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Modern Methods of Construction (MMC) and innovation negativism in the UK public sector

Purpose: The recent failures and insolvencies of organisations related to the Modern Methods of Construction (MMC) have gained increased attention and controversy across the UK construction sector. Such failures are linked to their inability to achieve an economy of scale and drive key clients to accept MMC as an alternative to traditional methods. This paper aims to unravel whether a phenomenon of 'innovation negativism' has manifested and is contributing to public clients' indecision towards broader MMC, and whether this is only linked to past negative experiences formed after the second world war or whether additional contributing reasons exist to influence adoption.

Design/methodology/approach: This study focuses on exploring the decision-making of the UK public construction sector; therefore, this paper adopts a qualitative approach, utilising interviews with fourteen carefully selected MMC experts, government advisors, and public clients. The phenomenological stance adopted herewith enables the authors to make better sense of the perceptions of the interviewees, leading to the conceptualisation of the innovation negativism phenomenon.

Findings: The paper identifies nine themes that may be argued to promote a profound understanding of MMC negativism influencing public clients' decision-making. The study has found that more than just the previous negative perceptions formulated post the second world war are driving innovation negativism in the UK public sector. Notably, the emerging themes are incomprehension, lacking evidence, communication, relationship history, bad experiences, uncertainty, inadequate experimentation, the business case, and localism.

Originality/value: This study is the first construction management research that acts as a fair departure point to conceptualise the reasoning behind innovation negativism in the construction setting. Through mirroring demand's unipolarity for traditional methods, policy and decision makers can now rely on the conceptualised reasoning to determine practical solutions to overcome clients' indecision towards MMC.

Keywords: Built Environment; Construction Industry; Innovation Negativism; Modern Methods of Construction; Public Sector.

Paper type: Research paper

Introduction

Industries around the globe often realise the role of innovations in their continuity and survival. Among these industries is one that often treats innovations as temporary, and most likely non-mandatory, commodities that are subject to unwanted liabilities. The construction industry has often embraced such debates, and it has been contended that the damaging outcomes of resisting change surpass the implications of trying new ideas. Notably neglecting change has led to construction projects being delayed (Ameh and Osegbo, 2011), high contribution to carbon (Wong et al., 2013), the inability to control construction waste (Alwan et al., 2017), and cost overruns becoming a construction normality (Salama et al., 2021). Hence, as current data shows, a responsibility exist among the research community to explain, and equally predict, the serious decline in the “capacity of the construction industry to deliver for its clients” (Farmer, 2016, p.32). The need for a radical change becomes vital among those aspiring to survive in the construction industry amidst its continued and increased shortcomings.

The construction industry includes groups that may be rational to consider the needed change, but it also includes those who often promote ill-considered biases in their decision-making towards construction innovations. For instance, perceptions driving decisions in construction are from individuals who “associate quality housing with the traditional brick and mortar housing structure” (Kedir et al., 2022, p.692), which in turn challenge the prospects of radical change in traditionally accepted ways. Taking this view, the research community’s responsibility demands the “ability and courage to look with fresh eyes (yours and other people's) at innovations and opportunities despite all negativism” (Jackson, 1991, p.28). Such responsibility

becomes imperative not least because decision-makers in the industry are often those who are mostly opposers of change.

A resurfacing construction innovation has captured the interest, and advocacy, of the UK government in its ability to address the construction industry's challenges. The Modern Methods of Construction (MMC) primarily focus on changing the uncontrolled nature of construction processes by introducing the element of control (Ali M. Saad, Dulaimi, et al., 2023). The implicit includes both onsite and offsite techniques that leads to a significant reduction in onsite activities (Sutrisna et al., 2018), dependency on skills (Ginigaddara et al., 2021), carbon reduction (Koronaki et al., 2021), and delays (Saad, 2023). The MMC guidance is a document published as a supplement to the revised Construction Playbook (HM Government, 2022), defines MMC as "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 and public sector" (Government Commercial Function, 2022, p.5). Such definition attributes to the definition framework, sorting MMC into seven categories (MHCLG, 2019), as follow:

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

The use of the methods has increased particularly after the world war, largely driven by the need for mass housing and demands of growing cities (Sánchez-Garrido et al., 2023). However, recent research shows that the uptake of these methods, particularly among UK public sector clients, remains low and insufficient to drive an economy of scale (Ali M Saad et al., 2023). One of the attempts to reason this is that the sector's memory recalls the failure of these methods in meeting post-war construction demand, raising a key question on whether an 'innovation negativism' has manifested in the UK public sector when considering MMC.

The emergence of construction innovations is a frequent and reoccurring phenomenon. However, it is historically rare for innovative methods that drastically failed in the past to remerge and reattempt to prevail over traditionally dominating methods. Particularly, this becomes more bedevilling as such an attempt is in an industry that "is the subject of often-conflicting vested interests" (Davidson, 2013, p.345). Scholarly efforts taking interest in innovation negativism are limited to areas of social sciences, psychology, and sociology. In the absence of a shared and validated approach to explore the formation of MMC negativism in the UK public sector, this study aims to investigate the influence of the perceptions and beliefs of the public sector in facilitating, and sustaining, innovation negativism. Therefore, the renewed interest in MMC, after historical failures, may be subject to innovation negativism and as such, requires a research that can detect the key contributing reasons inhibiting broader adoption.

Innovation Negativism: In search of a conceptualisation

The origin of the term 'innovation negativism' can be traced back to 1964 in the seminal work of Arensberg and Niehoff (1964) when studying social change. Many years later, the etymology has been acknowledged by Rogers (2003) in the Diffusion of Innovation (DOI) theory. Innovation negativism has been defined as "the degree to which an innovation's failure conditions a potential adopter to reject future innovations. When one idea fails, potential adopters are conditioned to view all future innovations with apprehension" (Rogers, 2003, p.225). The terminology has since gained the attention of scholars from varied areas of expertise. For instance, the definition has been used by Karahanna and Limayem (2000), Apostu et al. (2023), and Thornhill et al. (2009). However, due to the limited scope to critique the trajectory of relevant arguments, this is the first research effort to narrate innovation negativism in construction management. Like Loosemore et al. (2022, p.396), the study has adapted "laterally relevant" literature to develop a solid review with limited studies relating to the same context. In this study, innovation negativism refers to a passive form of decision-making in which an innovation is rejected based on priorly established negative perceptions.

Study of innovation negativism, and its formation, has received infrequent focus in construction management literature compared to efforts from the broader research community. Generally, scholars in management literature have pursued the topic in more detail. Karahanna and Limayem (2000), who investigate the adoption of e-mails and v-mails, relates negativism to the degree of usefulness and accessibility, as key aspects responsible for the development of users' perceptions. Moreover, Tsatsou (2012, p.177) link negativism to the "uncertainty avoidant" characteristic that is entrenched in society. Interestingly, the implicit of negativism tends to decline when adopters are not strictly following "traditions and customs" (Tsatsou, 2012, p.182).

Innovation negativism has also been seen in recent anecdotes such as accepting vaccination. Todorova et al. (2014, p.33) touch on this by explaining the attitude of negativism to “rejecting anything that is new, and suspicion of the healthcare system, which leads to rejecting anything provided by this system”. The argument herewith is thought-provoking as it links negativism to “suspicion of anything that comes from the government, or that sounds like it will be mandated” (Todorova et al., 2014, p.33). Hence, the academic standpoint regarding innovation negativism is varied and disjointed, which implies that innovation negativism’s formation may differ as settings and innovations differ.

Earlier literature often explains that decision reasoning behind innovation negativism is tailored towards human psychology. Negativism frames a stance in which innovations that are seen to “threaten traditional norms” are rejected “as a defence against contagion” (Thornhill et al., 2009, p.117). Arguably, Apostu et al. (2023, p.9) explain that innovation negativism is a factor that limits innovation adoption by promoting “functional and psychological barriers” to customers’ decision-making. From a similar physiological position, García-Herrero et al. (2013, p.85) infer that negativism may not always exist naturally but can also be encouraged in what has been described as an “oppositional culture” where “negativism is rewarded”. In a comparable implicit, Kuisma et al. (2007, p.77) further this argument by describing a linkage between negativism and the “image barrier” which is the “perceived negative image” that may influence innovation adoption. Thus, studies consistently show that innovation negativism’s formation is complex and problematic and is associated with human psychology.

The formation of innovation negativism may be challenging to measure, or even appreciate, without a solid qualitative foundation in the construction setting. Therefore, a thorough exploration is required so that the academic body becomes aware of the relative reasoning in the construction context. This section has illuminated few of the issues, presented by previous efforts, that can be contributing to the formation of innovation negativism. The authors acknowledge that this study “will not solve them and make them go away”, but it may rather ensure that “they are recognised and considered” (Zheng and Stahl, 2011, p.77). The following section justifies the methodological choices in accordance to the research question: What is facilitating and sustaining MMC negativism in the UK public construction sector? (RQ).

Methodology

The study adopts a qualitative method given the main pursuit for deeper understanding of innovation negativism relative to the adoption of MMC in the UK public sector. Such method has seen scarce focus from scholars in recent MMC research (Ehwi et al., 2022). The qualitative stance has been contemplated by exploratory interviews with decision-makers from both the industry and the UK public sector. The collection of data has commenced after the School’s ethical approval granted on the 25th July 2022 and lasted until October 2022. This study distinguishes itself from vast construction management research by viewing negative perceptions as something that can not be objectively controlled or measured. All too often, no distinction exists between ‘innovation negativism’ and ‘bad experiences’, where adopters tend to likely assume a sense of “a similar loss” (Jenkins, 2022, p.423). and these are rather deemed the same by the previous efforts.

Overall, 14 in-depth interviews have been carried with interviewees purposively selected based on their managerial and decision-making roles (see **Table 1**). The data collection process has been deemed sufficient upon reaching saturation. Guest et al. (2006, p.74) discuss that even a small sample “would likely render useful information” as long as “the participants possess a certain degree of expertise about the domain of inquiry”. The semi-structured interviews have included questions designed to explore and note the public sector’s views and perceptions. The questions touched on the general perceptions of the public sector from MMC and encouraged the interviewees to share their viewpoints without any limitations. As per the note by Zulu et al. (2023), utilising semi-structured interviews is believed to be effective when exploring research topics with lacking or weak theoretical standings and testable hypotheses. Similar to Maslova and Burgess (2023), all interviews have been conducted through virtual means, recorded, transcribed, and subsequently analysed thematically.

The phenomenological position of research emphasises the subjective experiences, largely focusing on interpretations, and is sought to “bring to light one’s research topic issues” (Garrick, 1999, p.147). Because negativism is embedded in individuals consciousness, their interaction with MMC is influenced by their own beliefs (Ali M. Saad, Zulu, et al., 2023). Such interactions are believed to be created through past and present exchange of information with the social environments as they observe and learn about an opportunity (Berglund, 2015). Therefore, the paper adopts such a phenomenological stance and ask questions to enable greater understanding of the decision-making of the public sector by exploring participants’ lived experiences.

Due to the phenomenological stance driving innovation negativism generally, this research is viewed from the lens of a social constructivist. The study advocates

Burr (2018, p.374) that “all societies have a moral code—not, of course, the same one—a set of principles that lay down what is thought to be valuable for all people, worth sacrificing for, worth facing difficult choices for”. The realm of social constructionism drives the act of generating meanings from experiences, and the utilisation of these meanings socially towards new ways of working. However, achieving this requires a “dynamic process that takes into account the cultural and historical aspects available in society” (Camargo-Borges and Rasera, 2013, p.4). Therefore, and similar to Sherratt and Raiden (2023, p.4), this study does not simply subscribe to a view where “one ideal theoretical framework for conducting qualitative research, or indeed one ideal method” exists. The following sections and subsections identify and subsequently discuss the recurring themes relative to the context argued above.

Findings and Discussion

The nine identified recurring themes described in the above methodology have been clustered and discussed in this section. The emerging themes are *incomprehension*, *lacking evidence*, *communication*, *relationship history*, *bad experiences*, *uncertainty*, *inadequate experimentation*, *the business case*, and *localism*. Each of these themes, solely and as a combination, are believed to critically contribute to the formation of MMC negativism in the UK public sector.

Negativism due to incomprehension

An important theme that emerges repeatedly is the role of incomprehension in the formation of MMC negativism. Interviewees explain that negative perceptions are shaped merely due to the lack of understanding of basic processes and general industry knowledge.

We seem to have less and less, I call them, professional clients, who understand the construction process. procurement process, kind of full stop. Not just MMC, but a lot of them are not aware of the design process that's required to deliver a new building [...] It's more them understanding that the processes are still there regardless of which option you go. Participant (P6)

The Interviewees explain that the public sector has limitations through misinterpreting information related to “value”, which indicates that perceptions are pointed towards the product rather than the process.

Procurers aren't necessarily experts in construction and certainly not experts in MMC. So, it requires a change management program to change the way projects are procured and procures understanding of procuring for value [...] MMC is just a tool to get to that final delivery. (P2)

The public sector encompasses varied public client organisations of whom purposefully adopt innovations based on their dissimilar goals. These specific needs for each organisation make decision-makers cautious to consider non-traditional approaches in pursuit for alignment. Such conduct is linked to ‘familiarity’ with the traditional norms and ‘non-familiarity’ with MMC, limiting broader engagement.

Some of them are way more familiar than others and therefore they're more engaged and they're more likely to use it. Others, I would say, are quite a long way off that and would be almost quite wary of using MMC compared with traditional methods. (P5)

Notably, incomprehension seems to have ranged influences on the formation of negative perceptions across disciplines. In particular, it may be reasonable to argue that negativism is promoted by designers, as the integration of MMC disconnects them from their previous understanding of “what works”, steering them into a new paradox

that becomes more complicated with regularity requirements.

Designers don't know what works. So, there is a compliance vacuum in terms of what the new regulations might mean to systems [...] and being able to demonstrate that it passes all the building safety requirements. (P12)

If you produce five schools using the same design and the same manufacturer and there's a flaw in the design, you have five flawed school buildings. (P3)

The finding challenges the assumption that MMC is an extension of traditional construction processes that does not require further understanding of the innovation, viewing it in comparison to norms rather than a fundamental change. Incomprehension varies throughout client types, becomes problematic across different disciplines, and is affected by alignment with regulations. Adding to the “persuasiveness” by Green and Sergeeva (2019, p.641), the results indicate that negativism also “depends upon alignment with existing institutionalised narrative”. The formation of innovation negativism here becomes reliant on the incomprehensive comparisons with traditional construction, where these act as the “yardsticks against which all attempts at innovation have to be measured” (Davidson, 2013, p.345).

Negativism due to lacking evidence

The study reveals that the lack of evidence contributes in creating MMC negativism in the public sector. Negativism, in this context, is formed in association with the newness of an idea which leads to discarding its merits because of the unconvincing evidence. Interviewees are certain of the existence of the evidence; however, it is the inadequate capturing and reporting of evidence that nurtures innovation negativism.

I'm not quite sure they're necessarily seeing evidence of the carbon reduction, the energy efficiency, not because I don't think it's happening, I think I'm not sure that data is being captured. And that would lead onto the second point really that I don't think there's enough data being captured of post occupancy data of the MMC buildings. (P5)

The 'lack of evidence', in this narrative, is linked to "historical data" and not mere commitments regarding MMC values. The finding suggests that perceptions towards a construction innovation are affected by a time-bound condition in which value has been sustained for long periods of time.

not many examples of 100 years old, you know, still standing later on. So that lack of historical data makes it difficult for a client to kind of rely on something that's new. (P8)

In response to this, the formation of innovation negativism becomes evident in the wariness of adopters to serve as a "guinea pig" in pursuit of such evidence. Negativism, in this narrative, resonates through an implicit of which an adopter carefully crafts their involvement until convincing data becomes available "elsewhere".

Invariably I'd be looking at where those systems had been successfully delivered elsewhere. But, you know, if somebody wanted to use us as a guinea pig, I'm probably more inclined to be receptive. (P11)

As we get an increasing evidence base of successful MMC projects, everything will gain momentum. Clients will be confident about procuring MMC and all that. It's actually the realities on the ground, it requires quite a lot of force from the clients. (P4)

Hence, interviewees have attributed lacking evidence in promoting negativism. Convincing evidence is described to be within a discourse of long-term, i.e. historical

data. Moreover, the finding suggests a reasonable tendency for clients to form solid perceptions on such data but are regardless less receptive to subject themselves by taking part. Such lack of evidence has been argued to undermine instilling confidence “based on risks and return on investment” (Correia et al., 2020, p.1457). In relation to construction innovations, a lack of evidence is believed to be a critical element due to the industry’s nature to operate on low-profit and high-risk basis (Davila Delgado et al., 2019). The lack of historical data that can reinforce confidence is therefore contributing to the formation of MMC negativism.

Negativism due to communication

The findings reveal that information is not overtly communicated in the public sector, and this is promoting innovation negativism. This is seen as ‘sharing’ of positive information regarding MMC, and the lack of communication often forms misconceptions.

There's not enough shared learning [...] My view is that until we have more of that, it's going to continue to be difficult for public sector clients to understand how to use MMC properly. (P13)

if we were able to share [...] people will actually be able to share what works and what doesn't. At the moment, data isn't shared. It's kept as an intellectual property for some kind of commercial gain. (P8)

At the moment there's this massive disconnect. There's no cohesion in the market, from manufacturers to contractors to clients. It's just nothing. And where it does happen, it's usually by accident. (P10)

The discourse rejects that the responsibility for communication should be from demand. The interviewees reflect that public clients would “listen” and “work closely” if approached.

Although I'm sure the industry moans about government as a client in the way that they moan about everybody's as a client [...] we've worked very closely with the industry to help them manage the impacts of COVID, we've worked closely with the industry on price inflation, and some of the challenges that they're facing now as a result of the Russia-Ukraine conflict. I think that our general rule is that if there is a real problem that the contractors bring to us and they can explain what it is and why they need additional funding to cover it or additional time allowed, we will listen and respond to that. (P3)

Additionally, communication takes the form of an ‘explanation’. The interviewees mirror that MMC organisations could play this role and have a greater say to facilitate comprehensive client understanding.

They should be prepared to explain what this is, how it works, give them that step by step process, help them with their understanding. It's very much about the education. (P5)

Nevertheless, it is worth noting that late communication is ineffective in an MMC paradox. The interviewees stress on the issue of “early” consideration, a matter that becomes precisely critical where communication is most needed. Consequently, it is clients’ responsibility to seek such communication prior to making decisions, as subsequently ‘squeezing’ an MMC option is believed to be problematic.

I don't think that's kind of worked up in the manner they wanted it to go because of a number of MMC elements or groups need that input from early

design stage on how things are designed, etc. rather than doing a full design and then trying to squeeze into an MMC option. (P6)

Hence, this finding illuminates an existing communication issue between supply and demand, which in turn is promoting MMC negativism. Broadening communication, particularly at early stages, is believed to reinforce a consistent commitment to change and minimises the development of misconceptions. These arguments reveal that the public sector does not recognise the importance of a “technology watch” practice, in which they are not devoting “resources to keeping up with potential opportunities, nor do they see the need to do so anyhow” (Davidson, 2013, p.350). Aligning with this, Altourah et al. (2021, p.238) describe active information-seeking to be a “result of the reduced feelings of negativism and increased levels of need for orientation”.

Negativism due to relationship history

Despite the rapidly changing demands of the construction sector, building a relationship history still acts as a key prerequisite that in turn is promoting MMC negativism. Long standing relationships and repeat business enable organisations to demonstrate their capabilities and reinforce clients’ confidence. It resembles close knowledge, loyalty, and affiliation between organisations, which is built across a longitudinal time scale.

We've used the main contractor to manage the MMC specialist subcontractor, that has been more successful than working with MMC contractor being the main lead contractor. And I think that goes maybe back to relationships we've had with main contractors being more historic, and kind of being built up over a longer period. (P6)

Such dependency on the relationship history may be unintentionally rolling out MMC organisations in favour of traditional ones. The argument herewith stems to

favour “the devil you know” rather than accepting a new relationship. The finding suggests that even when clients are conscious that the outcome may be declining, and often damaging, the historical relationship built is preferred over new endeavours in this setting.

It's better the devil you know. So there's a sense that you just keep doing the same thing, even though you know it's going to go wrong. (P13)

The willingness to achieve long term relationships becomes inhibited by the traditionally built system. In the MMC narrative, the interviewees imply the need to break down traditional procurement as a condition to build long term relationships with MMC organisations.

The confusion is that there are a lot of public sector clients who believe that MMC is a mature marketplace, that they can tender into using their usual procurement and do it on a project by project basis rather than a longer-term relationship and programmatic approach [...] their procurement is not fit for purpose. (P12)

As this study pursues greater detail in this theme, public clients are not seen as exempt from fostering positive outcomes. Through seeking a relationship history, public clients can play a proactive role in committing to robust and credible pipeline that can provide MMC organisations the opportunity to “build the spirit of collaboration”.

They know that the pipeline is there and therefore there's the longevity of opportunity, they wouldn't do it just for one project. But if they know this as part of a ten-year program of work, then it's like, okay, yeah, we can move our business model towards that sort of thing. (P14)

This theme presents an interesting paradox where the lack of a relationship history is promoting MMC negativism through favouring old and long-established relationships with traditional construction organisations. Such finding is largely consistent with Zhang and Qian (2017, p.526), who state that “it is important for owners to be prepared to expend resources (e.g. time) and develop managerial skills like organising trust-building activities to build good relationship atmosphere of strong solidarity”. Reflecting on the relationship history in the public sector, the finding subscribes to Järvenpää et al. (Järvenpää et al., 2022), who infer that “when there is no relationship history between the actors, the agent’s unfamiliarity with the principal’s actions may cause confusion and frustration, which in turn may reduce focus on project execution”.

Negativism due to past experiences

Another theme that has repeatedly emerged from the interviews is the influence of past unsuccessful experiences in promoting MMC negativism. The interviewees implied their concerns regarding the influence of such negative experiences, and the ambiguity around erasing the relative embedded institutional memory through “good exemplars and commitment”.

Past experience is a massive factor that we have to overcome, and the only way we're going to do that is by good exemplars and commitment. But I don't know how to do that, otherwise I'd wave my magic wand and it all worked.
(P10)

Some of the earliest schools that we procured using MMC have problems with the design. And if you produce five schools using the same design and the same manufacturer and there's a flaw in the design, you have five flawed school buildings. (P3)

A consensus among the interviewees supports that the history of MMC is mostly discouraging present adoption, especially among those who suffered from these failures personally. Such bad history has permitted MMC negativism and is being viewed as a mere “bubble” with weak fundamentals that is not worthy of clients’ investment.

We've seen MMC before and it bubbled up and it didn't really go anywhere.

And this might be the same this time. So, we're not going to invest too much into it. (P7)

The finding indicates that while such bad experiences have greatly contributed to the formation of innovation negativism, MMC has seen a transition in acceptability across one particular public client. The story of the “pro MMC approach” client provides evidence that bad experiences can be replaced with positive ones in the process of a “healthy challenge”. Indeed, several conditions exist as contributing factors to this effective transition, one of which is by avoiding a “dogmatic” personality trait.

The propensity to use MMC is highly dependent on people's personal journey through the industry and whether they have previous experience and how that's gone [...] take the Department for Education, they have a very pro MMC approach, they have a presumption in favour of MMC, they have MMC frameworks. Their leadership has driven MMC into their new build school building program. But I know there's individuals in the DfE that have had bad experiences of poor-quality schools being built in the past using MMC that are sceptical and are nervous about making the same mistakes. So, and I think that's a good thing to an extent because I think that's a healthy challenge. (P13)

We had to do quite a bit of work with our end users, with our sort of school population, to reassure them that they weren't getting another 1970s playground temporary modular building. (P14)

The issue of bad experiences in forming MMC negativism in the public sector can no doubt be argued as overt. However, the finding indicates that despite the bad and unsuccessful involvements, observed or personally experienced, a positive outcome remains possible. Nonetheless, this would still be subject to a critical transition once the contributing factors are adequately addressed from within the client organisation. Indeed, public sector clients are not willing to tolerate any less-than-ideal end results due to their nature of dealing with a public purse, and equally important not repeating the same negative experiences (Pan et al., 2007). Such finding acknowledges that previous bad experiences play a critical role in today's formed perception, but even so, the study reiterates Green (2022, p.656) view that there is "much to be learnt by studying the failures and successes of previous attempts".

Negativism due to post completion uncertainty

The traditional construction method lends itself to being manageable operationally many years post completion. In the MMC narrative, the fears and uncertain expectations post completion may be promoting innovation negativism in the public sector.

If a building is delivered or an asset is delivered through MMC in a contract or is contracted only for the duration of the delivery and it's done well, the public client still has to think about how that asset is going to be operated and maintained and doing that through MMC means that they're going to have to really change their ways of working. (P2)

The issue of post completion uncertainty is that it varies between traditional construction and MMC. In traditional construction, experience exists to flexibly resolve emerging issues as systems and services are widely utilised in the sector, making the process independent from one entity. In contrast, a level of attachment exists in the MMC anecdote.

Different modular companies build things in different manner [...] And because they vary from manufacturer to manufacturer or supplier to supplier, you almost get it involved with one supplier from day one, one option. (P6)

The issue of being attached to one point of responsibility raises the fear of uncertainty in the situation that the organisation no longer exists, i.e. has gone “bust”. This becomes complicated as no clear mechanisms to owning and maintaining an asset in the absence of the responsible MMC organisation. Such fear of attachment post completion, compared to the fairly detached stance of traditional construction, can be seen to promote MMC negativism.

Six of the pods were manufactured in Wales when the supplier went bust. So, we had to find another supplier in another part of the country. The first thing was a technical and legal thing in terms of we were given grant funding from the Scottish Government to design and build something that was zero carbon. And we couldn't certify that because the kit's manufacturer had gone bust on site. (P9)

The challenges for us come around owning that property for the next 70 or 80 years and how we maintain that asset and those components moving forward. (P7)

Hence, the varied nature of MMC organisations and the disjointed and non-

standardised processes among themselves are contributing to the perception that clients would be bounded with one point of responsibility post completion. In the probability that an MMC organisation ceases to exist, public clients would be left with an unextendable solution, becoming forced to lean towards more common industry practices. Such negativism is nurtured by the “numerous highly publicised failures of modular firms within the UK” (Green, 2022, p.656). Such arguments capitalise on the responsibility described by Anastasiades et al. (2021, p.11), who states that it is of primary importance “that all construction stakeholders should be involved in the development of these morphological standards and standard procedures for circular Reuse”.

Negativism due to experimentation

The interviewees exemplified that piloting and experimenting MMC projects, albeit done in good intentions to reinforce confidence, may not only be seen as ineffective, but also is seen as damaging to the overall reputation. The problem here becomes two-fold. As on one hand, contrary to traditional construction, little knowledge is gained through cross sectionally trialling MMC, which has been argued as “misleading”.

They just see what they see, and it doesn't make any difference. They don't actually observe anything, all they do is they see a building and then they go away. They need to see the whole process. (P10)

There is this synergy between demand and supply that needs to work well in order to realize this. So. I would almost discourage limited trials because limited trials, by their nature, are likely to be quite misleading. (P4)

The R&D on how it is applied to homes is with other people's money for other people who are going to have a one-shot approach living in that

environment. And if it is just one shot, one site, you'll never learn the lessons, never get the benefits from that. (P12)

On the other hand, excessive trialling of MMC has led to the formation of a perception that 'everything is a pilot'. Negativism is believed to lurk in this perception, where MMC is being portrayed as a passing prototype and not an actual industry solution meant to outlast the conventional ways.

Everything seems like it's almost in pilot phase or one-off phase rather than kind of, you know, a whole kind of change management program across the public sector or across a number of organisations. (P2)

MMC projects need to go through the sausage machine, so to speak, so we can get a bit more confidence because all I'm seeing now is pilot projects. Everything's a pilot project and I don't see any meaningful funded MMC units that we can go visit. (P9)

Hence, it may occur to the spectator that furthering pilot projects is a positive approach done to advance knowledge. However, this finding suggests that experimenting MMC on short-term basis causes misinterpretation through not realising the long-term benefits that distinguish MMC from traditional construction. Additionally, these pilots are believed to be damaging to the narrative by contributing to painting a picture where MMC is a meagre concept and a temporary prototype rather than a reliable and lasting construction solution. These arguments are consistent with Davidson (2013, p.349), who states that the "case histories of successful innovations, researched from outside, often fail to capture the subtleties". The same aligns with Green (2022, p.656), who explain that "experience shows that too much emphasis on short-term measures of success, such as construction productivity, is ill-placed given the longevity of buildings".

Negativism due to the business case

A positive perception towards an investment is often supported by a compelling business case. Arguably, the nature of MMC prohibits the development of an encouraging business case when compared to traditional construction. This is in turn seen to promote MMC negativism in the public sector. The argument built herewith suggests that the “exercise” done in the decision-making process places MMC in an unfair comparison.

So many clients are resistant to MMC because obviously when they do an exercise and they look at it compared to a traditional alternative, they see it as being more expensive. (P13)

I think it's really hard to see the direct result. So, like that kind of business case, that's it, the business case for investing in MMC, I think still needs work or it needs some sort of high level buy in to drive it. (P2)

The traditional way of predicting the success of a construction project based on initial costs rather than lifecycle costs means that MMC has a weak business case. It is important to note that the emerging discourse in this theme does not simply identify cost as the main issue but rather indicates the absence of a justification of this cost from a value point of view.

The cost is the cost, but what do you do? Do you just suck it up and find money from another budget? or do you build less houses? If the budget is fixed and given that the climate that we're in at the moment, the opportunities to find more money, I would suggest are fairly remote. (P9)

MMC will still struggle to compete because it will be from a capital point of view until it becomes established it will be more expensive. (P8)

Therefore, the distinctive dynamics of how cost is measured and depicted to public clients places MMC in a status quo that demands business case justifications. This finding does not subscribe to the oversimplistic perception that cost is merely the issue, but rather suggests that the absence of a compelling business case that encourages clients' investment is promoting the formation of MMC negativism in favour of the traditional methods. Interestingly, the finding is consistent with Davidson (2013, p.348), who infer "perceptions reflect the negative and positive experiences of the putative innovator, and are felt so strongly that he or she ventures (one might say "stumbles") into the innovation process, weighing up more or less accurately the business expectations, and thus weighing up the advantages vs the costs for a likely market over a reasonable time-span". From a behavioural viewpoint, Winch (2015, p.110) explain that "only the owner can defend the business case for investment because it is the only member of the project coalition that is motivated solely by that case".

Negativism due to localism

Public clients do not generically see construction as a commercial opportunity, it is rather perceived as a bridge to deliver their social missions. In this context, there seem to be a perception that local value may not be achieved because of the distinctive nature of MMC, subsequently promoting negativism.

I think there is a fear that it is taking away jobs. Yeah, even though it might introduce efficiencies and different jobs, but then you're looking at skilled jobs. I think there is the risk of a loss of that sort of localism. (P11)

The arguments emerge to criticise the nature of MMC processes which offers "fewer opportunities". This adds complexity to public procurement as it is often tailored to pinpoint such local value as a prerequisite condition.

You're not going to build a huge factory in London or the south east where land prices are high, and you've got population pressure and other things in relation to achieving social objectives. I think in some ways MMC makes it a little bit more challenging in terms of some of our traditional thinking about those particular incomes through apprenticeships and training because you need fewer people. So, there are fewer opportunities. (P3)

In this narrative, opinions concerning MMC are not formed from the lens of addressing skill shortages, or other relevant longstanding construction challenges. On the contrary, innovation negativism herewith is promoted on the basis of needing “fewer people”, which is seen as a downside to local regions rather than a beneficial feature nationally.

You get a lot of procurement looking for contracts that will increase skills, bring apprenticeships and jobs into the region. MMC doesn't always do that because obviously it needs fewer people on site. (P5)

The discourse explaining this mindset seems to be politically related. The transition from a traditionally measured social outcome to an alternative is influenced by pursuing public blessing. The perception that employment conditions, i.e. apprenticeships, and job opportunities, are altered, places decision-makers in risk of defying the will of the “people from their local area”.

... with traditional, it's going to help regenerate the local economy. Councils are going to forget the performance of it, councillors are going to be voting with their fee and going for what wins them votes and what wins in advance is people from their local area. Now if people in the local area don't see any benefit from MMC, they're not going to vote for the councillors. (P9)

Hence, perceptions regarding the social aspect of MMC are believed to be

politically steered and influenced by the traditional procurement requirements. The finding is overtly rational if viewed from the lens of localism and social value. However, there is a responsibility to view the benefits of an innovation from a nationwide lens beyond local regions, as an obligation exist to acknowledge challenges such as the skill shortages and the implications of aging labour that may not be overcome with regional bias decisions. The finding supports the argument made by Green (2022, p.656) who contend that policymakers should judge MMC “at multiple points throughout the building’s life cycle, rather than at the single arbitrary point of ‘completion’”.

Conclusion

It is here reasonable to assume that a state of conventional unipolarity has manifested in the UK public construction sector, as innovation negativism occur to challenge any new idea demanding industry change. Innovation negativism is seen as destructive to progression, and its formation is problematic and complex. Instead of realising the inherent advantages and potential of MMC, the general perception is still resided upon its historical failures. This study is the first to illuminate the discovery of contributing themes that are believed to facilitate MMC negativism in the UK public sector.

This study predicts that until MMC comprehension is established beyond traditional comparisons, until historical evidence becomes accessible in the sector, until the lurking communication issue is resolved, until scope for a relationship history can be built, until MMC is seen from the lens of present value and not from past failures, until solutions are standardised among providers, until short-term piloting is replaced with long-term commitments, until a compelling business case is presented, and until the criteria of pursuing localism is altered, MMC adoption will continue to be

driven downstream, and negativism will remain a stumbling block to the advancement of innovations in the public construction sector. Among these nine themes is a single golden thread that is drawn out as the communication of confidence in MMC, a realisation that would require efforts from both supply and demand towards addressing the negativism that has populated in the industry.

This study does not simply advocate that past failures and endured consequences concerning MMC are ignored. On the contrary, this study calls for admitting these shortcomings but also capitalising on the equally important unequivocal triumphs as justifications to identify the reforms needed for the progress of the public sector. Despite that innovation negativism has manifested among decision-makers, exploiting the benefits of construction innovations remain necessary to meet the needs of the public. Historically, innovation negativism has been associated with negative past experiences; however, this study infers that many additional key contributing themes are responsible for the formation of innovation negativism. Hence, future researchers are encouraged to assess the findings of this paper in comparison with the industry and governmental reports. Moreover, future researchers are called to explore the views of construction professionals to gain broader understanding on the formation of innovation negativism.

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