Exploring Contractual Arrangements Associated with Adoption of Modern Methods of Construction (MMC) in the UK

Ali M. Saad S.M.ASCE[1]

[1]School of Built Environment, Engineering, and Computing, Leeds Beckett University, Northern Terrace, City Campus, Leeds LS2 8AG, United Kingdom (corresponding author). Email: A.Saad5264@student.leedsbeckett.ac.uk

Abstract

The challenges imposed by the construction industry have, for decades, pressured research and practice to consider the adoption of innovations as means of constructive change. An increasingly emerging technique of construction that shifts key processes offsite is a construction methodology that maximises control. Such an approach is described as the Modern Methods of Construction (MMC), a term that has been widely utilised as a reference to practices that drive less site labour, fewer on-site activities, and maximum offsite and premanufactured value. Such fundamental change in how construction normally operates is logically accompanied by inconsistencies with the contractual arrangements. However, limited research focuses on how traditional arrangements are shaped and amended to suit the offsite anecdote in terms of contract form, contract type, procurement strategy, common changes, and legislation's role. A change in traditional processes would reasonably mean a change in the formal agreements, a research gap that motivates this paper to deem this exploration as timely and necessary. A qualitative research method has been utilised to approach forty critical positions of influence in the United Kingdom such as CEOs, COOs, managing directors, managers, and other decision-makers in businesses categorised as MMC firms. This is considered the first study to explore leaders' viewpoints to better understand how contractual arrangements flow to facilitate, or undermine, MMC in the construction industry. Results suggest that JCT, Design and Build, and bespoke amendments in the payment mechanisms are the preferred contractual arrangements when using MMC. Moreover, the findings indicate

that the success of these arrangements is conditioned to early involvement and collaboration between supply and demand.

Introduction

Undeniably, there is a lag in the construction industry regarding its ability to foster control. Such lack of control is directly linked to cost overruns (Salama et al., 2021), delays (Sharma et al., 2017), and environmental degradation (Agapiou, 2021). These inefficiencies dictate the sector's present realities of low profitability (Maqbool et al., 2022), shrinking growth rates (Razkenari et al., 2020), and poor productivity (Gbadamosi et al., 2020). The formation of an incompetency is contributing to the inability of the construction industry to meet the United Kingdom's growing housing needs (Shojaei and Burgess, 2022), an issue that has been emphasised by Farmer (2016) as catastrophic, driving the UK government to call for a prompt policy mandate to influence industry change (HM Government, 2022). Thus, a rational research approach is to search for a fundamental change that can aid practice to achieve efficiency through a higher degree of control.

According to Li et al. (2022), research interest in the Modern Methods of Construction (MMC) is expected to substantially grow. Such growth is driven by the ability of these methods to shift key construction processes to a more controllable environment (Rahman, 2014), and by that, achieving higher construction efficiency (Ofori-Kuragu and Osei-Kyei, 2021). The philosophy of minimising onsite activities and workforce under the MMC umbrella leads to a range of timely and important benefits (Maslova and Burgess, 2022). For instance, the use of MMC is associated with more cost certainty (Maqbool et al., 2022), time certainty (Vuuren van Jansen and Middleton, 2020), and an extended ability to meet key sustainability goals (Goh and Loosemore, 2017). However, the UK records less than 8% use of MMC across the overall new

developments (Branson, 2020). Such low uptake has been linked to a spectrum of technical and non-technical barriers (Maslova and Burgess, 2022). Therefore, the reluctancy to adopt construction innovations, despite their demonstrated benefits, motivates this paper to contribute to past research by justifying the reasons behind the industry's hesitancy towards higher rates of MMC adoption.

One of the understudied areas believed to be contributing to clients' indecision towards adopting MMC is the misaligning contractual arrangements designed for traditional construction (Charlson and Dimka, 2021). Such arrangements conflict with a range of features and are argued to limit the flow of innovations across industries (Reljic et al., 2021). This reality extends to exist in the construction industry (Razkenari et al., 2020). The misalignment in the contractual arrangements upholds a comprehensive justification of the low adoption rates of MMC, chiefly due to the incongruities impacting stakeholders' relationships (Xu et al., 2021), and their unpreparedness for innovative change (Maqbool et al., 2022),. Traditional contracts are therefore challenged by fundamental changes associated with the use of MMC. This becomes evident in recent research efforts, as Duncheva and Bradley (2019) call for the need for collaborative contracts that can embrace fewer onsite activities, and Charlson and Dimka (2021) emphasise the need for different payment provisions that can embrace work due and not only work done. A lag in achieving contractual congruence would as a result of these challenges lead to a lag in innovation-adoption (Reljic et al., 2021; Ali M. Saad et al., 2023). Therefore, the paper aims to reach better knowledge of the arrangements being fostered in the construction industry without conflicting with MMC's features.

Review and Theoretical Background

Defining the Modern Methods of Construction

A terminological vagueness surrounds the term MMC and what it includes (Ofori-Kuragu and Osei-Kyei, 2021), with a lack of a harmonised definition across multiple contexts (Nawi et al., 2019). Moreover, existing terminologies have been indicated as misrepresentative of their true connotations (Piroozfar and Farr, 2013). To address this, Taylor (2020) debates forming a standard definition that would reflect what is precisely meant and included under MMC. An approach supported by Ginigaddara et al. (2022), who classify MMC into multiple structures and components while sustaining a common goal of maximising offsite value and minimising onsite activities. Categorising MMC into multiple clusters has been accepted by the UK government, which relates MMC into seven clusters (MHCLG, 2019). These categories are as follows:

- *Category 1*: Pre-Manufacturing - 3D primary structural systems
- *Category 2*: Pre-Manufacturing - 2D primary structural systems
- *Category 3*: Pre-Manufacturing - Non systemised structural components
- *Category 4*: Pre-Manufacturing - Additive Manufacturing
- *Category 5*: Pre-Manufacturing – Non-structural assemblies and sub-assemblies
- *Category 6*: Traditional building product led site labour reduction/productivity improvements
- *Category 7*: Site process led labour reduction/productivity improvements

The quest to clearly define MMC has led to the release of an official MMC guidance, defining MMC as "*Modern Methods of Construction (MMC) is a wide term, covering a range of offsite and onsite techniques. MMC provides alternatives to traditional methods and has the potential to deliver significant improvements in productivity, efficiency and quality for both the construction industry*" (Government Commercial

Function, 2022, p.5). The author of this paper, therefore, adopts such a nationally approved definition as a frame of reference to describe MMC throughout the study (Ali M Saad et al., 2023).

MMC Contractual Arrangements

A review of past literature reveals a limited focus by construction scholars to explore the contractual interactions concerning MMC adoption. Nonetheless, it has been acknowledged that the traditional methods of procurement lead to a contractual misalignment with MMC's characteristics (Maqbool et al., 2022). Additionally, the contractual arrangements that would crystalise and reflect MMC's long-term benefits are lagging (van der Ham and Opdenakker, 2021). The same aligns with Hussein and Zayed (2021), who report the unsuitability of traditional contracts, emphasising the need for arrangements that can offer non-traditional features to support better uptake of MMC. Such vagueness in using conventional contracts to suit modern practices is associated with an unclear allocation of legal responsibilities and liabilities among the key stakeholders (Koronaki et al., 2021). Hence, previous studies recognise a contractual issue contributing to the indecision towards MMC adoption across the sector.

The limited attention by the existing body of knowledge yields a research gap in the key issues lurking within traditional arrangements and acting as traction to MMC's wider adoption. However, Xu et al. (2021) argue that the lack of collaboration and the absence of a synthesis between the advantages of MMC and achievement motivation among the stakeholders. Moreover, traditional contracts comprise clauses that demand satisfying particular social values that discard MMC characteristics of minimising labour and onsite activities (Chatzimichailidou and Ma, 2022). Similarly,

the same conflict with the old payment provisions, given that MMC requires more upfront financing (Gbadamosi et al., 2020). To address this, Koronaki et al. (2021) call for a fundamental transformation of contracts to influence the traditional ways of commissioning, procuring, and coordinating construction projects to embrace innovations.

The discrepancies of existing contract forms when considering construction innovations are associated with limited literature arguing the suitable contract types that may better align with MMC projects. Notwithstanding, a Design and Build (D&B) contract type has become popular in this context. For instance, Razkenari et al. (2020) report that the majority of MMC arrangements are considering D&B due to its demonstrated ability to facilitate collaboration, a characteristic that is nurtured by transforming multiple disciplines into one contractual unit for the client (Wuni and Shen, 2020). The same encourage early involvement, a key success factor when using MMC (Gbadamosi et al., 2020). Overall, the condensation of requirements that are different between traditional and modern methods is driving stakeholders to adapt to the most suitable contractual arrangements to facilitate MMC adoption.

In addition to the contractual arrangements implied by literature as inadequate and discreet, legislation transpires to inform on its potentially important role. Jin et al. (2021) discuss that multiple countries have developed policies encouraged by the lack of the same to govern better MMC adoption. Similarly, Koronaki et al. (2021) call for policymakers to establish legal forms that align with the MMC context through their legislation strategies, an effective approach to mandate MMC adoption across the industry. However, generally, the role of legislation to require policies that address contractual discrepancies remains scarce throughout past efforts, encouraging this paper to investigate the same. Therefore, the central aim of this research is to explore

the contractual arrangements relative to the adoption of MMC and the corresponding areas of improvements.

Research method

A review of literature establishes the discreet nature of construction management studies that explain the relations between contractual arrangements and MMC adoption. The lack of secondary data motivates this study to seek empirical evidence in the quest to lessen the blurriness by approaching a critical research gap. A qualitative approach has been utilised to guide the data collection of this research. Such a research method has been identified as effective in exploratory studies (Dmitriev et al., 2014), particularly in understudied areas where preceding theoretical constructs are not applicable (Madter et al., 2012). Moreover, the same method encourages reasoning and communication (Agustianingsih and Mahmudi, 2019). Hence, a qualitative method is deemed most appropriate for the particular nature of this research.

To align with the paper's aim of exploring the contractual arrangements relative to MMC adoption, gathering the supply side's perceptions can be argued as the least biased approach compared to that of the clients. This is justified by demand's influence to drive the contractual arrangements (Eriksson and Pesämaa, 2007). However, gathering quality data from key decision-makers working in MMC organisations in a complex and busy industry is problematic (Aka et al., 2022), driving the author to consider open-ended questions as a convenient data collection tool (Opoku et al., 2022). A qualitative questionnaire tool is described as prompt when collecting data compared to interviews that require a range of additional arrangements between the researcher and the participant (Oo et al., 2022).The use of open-ended questions to

collect qualitative data is a process that has been described as uncommon but equally effective in previous construction management research (Zulu and Khosrowshahi, 2021). Moreover, such a choice has led to collecting a relatively greater number of participants compared to other qualitative means of research in a time span of only two months.

The request sent to higher management of MMC businesses kindly asking their contribution to the study has led to forty responses detailing the contractual arrangements of their organisations. Overall, qualitative methods lack a consensus around the number of responses required to pinpoint reliability and credibility (Patton, 1982). However, O'Reilly and Parker (2013) argue that this is achieved after gathering qualitative data from over twelve participants (Galvin, 2015). The sole number of participants, therefore, is not a determinant of the quality of the research (Braun et al., 2021), where this paper satisfies the required threshold of participants believed to echo an effective exploration. Moreover, the characteristics of the participants' positions and roles reflect their decision-making status, an aspect that is orchestrated by their significant experience and qualification to provide imperative perceptions (Dulaimi, 2022). As shown in **Table 1**, most participants are leaders of their organisations, holding higher education degrees, and attaining over twenty years of industry experience.

To maximise the theoretical contribution of this rigorous exploration, the paper adopts an inductive reasoning approach to develop themes. Inductiveness is achieved by coding qualitative information in isolation from previous works but in relation to the meanings fortified by the respondents (Nowell et al., 2017), an approach deemed effective when exploring perceptions (Willig, 2007). The effectiveness of this approach is due to the extended ability of the researcher to relate participants' memories and

thoughts to the aim of this study (Taylor et al., 2007). Moreover, an inductive approach is dictated by a thematic analysis which, in this paper, aligns with the procedures detailed by Braun et al. (2022). This process includes data familiarisation, coding, theme development, classification, and finally, reporting as a sequential procedure when analysing qualitative data.

Analysis

Themes resulting from the analysis of the qualitative data vary to fit under seven themes. Subheadings, each representing a theme, are sequentially stated to address this research's central aim and are developed as a) Standard form of Contracts, b) Bespoke form of Contracts, c) Preferred Contract form, d) Procurement route, e) Procurement strategy, f) Contractual amendments, and g) Legislation's role. Each of these themes is inductively developed in accordance with the arguments by the respondents, acting as a categorisation of their perceptions relative to their MMC contractual arrangements. The identification of these themes is through repetitive patterns and trends in the provided responses (Boyd and Ashley, 2006), promoting overall knowledge rather than depending on pre-determined constructs (Hayes et al., 2010). Due to the extensive amount of data in qualitative studies (Rabiee, 2004), NVivo software has been used to code the data, enabling the researcher an extended ability to visualise all the inputs and simplify complexities associated with analysing such information (Dalkin et al., 2021). The process of identifying the themes in NVivo adapts the procedures explained by Ershadi et al. (2021), which comprise the following steps of 1) importing of all qualitative data from the participants as textual files, 2) closely reviewing each input to identify patterns, 3) assigning each of the identified patterns to a unique code, 4) allocating a tag for each group of patterns based on the emerging context, and 5) making sense from each of the classified data sets in relation

to the study's central aim. **Figure 1** depicts an example of the process involving node analysis using the NVivo software.

Standard forms of contracts

Standard forms of contract are considered the departure point of any construction project. Participants reflect a consensus towards the applicability of standard forms of contracts with their MMC services and products; "*we prefer to adopt standard terms of contract.*" Participant 35 [P35]. To justify this, [P5] explains that such forms are heavily used due to the alignment with both parties' past experience; "*standard forms are better because of the known content of them, without the hidden clauses in lower case.*" [P5]. Similarly, such a preference is said to be driven in pursue of seeking simplicity and decomplicating the contractual process; "*we prefer this as it keeps it simple only using one form of contract.*" [P14]. In addition to simplicity, participants agree on the workability of the standard forms; "*They are perfectly fine, too many people are trying to create problems where they don't exist regarding contracts.*" [P18], "*we have used standard in the past which have all worked fine*" [P23], and "*no issues currently*" [P20]. In contrast, [P29] tentatively argues that some clients tend to utilise non-standard forms to gain better control, which misaligns with the purpose of the standard forms; "*There are Public Sector clients out there who will use older forms of contract now not supported by industry in order to gain control wherever possible.*" [P29]. Hence, the belief that standard forms of contract align with stakeholders' past experience, offer simplicity and decomplicates the contractual process, and prove workability justifies the reasoning behind their dominance in the MMC context (see **Figure 2**).

Bespoke forms of contracts

Despite that standard forms of contracts emerge as popular, a counter perspective indicates the increasing use of bespoke forms; "*We operate with our own supply agreement*" [P34], and "*we have our own contractual arrangements that are stipulated to the contractor*" [P5]. Such choice is driven by financial pressures; "*When it comes to finance you have to meet the underwriters' conditions so bespoke forms or standard forms with the ability in part to refer to 'other' conditions*" [P9], by the tendency for clients to transfer risk; "*usually set by the client with bespoke terms dependent on their preferred contract type. As always the client will try to mitigate risk by passing the risk onto the contractor.*" [P16] and drafted to pinpoint clients' needs; "*can be tailored to the clients' needs but still uphold the fundamental principles of contracts*" [P19].

Overall, the drivers behind a bespoke form can be argued to be imposed and not preferred by MMC businesses; "*Bespoke amendments are common but would be better if they could be avoided*" [P14], and are argued to favour one party over the other; "*It is naive to pretend that public sector procurement vehicles are not affected by faculty policy or bespoke clauses that are inserted to provide the public sector body with contractual autonomy with no recourse to the Contract Administrator (or such like)*" [P29]. This is supported by [P38], who states; "*Bespoke forms of contract are often ideal for capital purchase schemes, however, many of our contracts utilise revenue budgets for shorter term rentals or managed service type agreements, which can lead to more bespoke contracts being required. This could be due, for instance, if there is a funder in place, which softens the case for larger schemes and there may be specific clauses required.*" [P38]. Moreover, [P39] reiterates on the risk transfer as a justification for shifting away from the standard forms; "*Traditional forms of contracting drive adversarial relationships, sub-contractors in this context are constantly pressed to carry more risk by the principle contractor. MMC should be about*

process and product, traditional contracts do not accommodate this." [P39]. Hence, the purpose for using bespoke forms in the MMC context is dependent on external pressures that place MMC businesses in a contractual arrangement irrespective of the standard forms (see **Figure 3**).

Preferred contract form

Determining the contract form that best suits MMC projects from an MMC business perspective can elevate a better understanding of the prospects of MMC adoption. A consensus among the participants that the Joint Contracts Tribunal, better known as JCT standard form of contract, transpire to be the most preferred contract form. This is firstly driven by being favoured by demand; "*most clients use the JCT contract*" [P14]. Moreover, JCT is being argued to be effective in its standard form; "*Contracts generally follow traditional forms such as JCT, not bespoke.*" [P30], but also allows the flexibility needed to embed amendments; "*JCT seems to be the preferred with all the amendments public sector want to make*" [P11]. Similarly, [P10} argues that JCT is practical and acknowledges the need for tweaks to better align MMC with the standard form; "*clients are predominantly comfortable with JCT contracts, but we have to bend them somewhat for MMC solutions*" [P10]. However, [P26] tentatively objects to the practicality of JCT in relation to their projects' size; "*JCT contracts too onerous for the size of projects we have been doing. We have made custom arrangements but struggle to find good examples for supply and install contracts as a specialist subcontractor.*" [P26]. Hence, JCT prevails over other standard forms of contract in an MMC context, and such a choice is driven by being favoured by demand, flexibility in amendments, and projects size (see **Figure 4**).

Procurement routes

Procurement routes vary in construction projects to align with a spectrum of varied needs and purposes. Such purposes can be described as client-dependant and can be argued as dictated by the project type, needs, and level of confidence they have in the MMC business. For instance, [P1] argues that their organisation prefers the Business-to-Business (BtB) and Integrated Project Insurance (IPI) agreements, types that are believed to foster early involvement, compared to the Design and Build (D&B); "*we are involved early with a B2B agreement or better still an IPI contract such as Dudley College in my opinion D&B does not work in MMC as early engagement from the supply chain is essential to understand how a volumetric or panelised solution is provided.*" [P1]. Such a statement contradicts other participants who advocate the latter, i.e. D&B, which has arguably been preferred over others; "*JCT design and build preferred but has capacity to do others" [P4], "Most clients use the JCT D&B*" [P14], and "*predominantly comfortable with JCT D&B contracts*" [P10]. Hence, it is reasonable to state that the choice of procurement route is favouring the Design and Build, and is influenced by the level of client engagement, being fostered by the clients, and is consistent with the overall needs (see **Figure 5**).

Procurement strategy

Knowledge of supply's views on the preferred procurement strategy would provide insight into the dynamics set out to procure MMC services and products. Such a section argues contractual arrangements beyond contracts themselves, offering adverse perceptions to what is needed at a procurement stage. The views on what encompasses an influence on MMC adoption varied to include the preference of a Two-Stage route; "*Two stage is preferred from clients since they don't like to commit to stage 0 but would like to exploit other benefits and mitigate their risks. Planning readiness would help in providing better costing.*" [P4], the need for more collaboration

that may not exist in current forms; "*More use of collaborative forms of procurement like FAC-1 are needed*" [P32], and the potential of a Fixed-Price agreement; "*Clients who are often in the Affordable Housing or Build to Rent space prefer a Fixed Price but inflationary environment means we need some cost protections*" [P12]. Discussing these choices in more detail, a two-stage route aligns with what has been argued by [P21] on the tendency of MMC to cost more; "*procurement is an issue as our costs tend to be slightly higher than traditional build or timber frame (depending on the specification required).*" [P21]. Moreover, the need for collaboration has been indicated as vital; "*Need to be more collaborative and use standard forms of contracts. Cut the lawyers who don't understand the process out and apportion risk fairly and openly.*" [P6], where [P33] argues that such a collaboration is not being achieved; "*the public sector rarely engages in a sincere conversation around how modular can solve their problems (that they are PAID to solve).*" [P33]. Hence, a two-stage tender would fall within the overall arguments and emerge as a preference that sustains collaboration among the key parties (see **Figure 6**).

Contractual amendments

Although that previous subsections deduce the preference for standard forms of contracts, a consensus exists on the overall tendency to incorporate amendments; "*all main contractors amend standard contracts anyway, so they are practically all bespoke in reality*" [P36], and "*Generally, all contracts are bespoke but are generated from JCT/NEC*" [P28]. Knowledge of these amendments and the needed incorporations may, therefore, enhance our understanding of the influence of contractual arrangements on MMC adoption. Ideally, [P8] argues that a contract that is free from Liquidated and ascertained damages, known as LAD's, and retention are pursued; "*the main drivers for our business is to work with clients on contracts that do*

not hold retention, LAD's" [P8]. Moreover, amendments are emphasised to consider the different nature of MMC compared to conventional construction methods; "*Current contracts do not consider the nuances of modern methods of construction generally. The traditional delivery model for instance focuses on a linear approach to procurement of services and products/ materials but tends to ignore the need for concurrent design approaches and earlier engagement of the supply chain.*" [P3].

Such changes have been indicated by the participants to be highly relevant to the payment terms; "*Advance and off-site payment provisions of many contracts are not suitable for MMC*" [P7], a fear that is nurtured by the liquidation of MMC businesses; "*Insolvency amongst specialist suppliers increases concern on payment mechanisms*" [P7]. Such amendments, therefore, are encouraged to be for work due and not for work done; "*standard forms of contract are fine however payment terms should not be for work done on site*" [P13], shaped by more upfront payments compared to traditional construction; "*the need for upfront payments need to be addressed as work carried out in factory location need funding day to day. Advance payment boards are very hard to obtain in this current market.*" [P17]. Such an amendment has been arguably discussed by [P25] as problematic in terms of client persuasion; "*Some of them don't capture the fact that Modular Manufacturers building site is our factory therefore requests for payment for offsite works should not be seen as begging.*" [P25]. This is supported by [P37], who states; "*A number of areas where contractual arrangements and in particular the allocation of risk and responsibility needs to be done differently for an MMC or Offsite approach. From the shift of responsibility for elements of design and engineering to the manufacturer to the need to recognize different payment structures and locations of work for inspection and sign off Offsite and MMC needs contracts that reflect the different approach."* [P37]. Hence, amendments needed for

incorporation across MMC projects vary to include minimising liquidated damages, retention, and payment mechanisms (see **Figure 7**).

Legislation's Role

Legislation and the role it can play in fostering construction innovation emerge to inform research on the need for change. A consensus exists among participants on emphasising the governmental impact to promote MMC through effective legislation; "*Traditional build is still the main standard, building schools, hospitals and public buildings have to change, we have the products/systems to make MMC the way forward, Government has to change and is changing but to slowly*" [P2]. Procurement framework providers have been particularly argued to be a potential departure point for such change; "*there is a challenge between framework providers local labour requirements in an MMC context*" [P15]. Overall, MMC is a new disruptive innovation requiring profound change in traditional practices being implemented for decades, a reality that is contributing to demand's indecision and nurtures the lack of contractual mobility; "*Simply put, MMC is an alien concept to many public (and private) sector customers. In the public sector in particular, it is in the 'too hard to consider' box i.e. it's not traditional bricks and mortar, it looks different, and no one else is using it so it can't be any good (which is patently untrue).*" [P33]. This is supported by [P40], who indicate the challenges for smaller firms to penetrate the public sector; "*Public sector support the larger providers and the smaller MMC firms appear to have better solutions but the public sector does not allow these to come to the surface due to their restricted processes*" [P40]. Hence, legislation is encouraged to consider change by reshaping their governmental policies, amending their local requirements, and mandate the construction sector to embrace innovative change (see **Figure 8**).

Discussion

The primary purpose of this paper is to expand comprehension of the contractual arrangements concerning the growing MMC uptake in the UK construction industry. This study adopts a definition promoted by the UK government to what is included under MMC's umbrella, an approach relative to what has been discussed by Rogers (2003) on the potential existence of a cluster of innovations within the innovation itself. Such exploration has been motivated by the lack of similar studies practising comparable efforts to reveal the dynamics behind the use of contracts and the adoption of innovations. As shown in **Figure 9**, a conceptual framework detailing the key arrangements, their influences, and their determinants has been developed.

Standard vs bespoke forms of contracts

To start with, consistency with previous experience has been described as a key predictor for innovation-adoption (Rogers, 2003). Such an attribute is believed to be a driver for choosing standard forms when considering construction innovations (Ragab and Marzouk, 2021). Moreover, results suggest the positive influence of standard forms that are designed to decomplicate processes in the construction context (Elkhayat and Marzouk, 2022). Additionally, the workability of such forms is considered in their initial drafting, allowing a degree of change that can suit technological change (Noruwa et al., 2022). Hence, findings propose that the use of the standard forms is driven by the alignment with stakeholders' past experience, simplicity, and perceived workability.

In contrast, findings suggest the occurrence of situations where standard forms are replaced with bespoke contracts. However, the use of bespoke arrangements is not encouraged by the participants, implying that their relative preference is a standard

form, which is justified as an attempt to avoid any disputes that can emerge from a bespoke contract's discrepancies (Seneviratne and Michael, 2020). Nonetheless, one of the drivers of using bespoke contracts is clients' tendency to request the same, an aspect linked to minimising risks when doing business with new suppliers (Thompson et al., 1998). Moreover, findings reveal that the tendency to higher use of bespoke contracts is linked to pressure from clients (Urquhart and Whyte, 2020), and the imposed financial pressures (Timmer, 2016). Hence, standard forms prevail over bespoke forms when considering construction innovations like MMC in the construction sector.

JCT as a preferred form

The findings of this paper report the tendency for MMC businesses to embrace JCT as a preferred standard form of contract. Results link this to the ease of introducing changes that can align with the nature of MMC in applying to both major and minor construction projects (Oyegoke et al., 2009). Likewise, JCT's flexibility in embracing changes contributes to the popularity of such standard contracts (Noruwa et al., 2022). Moreover, the preference of demand to use JCT is another likely explanation for its wider use (Oyegoke et al., 2009). Overall, clients prefer JCT contracts, and it has been indicated as the most used standard form in construction (Omotayo et al., 2022). Hence, JCT dominates over other standard forms in the MMC context in the UK construction sector.

Design and Build as a preferred procurement route

The results of this study reveal the propensity of the market to favour D&B over other procurement routes in MMC arrangements. This finding is consistent with previous works indicating the popularity of D&B in the MMC context (Razkenari et al., 2020).

Such choice is often chosen and driven by clients (van der Ham and Opdenakker, 2021). This is justified by the nature of MMC, where designs tend to be fostered by contractors and manufacturers, as designs need to align with their organisational capabilities (Charlson and Dimka, 2021). Adopting a D&B type means that the employer's requirements are well comprehended and reflected in the contract provisions (Oyegoke et al., 2009), and the popularity of this route acts as evidence of the maturity of the MMC market to meet clients' needs. The choice of procurement routes that reduce uncertainty and foster a single point of responsibility, therefore, is preferred (Elkhayat and Marzouk, 2022).

Determinant for effective procurement strategies

The findings of this paper identify the areas that are argued to lead to effective procurement strategies in MMC contractual arrangements. Logically, ensuring a collaborative environment emerge as a key factor. An agreement that can mandate trust across MMC arrangements is critical (Hussein and Zayed, 2021). The procurement strategy, moreover, would dictate the level of collaboration across teams in an MMC project, a characteristic that is directly linked to an MMC project's success (Wuni and Shen, 2020). In contrast, an ineffective procurement strategy may lead to a lack of trust, limit information sharing, and inhibit collaboration (Maslova and Burgess, 2022). The results of this paper are consistent with previous works that reveal the inappropriateness of current strategies and their negative influence on the adoption of MMC projects (van der Ham and Opdenakker, 2021). A procurement strategy, therefore, is a key element of MMC project success and is dependent on the interaction among the key stakeholders.

Regular contractual amendments

This paper's findings suggest the existence of multiple contractual amendments when procuring MMC projects. Results reflect the tendency of such amendments to focus on liquidated damages and retention amounts, both of which align with Taylor et al. (2022) discussions in the UK context. Overall, despite the findings suggesting the popularity of the standard forms, amendments exist nevertheless, and the original clauses are modified to reflect changes (Noruwa et al., 2022). Moreover, the results suggest a consensus in drafting different payment mechanisms, as alterations are made to suit the different nature of MMC for work due to the traditional mechanisms of work done (Salama et al., 2020). Therefore, the typical amendments in MMC arrangements consider liquidated damages, retention amounts, and the traditional payment mechanisms as contractual elements subject to consistent change.

Legislation's role in promoting MMC

This study explores the role of legislation in assisting the adoption of MMC projects across the construction sector. Our findings align with previous research efforts on the positive and vital role the government can play to promote MMC across the industry (Jin et al., 2021). One of the aspects revealed by this study is the need to change the local value requirement that contradicts the offsite nature of MMC projects, i.e. employment and social value. Such aspects are incorporated in contracts and are governed in construction projects (Chatzimichailidou and Ma, 2022). Moreover, encouraging long-term relationships and partnerships with small and medium organisations have been indicated as necessary for a higher uptake of MMC (van der Ham and Opdenakker, 2021), a matter that legislation can significantly influence by building confidence in these organisations and encouraging MMC use in public projects.

Conclusion

Literature uncovering the contractual arrangements when adopting MMC projects has been discreet. Such lack of knowledge motivates this paper to be the first to qualitatively explore, through gathering first-hand empirical data, the flow of arrangements deemed popular in the UK construction industry. Such information allows decision-makers to build informed decisions when negotiating contractual arrangements relative to radical construction innovations. According to this research, standard forms of contracts are more favourable than bespoke contracts in the MMC context. The most preferred contract form is JCT, and the most chosen procurement route is D&B. Additionally, early interactions between the key stakeholders have been reasoned as critical for the success of procurement strategies used in MMC arrangements.

The effectiveness of procurement strategies is linked to their ability to minimise risks and foster certainty. This paper, moreover, reveals the likelihood of common amendments being promoted in the MMC market, where liquidated damages, retention amounts, and payment mechanisms prevail to inform practice and research on a pattern that is regularly favoured when amending contractual clauses. Finally, legislation is called to consider policies that can support fairly smaller firms than those commonly being awarded construction projects, in addition to altering social value requirements to better suit the values projected in MMC projects rather than those specifically favouring traditional ones. The findings of this paper, therefore, link critical influences by legislation on the fundamental processes of an effective MMC arrangement.

This paper, however, is associated with a few limitations. Firstly, the number of participants can be argued to be low (forty). In qualitative studies, however, the number of participants is irrelevant to determine the value of an exploration. Moreover, the author trusts that the quality of those who kindly agreed to contribute to this study may balance any relative concerns, as all respondents hold decision-making roles in their organisations. Secondly, the author encourages that the results of this exploration are dealt with caution, as a qualitative method was necessary due to the lack of previous works in the same direction. Finally, the issue of contractual arrangements in MMC developments is majorly understudied, and the inclusion of vast issues using only one research method is not possible in one academic paper. Therefore, future research is encouraged to build on the knowledge provided in this study through other methods of research.

Data Availability Statement

The data generated during the study are available upon request from the corresponding author.

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Table 1. Participants' Information

Participants' Information	**Years of industry experience**					
	1 to 5 years	6 to 10 years	11 to 20 years	21 to 30 years	> 30 years	**Total**
Partner				**1**		**1**
P7				1		1
Bachelor's degree				1		1
CEO				**1**	**1**	**2**
P34					1	1
Master's degree					1	1
P6				1		1
Master's degree				1		1
CFO			**1**			**1**
P12			1			1
Bachelor's degree			1			1
COO					**1**	**1**
P39					1	1
No degree					1	1
Regional Practice Lead			**1**			**1**
P3			1			1
Master's degree			1			1
Managing Director			**3**	**2**	**3**	**8**
P11				1		1
Bachelor's degree				1		1
P17					1	1
No Degree					1	1
P18				1		1
Bachelor's degree				1		1

P20					1	1
No Degree					1	1
P23			1			1
Master’s degree			1			1
P26			1			1
No Degree			1			1
P32					1	1
Bachelor's degree					1	1
P38			1			1
Diploma/Certificate			1			1
Head of Business Development		**1**				**1**
P21		1				1
Bachelor's degree		1				1
Business Development Manager		**1**			**1**	**2**
P33		1				1
Bachelor's degree		1				1
P9					1	1
Diploma/Certificate					1	1
Regional Director					**1**	**1**
P16					1	1
No Degree					1	1
Chief Product Director				**1**		**1**
P15				1		1
Master’s degree				1		1
Commercial Director					**1**	**1**
P36					1	1
Bachelor's degree					1	1
Director	**1**	**1**	**1**	**3**	**4**	**11**
P1					1	1
Diploma/Certificate					1	1
P14				1		1
Master’s degree				1		1
P2					1	1
Master’s degree					1	1
P22					1	1
Master’s degree					1	1
P28		1				1
No Degree		1				1
P29				1		1
No Degree				1		1
P30					1	1
Diploma/Certificate					1	1
P35	1					1
Master’s degree	1					1
P37				1		1
Bachelor's degree				1		1
P4			1			1

Master’s degree			1			1
P40					1	1
Master’s degree					1	1
Commercial Manager		**1**				**1**
P19		1				1
Bachelor's degree		1				1
Contracts Manager					**1**	**1**
P13					1	1
Bachelor's degree					1	1
Key Account Manager				**1**		**1**
P8				1		1
No Degree				1		1
Procurement Manager	**1**					**1**
P10	1					1
Master’s degree	1					1
Manager			**1**			**1**
P27			1			1
Bachelor's degree			1			1
Pre-Construction Manager		**1**				**1**
P24		1				1
Bachelor's degree		1				1
Sales Engineer				**2**		**2**
P31				1		1
Master’s degree				1		1
P5				1		1
Master’s degree				1		1
Estimator				**1**		**1**
P25				1		1
Bachelor's degree				1		1
Grand Total	**2**	**5**	**7**	**12**	**14**	**40**