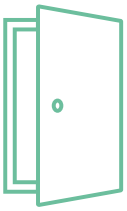
GVA

Pre-manufactured construction

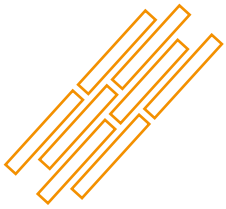
An overview & consideration of challenges for the industry

What is pre-manufactured construction?

Pre-manufacture is the term promoted in the Farmer Review and is a generic term to embrace all processes which reduce the level of on-site labour intensity and delivery risk. The definition suggests that processes can typically be broken down into four main categories.



Component sub-assembly
Comparatively small scale items that are assembled offsite, e.g. light fittings, doors, windows, or door furniture.



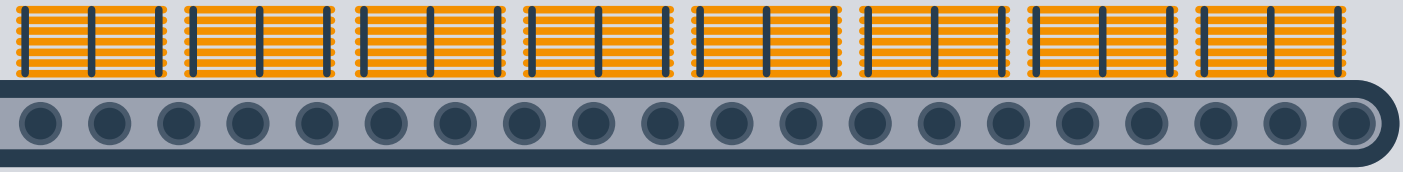
Non volumetric pre-assembly
Large categories of items assembled in a factory prior to installation, which do not contain usable space – e.g. panel systems.

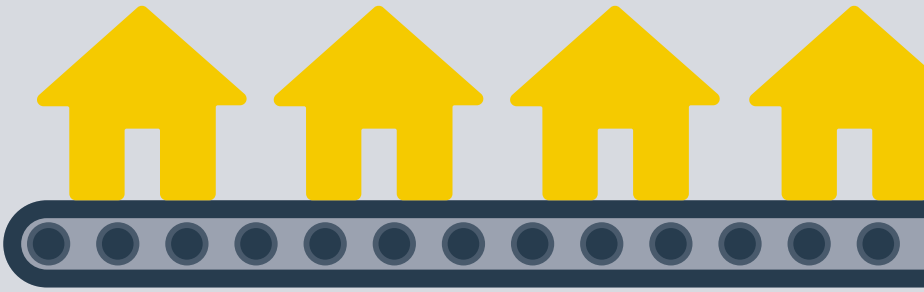
Volumetric pre-assembly
Units enclosing space that are installed within or onto a building; typically fully furnished internally – e.g. toilet/bathroom pods.

Complete buildings
Units enclosing usable space forming part of the completed building; typically fully factory finished internally (or also externally) – e.g. restaurant facilities.

An issue in the industry is confusion around the number of terms used and the lack of a common defining phrase. Modular construction, pre-fabrication, off-site construction and modern methods of construction being some of the most common alternatives.

We like the phrase pre-manufacture but it is becoming apparent that Farmer's pre-manufacturing value measurement formula is being manipulated for the purpose of tenders to demonstrate significant pre-manufactured value using traditional methods.





Growth drivers

Pre-manufacture is a growing area – the offsite construction of buildings, building elements and structures is currently worth around £6-7 billion per year and accounts for around 7% of the total construction market – with a market share increasing by 25% per year (KPMG & HSE).

A recent NHBC survey showed that 37% of respondents are considering using the fourth category of pre-manufacture (complete buildings) in the next three years.

This growth is being driven by a number of factors:

- **Housing shortage –** This has become a chronic problem and a political priority. Government housing targets have been missed for decades and we need to deliver housing across all tenures. We need to be building around 200,000 homes per year just to keep up with demand. Despite recent increases in building, for a range of reasons (discussed in the Farmer Review), the house building industry with its existing operating model and structure looks unable to deliver the numbers required.
- **Increasing policy support for pre-manufacture –** The Housing White Paper and government responses to the Farmer Review have introduced a number of initiatives to promote the pre-manufactured sector. These include the £1.7bn Accelerated Construction programme and the Home Builders Fund.
- **Increased importance attached to the energy performance of buildings and safety and working conditions –** The machine engineering, factory quality control and materials used in pre-manufactured housing should achieve significant energy efficiency benefits compared to traditional construction. There is a much smaller amount of waste and construction activity related impact. The greatly reduced need for on-site personnel carrying out dangerous tasks produces far better health and safety statistics.
- **Projected long term decline in the physical capacity of the traditional construction industry –** A low level of new entrants to the industry, combined with the ageing profile of the existing workforce mean that the industry is facing a demographic 'timebomb' and hence there is a big need for methods of construction that are less labour dependent. The significant contribution that migrant labour currently plays (particularly in London) and the affect that Brexit could have poses additional risk. Arcadis research has estimated that a 'hard Brexit' could result in a cumulative total loss of 214,542 EU workers to house building and infrastructure.

"We believe the UK is currently at an inflection point, with enough factors coming together to finally instigate a step-change in the use of pre-manufactured construction."

Hurdles

This section provides an overview of what we consider to be the main barriers to wider adoption of pre-manufacture in the UK.

The major barriers are seen as:

Lack of collaboration, and a need for strategic partnerships within the supply chain

The fragmented structure of the UK construction industry and the prevalence of long linear supply chains act as a constraint on productivity but also on increased use of pre-manufacture. The industry is geared up to function in this way and the time, resources and cultural shift required to adopt more collaborative, open supply chains, with stakeholders working together from the earliest phase, is a major challenge.

Lending, valuation, legal & insurance risks

These challenges are complex and with many inter-related factors. A lot of this relates to there being little or no historical data on products. The introduction of new materials, products and multiple innovative construction techniques creates uncertainty about the risks posed and the performance and desirability of buildings in the longer term. Traditional construction methods have been used for thousands of years and are well understood by both consumers and lenders. While new pre-manufactured products may have a certification or warranty, there is virtually no demonstrable evidence of how they will actually perform over their lifespan.

Lending

- The risk profile in development finance is very different than with traditional methods. As such it is currently not well understood by lenders and a concerted effort is required by the industry to gear up to lend on pre-manufactured schemes. Even if this happens, the prevalence of SME's in the pre-manufacturing sector will remain a problem. A significant amount of risk is concentrated in the front end manufacturing phase. A reluctance to lend will remain when there is reliance on small outfits, with heterogeneous products, to deliver units.
- There are huge variations in pre-manufactured products and without more standardisation it is a big ask for lenders to fully assess and accept each and every variation. There have been examples of this being overcome by developers warehousing the manufacturing risk but this will clearly not be a viable solution in all cases.

Valuation

- The existing lack of pre-manufactured schemes, historical data, comparable evidence and the variance in products represents a big challenge for valuers. This further contributes to challenges for lenders as they rely on valuers' expertise and knowledge to accurately assess risk.
- There is currently a lack of specific Red Book guidance on valuing pre-manufactured properties and this combined with the lack of comparable evidence inhibits growth.

Legal

- Significant insolvency risk – the contractor producing the units is critical to the development and insolvency can lead to the project having to start from scratch. If the contractor becomes insolvent, goods may be treated as theirs rather than the client's. Even if the insolvency practitioner is persuaded that the items are the client's, the project may be delayed if they are not released when they should be. The abundance of SME manufacturers currently in the market makes this problem more acute.
- Pre-manufacture strains the current legally established allocation of liabilities in typical design and build scenarios.
- It is believed that collateral warranties in a modular construction context are of limited effect.

  1. **Main contractor –** would refuse to warrant the module as he has no part in their manufacture or design.
  2. **Module manufacturer –** will necessarily warrant the fitness of the modules to be fit for purpose (or at least there is a strong likelihood that it will be implied by the courts) – But the effectiveness of this warranty will be limited as the manufacturer will seek to define the purpose in a narrow way or exclude aspects such as assembly. Causation and remoteness then become major litigation hurdles.
  3. **Module designer –** will only warrant reasonable care and skill in the design, and nothing more.

  (Source: Simmons & Simmons)

Home Insurance & Warranties

- Home insurance remains much tougher to find for pre-manufactured properties. This is a disincentive for consumers and developers, creating a vicious circle where developers are less willing to build because they are concerned with reduced demand. Some insurance firms decline all non-standard construction types and others see it as higher risk and reflect this with higher premiums.
- Warranties remain a challenge for the sector. A new build warranty is required by all lenders before accepting a new build property as security for a mortgage. The Build Offsite Property Assurance Scheme (BOPAS) was developed by Buildoffsite, RICS, Lloyd's Register and Building LifePlans Ltd in consultation with the Council of Mortgage Lenders and the Building Societies Associtation, to provide assurance to the lending community. Despite the introduction of the scheme around 6 years ago, the expected increase in lending has not been seen. Even with robust warranties, concerns will still remain around future saleability of properties and faults that only become apparent outside of the warranty protection period.

Lack of demand from consumers and the stigma of poor quality historical pre-fabrication stemming from the legacy of historical 'pre-fab'

The need to improving the image of pre-manufactured construction methods is frequently cited as key challenge. Consumers lack awareness of the benefits of pre-manufacture and its potential benefits to deliver better, safer, cleaner, faster buildings. To a degree this is the legacy of historic 'pre-fab' buildings in this country which were visually unappealing and associated with poor quality.

Investment needed in pre-manufacture suppliers

The significant up-front investment in manufacturing facilities and the up-front nature of costs, even with manufacturing facilities in place, is a major concern, particularly for big house builders. This is amplified amidst a climate of volatile demand and future uncertainty. The traditional UK model largely suits the major house builders as they can increase or decrease their rate of delivery easily, partly due to the prevalence of sub-contracting. The view is that a shift to upfront costs, without a guaranteed sale, inevitably means additional financial risk for developers. It's important to note this is less of an issue in the affordable, student and PRS sectors where the end demand is much more certain.

An extreme example of the investment required to deliver a large scale in-house manufacturing capability (along with other considerations such as finding an appropriate site for facilities) is illustrated by Legal & General leasing a 550,000 sqft unit and investing £55m to develop the largest pre-manufactured housing factory in the world.

Skills

The skills shortage in the UK's construction industry is well documented and longer term is a key driver for moving to pre-manufacture, as the requirement for labour is decreased. However, there needs to be significant investment and reform in training structures to develop individuals with the new skills that are required. This may well cause some resistance from trade bodies and unions as it can be seen as threatening traditional activities.

Current business models require the flexibility to cope with the wide range of conditions at the project level. They cope well with the differences of site conditions, demand patterns, construction approval processes and design requirements. The present models work well for house builders as they have been optimised for current conditions. But it is these vagaries that can create a barrier to the adoption of the new processes that pre-manufacture demands. In particular approval delays, regulatory complexity and change, together with inadequate certification can create barriers to improvement.

The training requirements to deliver pre-manufactured construction are complex and in a cautious environment, there is little reason for private companies to provide the required investment.

Should you wish to discuss any details within this report please get in touch.

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