO4

Got it.

00:17:21.100 --> 00:17:29.310

NP

Or in contract data part one, we define a bit more. Don't wait which where the station to review a way to look at, etc.

00:17:22.760 --> 00:17:23.160

CO4

Oh

00:17:24.950 --> 00:17:25.270

CO4

yeah.

00:17:30.510 --> 00:17:58.000

CO4

Yeah, I think it's great. We're putting it all up front rather than waiting for it and then arguing over crane downtime because we're taking measurements from somebody else's weather station and not the one we specify, for example. And so yeah, I think I think it's good to be upfront and what I would say is the experience is showing that it's not always completed because people think it's not important and therefore then there's gaps. When I've been asked to look at things as I say retrospectively.

00:17:42.830 --> 00:17:43.300

NP

Yeah.

00:17:59.060 --> 00:18:01.220

NP

Yeah, so I think we have to make sure from.

00:18:02.040 --> 00:18:04.810

NP

Beginning that you know those sections are completed.

00:18:05.590 --> 00:18:05.990

CO4

Yeah.

00:18:06.700 --> 00:18:11.010

NP

OK, in terms of prevention clause specific.

00:18:12.200 --> 00:18:25.080

NP

I've included this because of the COvidsituation. Some projects have used it, some haven't. What's your experience about clothes 19? Does it help to reduce dispute or does it clarify the position or not?

00:18:26.250 --> 00:18:33.190

CO4

And I've never. I've never used it, so yeah, it's quite hard to comment on it in that sense.

00:18:33.360 --> 00:18:38.270

CO4

And what was the experience with it? With some of them that have used it?

00:18:39.390 --> 00:18:46.130

NP

So I think it depends on the project to project. Some people have triggered it. Some people haven't triggered it because the project has.

00:18:45.670 --> 00:18:45.990

CO4

Yeah.

00:18:46.800 --> 00:19:01.310

NP

Kept going, but then at the same time some people have said that it's it requires more clarity. It's not as straightforward as it's stated in there, but if you haven't used it, it would be difficult for you to comment on that.

00:18:53.640 --> 00:18:54.110

CO4

Right?

00:19:02.000 --> 00:19:02.660

CO4

Yeah.

00:19:03.110 --> 00:19:13.700

NP

An OK, uh, in terms of the lawyers involvement in variation management process, do you believe it is too much to lead to little or just right?

00:19:14.930 --> 00:19:17.140

CO4

With the lawyers, did you say?

00:19:16.350 --> 00:19:16.770

NP

Yeah.

00:19:17.390 --> 00:19:18.410

NP

Yeah, lawyers.

00:19:22.730 --> 00:19:31.620

CO4

Well, I've never had to involve them in variation management. It's been later in when there's been disputes, so.

00:19:32.410 --> 00:19:35.410

CO4

I haven't had to use them to manage variations.

00:19:32.690 --> 00:19:33.730

NP

OK, fair enough.

00:19:36.330 --> 00:19:36.950

NP

Fair enough.

00:19:38.500 --> 00:19:41.840

NP

OK, an in terms of.

00:19:42.760 --> 00:19:44.130

NP

Case precedence.

00:19:45.240 --> 00:19:55.430

NP

Uh, do you think there is enough information, or enough case precedence that helps parties to draft the CE or make a decision CE?

00:19:57.390 --> 00:20:03.750

NP

Or what has or did you not have to look into that much because the contract was clear?

00:20:05.480 --> 00:20:35.830

CO4

And so my most recent experiences, we didn't need a precedence or legal case perspective because we we've pretty so not with our scope, and that was that was good. You know we understood it and the contractor understood it, and I think I'd be. I'd be worried if contractor was the contractor. Was using case precedence to draft to CE because it feels like they're coming from the wrong place from the starter in drafting it.

00:20:34.970 --> 00:20:35.400

NP

Yeah.

00:20:35.910 --> 00:20:44.370

CO4

Instead of the roots of all the thoughts of what the NEC is, therefore it feels like it's the wrong foot to be starting on it from my perspective.

00:20:46.900 --> 00:20:52.410

NP

OK, fair enough. In terms of drafting, but so say for example cases like prevention.

00:20:54.100 --> 00:21:01.510

NP

And just to understand how it has been triggered by other people or what sort of decisions or things like that?

00:21:03.490 --> 00:21:05.470

NP

Do you think there is enough out there?

00:21:08.080 --> 00:21:24.610

CO4

Well, in relation to Covid know, and that's completely still really unclear and and I don't think there's many that have even, you know, provided real clarity on that with other with other prevention matters then.

00:21:12.620 --> 00:21:12.960

NP

Yeah.

00:21:13.970 --> 00:21:14.350

NP

Yeah.

00:21:24.820 --> 00:21:31.950

CO4

I'm kind of mixed, isn't it? It really depends. So I know that there are a fair few bits.

00:21:32.020 --> 00:21:32.430

CO4

And.

00:21:33.700 --> 00:21:45.020

CO4

In some areas, I think it's really mixed. I really do when we get there. If you were to get into the detail of that specific part of prevention, I think it would be very dependent on that specific.

00:21:38.250 --> 00:21:38.670

NP

Yeah.

00:21:45.670 --> 00:21:47.960

NP

Yeah, OK.

00:21:48.840 --> 00:21:49.450

NP

Ann

00:21:50.010 --> 00:21:57.390

NP

in terms of the training session, have you attended the training session or accreditation costs on NEC?

00:21:58.460 --> 00:22:01.750

CO4

Yeah yeah, I got that. It's five days. I think it was.

00:22:01.900 --> 00:22:10.900

CO4

I'm a plus then pre work and homework so I don't know what it equated to total. But yeah I think it was. It was a five day course.

00:22:11.490 --> 00:22:22.270

NP

OK, and do you think the training was effective or is there anything that needs changing? Not just for you, but overall project and the teams involved?

00:22:21.240 --> 00:22:21.590

CO4

And.

00:22:23.180 --> 00:22:54.100

CO4

The training was the training was effective. I think it was really useful to bring in real life examples that really brought things to life and to be able to have those discussions, especially in sort of when you're in your smaller groups. But one thing that I've been really clear on with when I was at [REDACTED] and with my new team, is that the best thing is that you do your training when you're managing in NEC project. Because if you do it and then you haven't, you don't use it for a while. It all becomes disjointed.

00:22:32.050 --> 00:22:32.270

NP

Yeah.

00:22:54.150 --> 00:23:08.210

CO4

So I think you know, like for you when you joined, [REDACTED]. It was great that you did it in the midst of it, and you were having to deal with these things day today. 'cause really brings it to life and sore embeds it as the [REDACTED] understand how all these clauses are knitting together.

00:22:54.500 --> 00:22:54.930

NP

Yeah.

00:23:01.290 --> 00:23:01.670

NP

Yeah.

00:23:08.620 --> 00:23:09.020

NP

Yeah.

00:23:11.030 --> 00:23:11.600

NP

OK.

00:23:12.710 --> 00:23:20.140

NP

Uh, in terms of the what is your experience of software used for variation management process in any CE?

00:23:21.990 --> 00:23:23.330

CO4

Quite limited actually.

00:23:23.600 --> 00:23:40.820

CO4

I have, but I know that there's lots out there we didn't. I haven't used it recently, but I think it's got to be the way we go. We can't keep relying on paper and you know, like I say, calendar reminders and just counting days down where it needs to be more automated.

00:23:42.890 --> 00:23:43.320

CO4

Yeah.

00:23:46.850 --> 00:23:57.330

NP

So there are some people who believes that you know it's challenging to convince in because of the cost element to it.

00:23:58.250 --> 00:23:58.640

CO4

Yeah.

00:23:59.000 --> 00:24:01.880

NP

So how how would you go about in, you know?

00:24:04.040 --> 00:24:08.100

NP

Making sure that it is implemented on a project and convincing the parties.

00:24:10.110 --> 00:24:40.260

CO4

And I think there's there's two ways you do it. I would look at whether there that changes the resource makeup on a project. So if we had some software supporting the process with that mean that we may need some less junior resource, who would normally do some of that chasing et cetera, et cetera. So I look at whether that provided efficiency. I probably then look more strategically as to without it. What happens if someone human error occurs and somebody forget something, and then you know you've got?

00:24:40.480 --> 00:24:50.900

CO4

Not particularly helpful or collaborative approach with the with the contractor and they go hard at you with being late with payment. Being late with program acceptance.

00:24:52.090 --> 00:25:04.480

CO4

That doesn't have a price tag on it because all of a sudden were in to quite litigious or the start of quite earlier to just process is. So I think you know, I'd probably, as I say, go quite strategic in that way to say that's why it's a benefit.

00:24:59.080 --> 00:24:59.520

NP

Yeah.

00:25:14.070 --> 00:25:14.480

CO4

Yeah.

00:25:16.240 --> 00:25:16.690

CO4

Yeah.

00:25:18.190 --> 00:25:23.810

NP

In terms of the Z clauses, have you always had many Z clauses in the contract?

00:25:25.220 --> 00:25:45.580

CO4

And varied actually so from probably like a handful. 2 pages of them. And then when it gets into pages, I think we're losing the loss of what we're doing. They're not standard forms anymore with with changing the contracts, and that would make me think that we chosen the right contract in the 1st place. Then if we're having to use so many of them.

00:25:39.640 --> 00:25:40.100

NP

Yeah.

00:25:47.780 --> 00:25:50.730

NP

And when I spoke with few people.

00:25:50.940 --> 00:25:54.680

NP

Uh, it was noted that, you know.

00:25:55.340 --> 00:25:59.830

NP

The subcontract has more Zach clauses than the main contract.

00:26:00.910 --> 00:26:04.880

NP

And so the standard form is this much and they that clause.

00:26:05.890 --> 00:26:14.330

NP

That much what what can be done so that there's less pressure when it gets to the right at the bottom of the chain.

00:26:17.360 --> 00:26:18.820

CO4

What can be done?

00:26:21.850 --> 00:26:29.310

CO4

This is an industry response, isn't it? Because it's unusual for the whole supply chain to use the NEC, 'cause it it's just not done.

00:26:29.800 --> 00:26:30.550

CO4

Ann

00:26:29.890 --> 00:26:30.350

NP

Yeah.

00:26:31.790 --> 00:26:36.730

CO4

it's on the bigger it's on this sort of tiered ones and twos that it's more more common.

00:26:37.420 --> 00:26:38.530

CO4

And.

00:26:41.490 --> 00:26:58.650

CO4

I don't know, I, I mean that that that [REDACTED] and say there's an industry response to it. There's something about does the does the standard clauses need to be beefed up then so that they have more provisioning that can be struck through instead of adding? I didn't you, which is possibly the easier to digest.

00:26:58.700 --> 00:27:18.290

CO4

And for many an and, I think there's a marked move that the industry and do need to recognize that the lower down the supply chain they still need to work collaboratively. They still need to work to it should be a back to back contract in arrangement. I think through the sun through the supply chain, but I appreciate that that isn't common.

00:27:16.660 --> 00:27:16.980

NP

Yeah.

00:27:19.830 --> 00:27:27.410

NP

Yeah, it's because yeah, the some of the subcontractors issues that they face with this app closes.

00:27:28.120 --> 00:27:31.760

NP

Is different than what we have with the main contract.

00:27:32.840 --> 00:27:33.280

CO4

Yeah.

00:27:34.360 --> 00:27:41.860

NP

In terms of implementing the variation itself, what is the main source of disagreement that you have faced?

00:27:45.300 --> 00:27:45.900

CO4

Cost.

00:27:47.570 --> 00:27:50.360

CO4

The simple is that we don't agree with the cost, yeah?

00:27:50.510 --> 00:27:50.890

NP

Yeah.

00:27:51.790 --> 00:28:00.970

CO4

It's too expensive if you have added later being then you've double counted here 'cause it was already in the scope. You know all these things.

00:28:02.560 --> 00:28:04.050

CO4

Where you'll start right now so.

00:28:03.400 --> 00:28:04.130

NP

With others

00:28:05.740 --> 00:28:06.250

NP

uh?

00:28:05.760 --> 00:28:06.400

CO4

Yes.

00:28:06.930 --> 00:28:13.870

NP

Uh, so how do you deal with the disagreements? And does it always work? If not, then what do you do differently?

00:28:15.360 --> 00:28:45.050

CO4

So one thing and it was similar to the program discussion actually earlier was that at the [REDACTED] part of the CE or quote process was that we I would sit next to the estimators [REDACTED] and work it up together straight off and it would be from an early stage so that you know if they had questions,

don't put them in as assumptions or risk numbers. Ask the question and we'll get it confirmed, so I'd rather drill down and get to the detail.

00:28:33.490 --> 00:28:33.780

NP

Yeah.

00:28:45.840 --> 00:28:59.340

CO4

Then price something that I couldn't get approved 'cause I've wasted their time and it caused an issue that we've all got to deal with now, so I'd rather, you know, get to that. So yeah, you know work alongside in in bringing it together.

00:28:56.290 --> 00:28:56.590

NP

Yeah.

00:29:02.000 --> 00:29:02.590

NP

OK.

00:29:03.600 --> 00:29:10.880

NP

And if you didn't use NEC on your projects, what would you have used and why?

00:29:13.030 --> 00:29:20.500

CO4

I guess it would have just been JCTD&B because of the scale of projects I've worked on. Intermediate would be too small, so.

00:29:22.200 --> 00:29:31.220

NP

Why?

00:29:32.550 --> 00:29:42.320

CO4

And for me it probably would have been just because of the familiar within the industry and with myself. I haven't used loads of other forms.

00:29:42.810 --> 00:29:43.130

NP

Yeah.

00:29:45.220 --> 00:30:00.100

NP

In terms of the challenges that you faced during the variation management process,

00:30:01.720 --> 00:30:07.580

NP

From other parties or any anyone involved in the project and what have you done to address that?

00:30:08.490 --> 00:30:36.840

CO4

Yeah, the you know there is a disparity with those that understand it and get it and therefore then come with the right mindset to work together. And then there are others that probably the NEC is been enforced upon them and they don't get it and they come with a different mindset. So we did some familiarization, some quite sort of soft familiarization sessions on projects. Previously we did pay for some training. We found money in the budget and you know, we were fortunate to find a little.

00:30:24.570 --> 00:30:24.990

NP

Yeah.

00:30:37.130 --> 00:30:49.100

CO4

Money is in if you 100 pounds to be able to do some group training and then that allows all parties to CE the type of questions that were being asked from the employer. The contractor on the project management team.

00:30:49.630 --> 00:30:56.270

CO4

And and that helps. So I understand where they're coming from with their queries exception as well so.

00:30:56.320 --> 00:31:08.110

CO4

And and and there is something around. Again, it's a softer thing around team building, around trust relationships, all of that that comes which doesn't always have a price attached to it.

00:31:13.570 --> 00:31:13.950

CO4

Yeah.

00:31:14.850 --> 00:31:15.430

CO4

Yeah.

00:31:16.380 --> 00:31:16.840

NP

OK.

00:31:18.110 --> 00:31:18.920

NP

I'm good, thank you.

00:31:21.180 --> 00:31:22.340

NP

OK, ah.

00:31:23.310 --> 00:31:30.580

NP

I have really run through this because of the conscious of the time. Do you have any questions for me?

00:31:33.580 --> 00:31:53.620

CO4

I don't think it's a question, it's a. It's an offered normally if you want to use me for any sort of just reviews or drafting, I'd be more than happy to, and I'd be quite interested as well. It's quite nice to see you know your your development of your thesis is that except for your dissertation. So yeah, please if you want me to look at anything. I've been more than happy.

00:31:54.200 --> 00:31:56.550

NP

thank you very much for the offer.



00:31:57.590 --> 00:32:09.140

NP

So once I have drafted it, well, once I've finalized it, I intend to send it to people who have participate, because so that they know exactly how I've used the data.

APPENDIX C – SUPERVISION SHEET

BNV7095 Dissertation Supervision Record Sheet

| | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------|---------------------------|
| Student Name | Nirali Patel | Date | 11 th May 2020 |
| <u>Actions taken since last meeting</u> <ul style="list-style-type: none"> • Undertook research on the subject • Updated aims and objectives • Defined structure of the research proposal | | | |
| <u>Key issues discussed</u> <ul style="list-style-type: none"> • Clarified the terms Change Management vs Variation • Updated the title to reflect the actual intent ie variation during the construction phase • Clarification that essay need to focus on how Variation impact on a project ie cost, time and quality • How variations are managed in forms of contract • Research method discussed and agreed that case study approach • Variation link to risk in NEV4 • Discussed about how NEC4 is different from other forms of contract • What are the reasons for variations? • Important to include bar chart within Research proposal | | | |
| <u>Action plan agreed</u> <ul style="list-style-type: none"> • Update aim and objectives • Submit formative by 24th May 2020 • Incorporate the details stated within key issues • Literature review to be completed during summer holiday | | | |
| Student's signature |  | | |
| Supervisor's signature |  | | |

BNV7095 Dissertation

Supervision Record Sheet

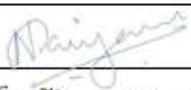


| | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------|---------------------------|
| Student Name | Nirali Patel | Date | 27 th May 2020 |
| <u>Actions taken since last meeting</u> | | | |
| <ul style="list-style-type: none"> Submitted Draft research proposal | | | |
| <u>Key issues discussed</u> | | | |
| <ul style="list-style-type: none"> Comments provided by supervisor on draft research proposal. What are the issues within variation management process in NEC? Discussed about focussing the research on cost implication or organisation barrier. Elaborated that cost implications will lead to quantitative research. Elaborated that organisation barrier would be resistance in change, culture change, governance, administrative burden, etc. How organisational barrier will impact on basic principle of NEC (collaborative working). Discussed that NEC is new form of contract and thus less precedence and research. Supervisor explained that knowledge gap must be detailed properly within research proposal. Discussed that case study will be useful for the dissertation as I am currently working on the project and can access information. (<i>This was further clarified by supervisor on 29th May 2020 that there should be case study as main research method which includes obtaining info through different source i.e. interview, meeting minutes and observation</i>). | | | |
| <u>Action plan agreed</u> | | | |
| <ul style="list-style-type: none"> Update aim and objectives Update research proposal as per the comments made by supervisor Submit the final version by 29th May 2020 (12:00) Literature review to be completed during summer holiday Liaising with the client to seek permission to carryout research on the project | | | |
| Student's signature | Nirali Patel | | |
| Supervisor's signature | <i>Confirmed through email</i> | | |



BNV7095 Dissertation

Supervision Record Sheet

| | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------|-----------------------------|
| Student Name | Nirali Patel | Date | 23 rd April 2021 |
| <u>Actions taken since last meeting</u> | | | |
| <ul style="list-style-type: none"> First draft of literature review | | | |
| <u>Key issues discussed</u> | | | |
| <ul style="list-style-type: none"> We discussed the importance of numbering within literature review Literature Review is chapter 2 Discussed how to improve the structure of literature review Importance of ensuring each section of the chapter focuses on individual topic Expand on implementation of variation within NEC Discussed the importance of highlighting issues within the knowledge gap Discussed interview questions and add following to each question: <ol style="list-style-type: none"> Add narrative within each question to explain the reason for asking the question; Add narrative to explain what I want to achieve from each question; Add narrative to explain what kind of answers I am expecting for each question and how I can use the answers for discussion. | | | |
| <u>Action plan agreed</u> | | | |
| <ul style="list-style-type: none"> Agreed to update literature review with today's discussion Update knowledge gap section and highlight main issues Agreed to remove table from literature review and add narratives NP to submit finalised literature review to HX by 3rd May 2021 NP to forward interview questions to HX by 9th May 2021 NP to arrange a follow up meeting for 14th May 2021 to discuss and finalise the interview questions | | | |
| Student's signature |  | | |
| Supervisor's signature | <i>Hong Xiao - confirmed acceptance of above minute via email on 23rd April 2021</i> @11:39 | | |

BNV7095 Dissertation

Supervision Record Sheet



| | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------|---------------------------|
| Student Name | Nirali Patel | Date | 14 th May 2021 |
| <u>Actions taken since last meeting</u> <ul style="list-style-type: none"> NP sent DRAFT literature review and interview questions to HX HX provided feedback on literature review and interview questions Finalised interview questions | | | |
| <u>Key issues discussed</u> <ul style="list-style-type: none"> Discussed comments provided by HX related to interview question Discussed importance of <u>open ended</u> question vs closed ended question Importance of ensuring that questions are neutral and not leading | | | |
| <u>Action plan agreed</u> <ul style="list-style-type: none"> NP to finalise the interview questions and send it to HX NP to complete ethics form and send it to HX for approval NP to arrange interviews with relevant parties NP to address comments from HX on literature review section and arrange meeting if there are queries regarding the comments provided by HX NP to focus on Methodology as next section. | | | |
| Student's signature | Nirali Patel | | |
| Supervisor's signature | <i>Confirmed through email</i> | | |



APPENDIX D – RESEARCH ETHICS’ FORMS



ACCESS REQUEST LETTER NOTES

Date

For the Attention of:

Dear Mr/Ms/Mrs|

My name is Nirali Patel, and I am a Postgraduate student at School of Engineering and the Built Environment studying Construction Project Management course.

As a component of my degree, I am researching and writing a dissertation about Implementation of Variation Management Process (VMP) within NEC form of contract. The aim of the study is to critically evaluate implementation of VMP under NEC contract. My research is being supervised by Hong Xiao, who can be contacted at Hong Xiao Hong.Xiao@bcu.ac.uk.

In order to help with my research, I would like to invite you to participate in a semi structured interview on your experience of implementing VMP in NEC. You have been chosen to contribute because you have experience in NEC and work within construction industry. I appreciate your valuable time and your contribution.

I would confirm that all responses will be treated as confidential and only used for the purpose of academic research. Responses will only be analysed or reported in aggregated form; so no one response will be identifiable and no personal or company names will be included in the research write-up.

Thank you for your time. I look forward to your valued response. In the interim, should you have any queries please do not hesitate to contact me at Nirali.patel@mail.bcu.ac.uk.

Yours sincerely

Nirali Patel

INFORMATION SHEET

School of Engineering and the Built Environment

This research is being undertaken by Nirali Patel on the MSc Construction Project Management course and is being supervised by Hong Xiao Hong.Xiao@bcu.ac.uk during the period April 2021 to August 2021. This research aims critically evaluate implementation of Variation Management Process under NEC contract and a copy of the final report will be made available to all participants when the work is submitted and graded in September 2021.

QUESTIONS AND ANSWERS – ABOUT THIS RESEARCH

Please note that this information sheet is here to provide basic information about this research project and why you have been invited to participate – specifically common questions arising are listed and answers to these provided. Any further queries will be answered prior to agreeing to your consent to participate. Thank you.

| No | Question | Answer |
|----|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Title of your project? | A critical evaluation of implementing Variation Management Process (VMP) under NEC |
| 2 | What is this research about? | <p>This research project is investigating implementation of VMP in NEC and specifically seeks to critically evaluate the implementation of VMP in NEC within the construction industry in UK. The objectives are as follows:</p> <ul style="list-style-type: none"> • To investigate the significance of VMP in construction project. • To establish benefits and barriers in implementing VMP in NEC through comprehensive literature review. • To examine the barriers in implementing VMP in NEC through primary research. • To analyse the data and compare these with the literature review to understand the effectiveness of implementing VMP in NEC. • To provide recommendations for effective implementation of VMP in NEC which supports collaborative working and mitigates impact on time, cost and quality. |
| 3 | Why have I been invited to participate? | You have been invited to participate as a professionally competent and knowledgeable practitioner who has accrued many years of experience working in the industry – your views and opinions will be invaluable. |
| 4 | What input do you require from me? | The research will require information and data from you, and your experience in the UK construction industry. This data and information will include: your experience of working on NEC project and personal perceptions and opinions. |
| 5 | Where will data collection take place? | Data collection will take place via MS Teams. |

| | | |
|----|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6 | How often will I need to participate in this research and for how long? | You will be required to partake in one interview that will only take one hour. |
| 7 | At what stage in the process will I have the opportunity to discuss my participation? | You will be able to comment upon your participation at the end of the research. |
| 8 | Who is responsible for the information and data collected when this study is complete? | Responsibility for information and data collected is the responsibility of the lead researcher and the supervisor – who must abide by Birmingham City University research ethics rules and regulations. |
| 9 | Who will have access to the information and data? | Only the lead researcher and staff at Birmingham City University. |
| 10 | What will happen to the information/data supplied when this research is complete? | At the end of the study, all information and data will be securely disposed of (including raw data) and only anonymised data will be used for publishing the findings as part of this research. At no time will any data be passed to a third party (willingly or otherwise). |
| 11 | How will the information and data be used? | The information and data will be used to create a research paper that will not contain any personal details of participants or organisations supporting this work. |
| 12 | How long is the research project duration? | The research commences in April 2021 and finishes by mid-June 2021. Contact with participants will only be at short, intermittent periods so as not to disrupt your working arrangements. |
| 13 | Is my data and information secure? | All information is stored electronically on the University's secure 'One Drive' and/or locked away in a secure cupboard. |
| 14 | Can I have access to the research results? | Yes, a summary of the research findings from this study results will be made freely available to all participants. |
| 15 | What if I do not wish to participate in this research project? | Participation is completely voluntary, and you do not have to participate. |
| 16 | What if I change my mind during the research project? | You can withdraw from the research at any stage of the process. |
| 17 | Who do I contact if I experience any concerns or if the study generates any adverse effects? | In the first instance, you need to contact my supervisor Hong Xiao Hong.Xiao@bcu.ac.uk who should refer the matter to the Faculty Academic Ethics Committee. |

CONSENT FORM

School of Engineering and the Built Environment

This research is being undertaken by Nirali Patel on the MSc Construction Project Management course and is being supervised by Hong Xiao Hong.Xiao@bcu.ac.uk during the period April 2021 to August 2021. This research aims to critically evaluate implementation of Variation Management Process under NEC contract and a copy of the final report will be made available to all participants when the work is submitted and graded in September 2021.

Please note that you are able to withdraw from this study at any time up until 19/06/2021 without giving reason or explanation. All responses will be treated in the strictest of confidentiality and will not be share willingly or otherwise with any third party. Data and information analysed will be anonymised to preserve your identity and all information collected will be securely destroyed upon successful completion of the award.

SECTION ONE

Title of study: Implementation of Variation Management Process (VMP) in NEC

Researcher contact email: Nirali.patel@mail.bcu.ac.uk

SECTION TWO - INFORMATION

Please can you answer the following questions by placing a tick (✓) in the appropriate boxes below. Thank you for completing this consent form.

| Question | Response | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----|
| | Yes | No |
| Have you read and fully understood the letter/information sheet that accompanies this invitation to participate in this research? | | |
| Do you agree to participate in this proposed dissertation research conducted by the School of Engineering and the built Environment? | | |
| Have you been given opportunity to ask additional questions about the research study? | | |
| Do you understand that you are free to withdraw from this study, at any time and without giving reasons? | | |
| Do you give permission for the research team members Nirali Patel and Hong Xiao to have access to your anonymised responses and/or data/information? | | |
| Do you understand that all information and data collated will be anonymised, securely stored during the research <u>period</u> and securely destroyed at the end of this study? | | |
| Any other additional comments: | | |
| | | |

NB: Please sign below to confirm that you have voluntarily decided to participate in this dissertation study (as detailed above) and that you have read and fully understood the accompanying letter/information sheet. Your signature will also certify that you have had every opportunity to pose questions about the research and that your questions have been satisfactorily answered.

SIGNATORIES TO THIS CONSENT

Signature of participant:Date:
Name (block letters):

Signature of Researcher: Nirali Patel Date:

Name (block letters): NIRALI PATEL

Signature of Supervisor: Dr Hong Xiao Date:

Name (block letters): HONG XIAO

Please produce three copies of this signed consent form and cover letter – one for the participant, researcher and researcher's supervisor.