

Prefabrication and modular construction – from fragmented to integrated value chains

Rising demand for prefabrication

The overall increasing skilled labour shortage in Europe as well as an ongoing pressure on construction costs and schedules, is accelerating the adoption for modular construction and prefabrication across building typologies. On the positive side, the construction industry is increasingly digitalised in terms of design, construction and operation of buildings and assets. Thus the labour and material productivity is increasing due to standardised construction approaches such as prefabrication.

Fast movers in the façade industry

There are fast-movers in the industry – particularly players that have always followed systemised building and construction approaches such as façade system providers and turnkey housing developers. To retain their edge, these players will need to build strong coalitions across the value chain, and build their competitive advantage by focusing more on quality, rather than price.

Four key typologies are at the core of the prefab market – housing, student accommodations, residential care homes and hotels are increasingly standardised using prefabricated principles. There is a trend towards turnkey solutions, meaning fully equipped volumetric units.

Matt Cooper – an Arup Advisor to the UK Government notes that “the UK is seeing a significant investment in prefabrication which will help address skilled labour shortages from Brexit and Covid-19 and to improve the quality, performance and supply of buildings. Key to the success of the investments is an adoption of Design for Manufacturing and Assembly (DFMA) throughout the supply chain and assembly companies”.

The implications on façade supply and value chains

Façade system suppliers will need to revisit their downstream supply chain. In the prefabrication market, system houses will need to increasingly build coalitions with their end-customers and the prefabrication contractor. This implies adjusting logistics and overall route-to-market strategy but also technical innovation such as new interfaces for individual components, different handling off- and on-site and an even higher vertical range of manufacturing.

The impact of Covid-19

Covid-19 has highlighted the importance of local and regional supply, so industry players now need to shift their focus away from just price efficiencies towards greater resilience. Players in the prefabrication and modular construction segment have long embraced local supply chains, and are set to continue to benefit from recent developments

THE 6 KEY BENEFITS OF PREFABRICATION

1

Off-site prefabrication means faster turnarounds, addressing demand for shorter lead times

2

Off-site manufacturing enables a higher execution quality

3

And higher productivity due to more standardised approaches with less material and labour effort

4

The planning complexity is lower due to fewer stakeholders involved in the value chain as well as less single execution steps

5

The end-of-life scenario can be better addressed due to the more systemised building approach

6

Health and safety are enhanced due to controlled factory environments

The opportunity – 5 key steps to create value with prefabrication in the façade industry

In order to create long-term value with prefabrication and modular construction, façade (and other) industry players must follow five steps;

1. Focus on building typologies that have repetitive layouts, standardised space configurations and architectural elements – these include student accommodation, residential care homes, hotels and housing
2. Build strategic partnerships and frameworks along the value chain and focus on stakeholders that provide seamless – ideally end-to-end services
3. Create façade products that can be quickly put together and/or disassembled off-site to the highest possible quality by a less skilled workforce
4. Consider new route-to-market concepts resulting from changing digital design, configuration and decision-making processes with building information modelling as the main driver
5. Embrace digital additive manufacturing technology to address the need for smaller-batch and customer-specific/bespoke designs

Conclusion

Prefabrication, modular construction and the associated shift from the site to the factory and from prototypes to products can have a significant impact on the future shape of the construction industry. Arup's Research and Innovation team helps industry players across the value chain to navigate through that uncertain future and be better prepared with respect to their product, system and service propositions.

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