

# MODERN METHODS OF CONSTRUCTION AS THE SALVATION OF THE UNDERSUPPLY OF AFFORDABLE HOUSING

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**ABSTRACT:** The aim of the study is to investigate whether modern methods of construction (MMC) will be used by housing associations (HAs) to address undersupply of affordable housing in the UK. The population is development departments of HAs, to determine answers to two questions: (1) is there an undersupply of affordable housing in the UK, and if so what factors are influencing it?, and (2) what factors are considered when choosing between MMC and traditional methods? The main research instrument is qualitative semi-structured interviews with nine senior development directors, validated by quantitative data obtained from development staff. It is confirmed that there is an undersupply of housing, and that MMCs alone cannot resolve this problem. The main conclusion is that Government needs to address the amount of bureaucracy currently hindering HAs from developing. The study should inform the decision making process at inception stage for housing developers and HAs.

**Keywords** - Affordable housing, housing associations, modern methods of construction.

## 1. INTRODUCTION

The reported undersupply of affordable housing is driven by a complex mix of circumstances culminating in the construction industry failing to build enough affordable housing, at the same time that the population is increasing. In addition, the average size of households is in decline caused by a range of demographic factors: increasing life expectancy, more couples divorcing and single parent families. The undersupply of housing seems to go hand in hand with the undersupply of land, at an affordable cost and quantity, in the correct location. The Government has exacerbated the problem with the introduction of a number of bureaucratic policies.

The size of the problem varies depending on which report is read: Egan Report (1998), Department of Environment Transport and the Regions (DETR, quoted McAllister, 2000), The Barker Report (2004), Royal Institution of Chartered Surveyors (RICS, 2004) each confirmed an undersupply however, they could not agree on the extent of the undersupply.

The Office of the Deputy Prime Minister (ODPM) has imposed target numbers to be developed using modern methods of construction (MMC) on housing associations; statistics indicate that institutions and people (such as insurance companies, asset managers) are reluctant to change, wishing to retain traditional methods of construction, they understand due to concerns regarding past problems with maintenance, and the long-term viability associated with off-site manufacture.

The aim of the study is to investigate whether MMC will be used by housing associations (HAs) to address undersupply of affordable housing in the UK. This aim is supported by two research questions: (1) is there an undersupply of affordable housing in the UK, and if so what factors are influencing it? and (2) what factors are considered when choosing between MMC and traditional methods?

## **2. LITERATURE**

### **2.1 Modern Methods of Construction**

MMC is a generic term used by Government for alternative methods of off-site manufacturing (OSM). The Housing Corporation (HC, 2003) sub-divides MMC under five headings:

- Panellised OSM: commonly referred to as ‘timber frame’ or ‘steel frame’.
- Volumetric/Modular OSM: fully manufactured and fully pre-commissioned within a factory environment and transported to site as a kit.
- Hybrid OSM: combination of both panellised and volumetric approaches.
- Sub-Assemblies and components the use of floor or roof cassettes, pre-cast concrete foundation.
- Non OSM, MMC: schemes utilising innovative building techniques, structural systems that fall outside the OSM categories above.

### **2.2 Historical reasons for using off-site manufacturing**

After the First and Second World Wars due to post-war shortages of materials, along with a lack of skilled labour, it became necessary to consider alternative methods of construction to resolve the undersupply of housing. Successive Governments gave generous funding to non-traditional system building methods.

Renewed impetus to use system housing arose due to a combination of social and political pressures, to re-house people displaced by the major slum clearances of the late 1950s and 1960s. The 1970s saw a public reaction against pre-fabricated system buildings, largely as a result of high profile failures such as Ronan Point, East London.

In 1982, 27% of all new houses in the UK were constructed from timber frame (Palmer, 2000). However, a popular investigative television programme, ‘World in Action’ (1983) destroyed confidence in timber frame construction for housing. It highlighted the vulnerability of poorly constructed timber-frame housing. This caused the market to plummet to 5% of the share in the domestic housing sector overnight.

### **2.3 Current reasons for using MMC**

The reputation of the United Kingdoms’ construction industry has been in decline for a number of years. With the under investment, lack of training, the demographic shift and a lack of innovation in the construction industry; the Deputy Prime Minister, John Prescott commissioned the ‘Construction Task Force’ chaired by Sir John Egan to report on the scope for improving the quality and efficiency of the UK construction industry. The outcome from the review was ‘Rethinking Construction’ (1998).

The Construction Task Force compared the construction industry with other industries, on quality and efficiency; the outcome was unfavourable. It compared construction with the manufacturing industry as to how that industry had met challenges, and improved in recent years, on the delivery of goods to its customers in both time and quality, increasing its profits in so doing. However, the construction task force team repeatedly heard the claim that construction is different from manufacturing because every product is unique (Egan, 1998).

The team reported that it did not agree with this statement, houses are essentially a repeat product, which can be continually improved on.

Government set itself targets to stabilise the UK's runaway housing market of 2004, and end its boom and bust housing cycles. House prices in the UK have doubled since 1995, with many people unable to get a foothold on to the property ladder. There is in addition a lack of affordable housing, particularly for key workers. This problem of high prices is compounded by the shortage of houses being built. In 2001 house building fell to its lowest level since 1924, excluding the war years and its immediate aftermath.

## **2.4 The undersupply of affordable housing**

The average size of households is in decline caused by divorces and single families. In addition, there is a demand for more housing due to a range of demographic factors along with increasing life expectancy and movement of people to areas with economic growth. With this in mind, The Chancellor and The Deputy Prime Minister set up a review of housing supply in the UK on the 9th April 2003. This culminated in a report, known as 'The Barker Report' published along with the Budget in March 2004.

The provision of social housing in 2004 is one-fifth of what it was twenty years ago (RICS, 2004). Numbers of affordable houses built in the UK fell from 42,700 in 1994/95 to 21,000 in 2002/03; with costs increasing from £800 million in 2001/02 to over £1.4 billion in 2003/04, while the rate of new supply continues to decline (Barker, 2004). Barker attributed part of the costs due to strong land costs and the importance of improving the existing housing stock.

Over the next ten years the 'Barker Report' (2004) estimated the number of affordable houses built would have to increase by at least 17,000 units per year. In addition, if the backlog of the past were to be met, then a further 23,000 houses would need to be constructed (Barker, 2004). For Government to deliver based on the Barker report, it will have to ensure that 61,000 houses are built each year for the next ten years; this would be a three-fold increase overnight. This figure would mean the construction of over half a million homes in a ten year period, which is in excess of Egan's prediction in 'Rethinking Construction' (1998) of one million homes in the next twenty-five years.

In contrast, The Campaign to Protect Rural England (CPRE) cited recent census data to be inaccurate, indicating the population of England and Wales to be 900,000 lower with the country currently having a surplus of dwellings over households. CPRE agenda is to protect the greenbelt from further development, at the same time as developers are pressurising Government to change the current planning policy.

## **2.5 Skills shortages**

The construction industry is one of the UK's largest employers but the shortage of traditional skilled labour is inhibiting the house building sector's ability to meet demand. As a result, there are poor levels of quality control and low productivity; consumers pay too much for their homes that are often very poor value for money (Pickard, 2002). The Barker report (2004) was particularly concerned with the low levels of training undertaken by industry. Levels of training are low compared to other industries and by international standards. However, The Traditional Housing Bureau (THB) refuted that there is an undersupply of skilled labour for masonry construction; workers travel for employment often being multi-skilled, are often absorbed into different areas of the industry when work is scarce.

Labour costs in 2004 have increased between 4.5% and 8.2%, which is approximately twice the average rate of increase for the rest of the UK economy. It was predicted that pay settlements for 2005 will be between 3.3% and 9.5% (Building, 2004). Due to the real issue of skills shortages a number of developers have been tempted to reconsider the use of off-site manufacturing.

## **2.6 Government bureaucracy**

Government action is influencing planning authorities in the way consents are granted. The introduction of 'Planning Policies Guidance 3' (PPG3) on housing, published in March 2000, made fundamental changes to planning for housing. It placed the pursuit of sustainable development at the heart of both forward planning of new housing and the consideration of housing proposals through development control. PPG3 is central to the Government's policies for securing an urban renaissance, protecting the countryside from unnecessary development and meeting the housing needs of all in the community. PPG3 tasked the construction industry to develop well-designed, high-density dwellings.

Build totals have fallen as the industry has struggled to work on complex brownfield sites and planning committees who regarded the guidance's high-density diktat as locally unpalatable (Smit, 2003a.). David Holliday of 'Ward Homes' said that the conundrum now is that we're trying to use off-site manufacturing at a time when sites are getting even more complex and there is a need for attached housing (Smit, 2003b).

Richard Hough of house builders 'Swan Hill' stated that the undersupply fundamentally exists due to the planning system not releasing enough land for building (Hough, 2002). Whereas, David Pretty, Chief Executive of Barratt who constructed 1,256 affordable properties in 2004, said 'there is no shortage of land on this island ... just a shortage of planning permission' (Monaghan, 2005).

In recent years there have been several changes to the Building Regulations, to reduce carbon dioxide gases; to comply with the 'Kyoto Treaty' signed in Japan in 1997. This legally binds industrialised nations to reduce worldwide emissions of greenhouse gases, by an average of 5.2% below their 1990 levels, over the next decade. This has brought in many changes to building regulations in a very short space of time, with even more stringent insulation and ventilation amendments proposed over the next couple of years.

The Deputy Prime Minister tasked the Housing Corporation (HC) to take a lead in promoting the use of MMC amongst HAs. At least 25% of the housing that the HC funded in 2004/05 will be expected to be built using MMC (HC, 2003). With the ever-increasing rising costs of housing construction, John Prescott set the toughest possible challenge during the Labour party conference in September 2004, to construct a house for £60,000 ahead of a predicted general election due in May 2005. Many in the construction press feel that its one step too far, with this cost being almost half the current costs in the London area.

Whilst Government are exerting pressure on HAs to use MMC; a high profile project CASPAR modular housing scheme in Leeds, completed only six years ago is threatened with demolition following the evacuation of all forty-six residents due to a fear it may collapse in severe weather conditions (Smit and Hay, 2005).

## **3. METHODOLOGY**

Recently there has been an increasing recognition of the value and appropriateness of qualitative studies within management of technology and engineering (Fellow and Liu, 2003).

Fellow and Liu (2003) acknowledged that qualitative studies have a great potential to get beneath the manifestations of problems and issues which are the subject of quantitative studies. For this reason a qualitative research was selected to be the most suitable solution in delivering the aims of this study. The main benefits to be gained from this method of research is it uses interviewing techniques for three interrelated purposes: (1) diagnosing a situation; (2) screening alternatives; and (3) the discovery of new ideas' from others (Zikmund, 1997 quoted in Naoum, 2002). However, the limitations of qualitative research will bring forward hunches and hypotheses which can be tested more rigorously by a further quantitative research (Naoum, 2002). For this reason two research methods were undertaken; a qualitative semi structured interview of nine development directors and a quantitative questionnaire survey of development staff working for the directors interviewed; this was undertaken in an attempt to triangulate the findings from the interviews (Fellows and Liu, 2003), also referred to as mixed methods approach, recommended by Creswell (2003). Due to time scales the mixed method research was carried out concurrently as described by Creswell (2003). The questionnaires for the development staff comprised of fifteen closed questions and four open for a qualitative response. These were issued to 100 development staff via e-mail with thirty-four being returned within the allocated time.

The population for research was restricted to HAs being the main provider of new social housing in England. It is the associations' task to deliver quality affordable housing to those in need, whether it is key workers in the South or for the less well off generally in the North. As of 31 March 2003 the HC had 2,004 housing associations registered. The HC is a Non-Departmental Public Body (NDPB), sponsored by the ODPM. It has a board of fifteen members, including the chief executive, who is appointed by the Deputy Prime Minister. All funding of associations is via the HC, which is subject to the provisions of The Housing Act 1996. Based on annual survey March 2003 the HA sector stockholding of properties was 1,762,404 units owned for rent, which provides homes for at least 4 million people in England.

Of the 2,004 associations that manage almost 1.8 million properties the majority are small, owning fewer than 250 homes. However, the largest 7% of associations, those with 2,500 plus homes own 78% of all the sector's homes (HC, 2003). The HC publish a league table of the HAs with the largest housing stock, this research restricted the survey to the top thirty. However, one small association with 900 rented properties was selected for interview; it having a high percentage of its existing stock made up of prefabricated developments from the 1960s. The final sample was in the main restricted to associations in the North of England with two interviewees having responsibility for the whole of England.

#### **4. QUALITATIVE AND QUANTITATIVE DATA ANALYSIS**

The basic principal process of analysis is based around the methods recommended by Creswell (2003). All nine interviews were tape-recorded and were transcribed verbatim. In addition, the open questions from the questionnaires were analysed in a similar manner. The first step to reduce the text from the interviews was to systematically analyse them by manual reading, 'making sense out of text' (Creswell, 2003) to draw out common themes; these were coded. All the common themes were organised into 'chunks' of material (Rossman and Rallis quoted in Creswell, 2003) relevant to answer the research questions. The process in selecting the important themes is based on the authors' experience and judgment about what is significant in the transcripts (Seidman, 1998). This process reduced the ninety pages of interview text down to twenty-five pages, as a first stage analysis. The second stage analysis reduced the key points/words into tables, pie and bar charts.

The analysis of the quantitative data was undertaken with the use of a computer rather than manual calculations. However, computer analysis software SPSS (Statistical Package for the Social Sciences) was considered and rejected in favour of Microsoft 'excel'. This is due to the relative small amount of data to be analysed, along with the lead author's extensive experience in the use of excel. Data from the questionnaires was transferred to excel spreadsheets, and findings were represented by bar and pie charts. Results from both methods of research will be summarised in the form of a narrative in section 5.

## 5. DISCUSSION AND FINDINGS

The following analysis will integrate research for the qualitative interviews and quantitative questionnaire research with that found in the literature. *'Texts shown in italics within inverted commas are direct quotes taken from the interviews'*.

### 5.1 Is there an undersupply of affordable housing in the UK, if so what factors are influencing the undersupply?

**5.1.1 Supply of housing:** An overwhelming majority of senior managers and development staff, 100% and 94% respectively were in agreement; currently the UK is experiencing an undersupply of affordable housing. Of those interviewed 78% considered that issue of undersupply to be a far greater problem in the South, with the situation in the North being an issue of undersupply in areas of high economic demand, and an issue of under investment over the years, leading to a need of regeneration in other areas. These findings compare favourably with the literature, however no one in the literature can agree as to how many houses need to be built and where.

**5.1.2 Factors for the undersupply:** Of those interviewed 81% considered the largest contributing factor leading to the current undersupply of housing to be the need to reform the current planning system. *'The planning system has stifled the production of new housing'; 'certainly planning policy is constricting the supply of land'*. In the North, they identified the restrictions to building on small brownfield sites, of ten to twenty-five properties using MMC not to be cost effective, which in turn restricts and slows down the development process. These findings are supported in the literature; the current planning system is impacting on developers from developing (Monaghan, 2005 and Smit, 2003a).

**5.1.3 Government bureaucracy:** In an attempt to deliver more housing, the ODPM set a blanket target of 25% for partnering associations to use MMC on all new development projects. All senior managers agreed Government are going about this in the wrong way; they should not make it *'mandatory which will be difficult'*, but should *'give incentives for people to use'* MMC. Conversely, 46% of development staff considered it acceptable for ODPM to set targets on the use of MMC. However, 97% of all development staff said 'don't know' or 'no'; to the question 'does your association have a target number of MMC projects to deliver each year?' The additional pressures placed on associations to consider MMC on small sites in the North is cost prohibitive; this is one additional factor slowing down the development process.

**5.1.4 Funding of housing:** Should Government want associations to use more MMC, senior management and development staff agreed, 67% and 73% respectively, the requirement for additional grant funding to be made available. Conversely, a number of people contradict this, it would increase the proliferation of the market; *'at the moment the modern methods of construction systems are too fragmented'*. In addition, a couple of senior managers resented the ODPM making associations an *'experimental tool'*, in the use of MMC. Just over half (56%) of senior managers considered the best way for Government to offer incentives by the way of grant, is to select a few tried and tested systems, this would, in time, hopefully reduce the fragmented market.

**5.1.5 General issues:** A high percentage of Local Authorities in the North have planning moratoriums on the numbers of new private houses that can be built. These moratoriums are to balance the supply and demand of houses. However, this causes a knock on effect; if private developers cannot build this restricts associations working with developers, under planning section 106 agreements.

Associations are weighted down by more regulations than the private developers, a great many being bureaucratic rules and forms. The latest standard introduced by the HC is Eco-Homes, an environmental assessment devised by the BRE. One of its main purposes is to increase sustainability to reduce carbon dioxide omissions for Government to comply with the Kyoto agreement. However, private developers will soon have to contend with this issue through proposed changes to the building regulations.

The reported lack of skilled labour, at present, did not have an impact in building houses, but it has without doubt increased costs. Reasons given for lack of available labour, is Government's desire to have more students gaining 'A' levels and going to universities. Two people reported that the undersupply of labour is not just in construction trades, it is in the whole industry, management, local authority planning and building control departments. However, both Egan and Smith of the NHBC considered that changing to MMC would get over the problem of low supply of labour (Bachelor, 2003). A number of people commented during the interviews that it is folly to encourage certain students to attend university if all they achieve is poor grade. Many employers do not employ these students; they would be better advised, due to their academic ability, to go via an apprenticeship route.

## **5.2 To determine what factors housing associations take into account in selecting which method of construction to use.**

**5.2.1 Influence associations have:** When a new development opportunity arises 56% and 52% of senior management and development staff respectively, considered that the method of construction should be considered at feasibility. For the economic use of most MMC, systems manufacturers need to be aware of projects as early as possible, and be appointed; without this, the overall project programme from inception to completion will be lengthened, increasing costs. The findings found that almost half associations did not consider this important; it is therefore assumed the automatic choice would be to use traditional constructional methods. This could be explained by the fact that very often nowadays associations are not the lead developer. A third of senior managers confirmed that a great deal of their projects come on the back of planning section 106 agreements. These planning agreements are to ensure that private constructors deliver mixed developments; with a portion of all new properties being affordable.

The research and the literature concur that presently not enough is known about the alternative systems of MMC available; this inhibits designers, clients in being able to confidently specify at an early stage of a new project. In the judgement of the authors most people in development are happy in securing a new opportunity to develop; the method of construction is secondary. A lack of knowledge of MMC, along with higher costs, makes traditional construction on the small sites in the North the automatic choice.

**5.2.2 Advantages of MMC over traditional:** The three main advantages of MMC came down to time, quality and sustainability:

**Time:** Over two thirds (67%) of senior managers with 43% of their staff confirmed a reduction of construction time on site.

**Quality:** 81% of senior managers and 47% of development staff considered quality to be better with MMC housing, this is due to constant quality of manufactured components from a factory. However, 25% of development staff were of the view the method of construction did not have a direct influence on quality. Seven of the nine senior managers considered one of the main advantages of MMC is it delivers *'better degree of quality control'*. With two selecting volumetric *'I guess the most tight quality control you can get in volumetric manufacturing'*. The authors' judgement why MMC received high scores for quality is; people considered a high percentage of work being carried out in dry controlled factory conditions, which is the case with volumetric. However, in the use of timber frame, a very high percentage of overall works is still carried out on site; therefore, anecdotal evidence on quality is reduced to less shrinkage cracking to plaster after completion.

**Sustainability:** The research found that on average 60% of people selected panellised construction to be the most economical method of construction currently available in delivering sustainable housing, compared to only 3% selecting traditional construction to be best. However, four of the senior managers considered during the interviews, that the word sustainability was in fact a long-term issue, 'durability' and 'longevity' (Clarke, 2004). Therefore, for that reason alone traditional construction would be the best long-term solution, being tried and tested.

**5.2.3 Disadvantages with MMC over traditional:** From research there are far more disadvantages than advantages, each area is considered separately:

**Past failures with prefabrication:** Without the interviewer asking a direct question about the past history of pre-fabrication, 78% interviewees' raised the issue of past failures of various methods of off-site prefabrication. A number drew comparison to high demand for new housing in the 1960s, with that of today, and how Government had exerted pressure on councils and the construction industry to deliver alternative methods of building. Typical comments were: *'We should not leap headfirst into covering it all using modern methods of technology because we will be looking at repeats of the mistakes of the past'*. *'We are actually knocking down failed old system building stuff to replace it with current MMC'*. Association staff had concerns of the past, genuinely keen not to make similar mistakes councils made in the 1960s and 70s.



**Mortgages and insurances:** From the research three interviewees had experienced problems obtaining mortgages, with two relating to difficulties in obtaining insurance cover on certain types of MMC. Problems with insurance cover came to light during the literature review. The Barker report 2004, recommended that the NHBC, the provider of cover for most new housing, should work in conjunction with The House Building Federation, to agree quality standards in MMC projects.

**Value for money:** All senior managers considered various MMC cost more than traditional forms of construction to build, the average on-cost being in the region of 12%. This figure quoted by interviewees is in agreement with the literature at between 8 to 15%. Almost two thirds (61%) of those completing the questionnaires agreed, MMC cost more than traditional methods. However, 34% considered there to be no difference in costs between MMC and traditional, with a further 15% having a view MMC cost less. Additionally, development staff voted 64% to 36% against MMC being value for money in the short term, up to 5 years. However, when considering the long-term these figures slightly improved from 57% to 43%. Cost savings are not available particularly in the North due to, (1) small sites and (2) too many manufacturers, having spent research and development money, recouping their investments. Egan agreed currently that costs are likely to be higher in using MMC, but costs should be less volatile than in traditional construction (CABE, 2004).

**Commercial risk:** In the open quantitative questionnaires the largest concern people had is procurement through the supply chain (34%), *'too many horror stories of long lead in times due to suppliers being too busy and unable to meet demands. The client becomes too reliant on one supplier placing all your eggs in one basket'*. Senior managers raised similar concerns, using the same phrase *'all your eggs in one basket'* leading to clients being held to ransom. Typical comments from senior managers were *'no we should not take any more risks than anybody else'*.

**Maintenance:** When asked do they consider long-term maintenance costs of various methods of construction, it drew conflicting replies. Senior managers and development staff considered that 34% and 65% respectively considered that traditional methods would deliver less defects. From the replies to the qualitative interviews, it became quite apparent to the author that this information is either unknown or that more than likely no one had considered the long-term costs.

**Flexibility:** Senior managers and development staff 56% and 59% respectively, confirmed in their views traditional construction to be the most flexible method of construction; with 26% percent of development staff considering panellised construction to be the second most adaptable. The remaining four senior managers stated they were unsure which system to be the most flexible in terms of future adaptation, as they were not technically qualified to comment. Clarke (2004) concurs with the above findings that traditional housing construction is the best option to provide *'lifetime homes'* it is also *'easy to alter in an economical and hassle-free manner'*. However, others in the literature expressed the flexibility of design to be very impressive using MMC (Hart, 2004).

#### **5.2.4 General issues:**

**Standardisation:** of components and manufacturing. All nine senior managers and 89% of development staff agreed, more standardisation would bring cost effective housing, however one stated *'you can't answer no to that even though I would like to'*, where as one confirmed

that *'I am not convinced that that is a major issue'*. These findings concurred with that discovered in the literature, that standardisation with more use will bring continual improvement (CIRIA 176, 1999). However, in the authors' experience there is some reluctance to standardisation, due possibly to the misconception that everything will look the same.

## 6. CONCLUSIONS AND RECOMMENDATIONS

Research established by interview, questionnaires and during the literature review concurred that without any doubt the UK is currently experiencing an undersupply of affordable housing. Of those interviewed 78% considered the undersupply to be far worst in the South than the North. With the North having an undersupply in areas of high economic activity, and possibly an oversupply of poor maintained housing, in other areas where people no longer desire to live.

Having established there to be an undersupply of housing, the second element of the first question is to determine current factors leading to the undersupply of affordable housing. Of those interviewed 81% considered the main reason for the undersupply, is Government bureaucracy, the main culprit being the planning system. In addition, associations are weighted down by more regulations than the private developers. Currently, Government via the HC have a 25% target of all new developments, to be built using MMC, for partnering associations. Of those interviewed, 100% considered it unacceptable to have a blanket fixed target, for all parts of the country. The majority interviewed considered that the undersupply of construction labour brings increasing construction costs, due to the laws of supply and demand.

**Conclusion 1:** Government to address the amount of bureaucracy, in particularly planning legislation, currently hindering housing associations from developing.

The second research question considered the thoughts and processes associations go through, in selecting a particular method of construction. The findings to this question are extensive (see 5.2 above).

**Conclusion 2:** It is the responsibility of development staff, and their clients to work together, as project teams, to consider all issues, for the circumstances presenting themselves, for each project; selecting the best method of construction for a particular project. Consideration should be given to each of the following: Commercial risk, time, quality, flexibility, maintenance, standardisation, sustainability, available labour, location and size of development, ground conditions, finally costs and value for money in the short and long term.

There are two recommendations, one of which is directed at Government to take action. The second, involves development departments; Government could also drive this via the Housing Corporation. Recommendation (1) is that Government appoint an independent research company to investigate the amount of bureaucracy that associations have to contend with in the development process, making development uneconomic with a view to streamlining the process. Recommendation (2) is that all development staff to be given training on current best practice, related to various methods of construction.

The authors conclude that the use of MMC alone will not be the salvation of the current undersupply of affordable housing.

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