Japanese Prefabricated Housing Manufacturers

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Japanese prefabricated housing manufacturers have gained international recognition for their innovative approaches to the whole design process, ranging from initial design to innovative cutting-edge technologies, state-of-the-art automated production lines, meticulous workmanship, and mass customisation. In this entry, three manufacturers (Daiwa House, Sekisui House, and Misawa Homes) were selected as case studies for close examination. By studying these leading companies, researchers and industry professionals can gain valuable insights into best practices, challenges, and innovations within the Japanese prefabricated housing sector. The research methods involved a desktop study of available information on websites, articles, and reports, as well as undertaking two study tours on residential sustainable design in Japan in 2022 and 2023. These three manufacturers were discussed and compared with respect to their development trajectories, design customisation, research capabilities and technological advancements, sustainable initiatives and procurement, as well as their after-sale services. They have demonstrated their adaptability and flexibility in response to natural disasters and the transformation of the needs in society. They are all keen on reducing the environmental impacts of their work towards zero carbon emissions and a sustainable future.

Keywords: prefabrication; mass customisation; earthquake resistance; post-disaster recovery; sustainable procurement; post-sale service; corporate social responsibility; zero deforestation; zero emissions; carbon neutrality

Japanese housing manufacturers are regarded as world leaders in prefabrication. After the end of the Second World War, Japan opted for prefabricated construction for mass production to address the substantial housing deficits in society. Early examples include the prefabricated A-frame prototype house by Junzo Sakakura and the Prefabrication Maekawa Ono San-in Kōgyō (PREMOS) by Kunio Maekawa in the 1940s. The mass production of housing led to shorter timeframes and lower construction costs but resulted in homogenous and identical products.

For facilitating the prefabrication and modernisation of the construction industry, the Japan Prefabricated Construction Suppliers and Manufacturers Association was set up in 1963 by the Ministry of International Trade and Industry and the Ministry of Construction. The Japanese Government exhibited the “Home Core” House of Misawa Homes as a showcase of the quality of housing prefabrication to the public at the Japan World Exposition in Osaka in 1970 and launched the “House 55” nationwide competition in the 1970s to promote the improvement of the quality of work produced by the Japanese housing manufacturers.

Following the booming economy and the growing desires of the middle class for home ownership in Japan in the 1960s and 1970s, Japanese housing manufacturers shifted the focus from housing quantity to cope with the huge demand for post-war reconstruction to higher quality in design, production, and service to accommodate the individual needs of their customers. This signifies the transition from mass production to mass customisation.

The basic idea of mass customisation was first introduced by the American futurist Alvin Toffler as a technological capability in his best-selling book Future Shock in 1970. In 1987, Boston University Research Professor Stanley M. Davis further elaborated the notion of mass customisation:

*the same large number of customers can be reached as in mass markets of the industrial economy, and simultaneously they can be treated individually as in customized markets of pre-industrial economies.*

Influenced by Davis' book, Joseph Pine II refined mass customisation and developed strategies for mass customising products and services. Instead of focusing on volume sales of standardised products under mass production, it is important to have innovation in the whole process from design to delivery, with continual incremental improvements supported by research and development (R&D), to enhance customer satisfaction. Creating modular components is regarded as the most effective way to achieve mass customisation to minimise the cost and maximise the variations in end products to cater to individual customers.
Japanese housing manufacturers have applied mass customisation and developed a total coordination approach to the design, production, and marketing of prefabricated houses. Prefabricated homes accounted for approximate 13.1% of the total residential construction started in Japan in 2022. Compared with traditional on-site construction practice, factory production of modular housing components has various benefits. Under optimal conditions and rigorous control in factories, enhanced quality of work is obtained, leading to better house quality in terms of air-tightness, energy consumption, and insulation. With the use of automation and robot-equipped production lines, meticulous precision is achieved and construction waste is significantly minimised. The mass production of modular components reduces the cost involved, while the combination of different components offers various options for customers in response to their respective demands. Customer-oriented approaches focusing on quality and value for money are adopted to prioritise customers' choices. Customers are encouraged to engage throughout the whole design stage in customising their new houses according to their desires and expectations. Catalogues, interactive exhibitions, display homes, and computer-aided software facilitate customers making decisions and visualising the outcome for modification and optimisation. Based on the selected components, a cost estimate is provided for customers to consider whether to upgrade some of the standard items to optional features within their budget for better quality and cost-effective performance. The selling price of Japanese prefabricated houses tends to be around 8% higher than site-built houses, yet their quality is higher through the cost-performance marketing and value-added production approach.

Large Japanese housing manufacturers have resources and funding to heavily invest in R&D with in-house research facilities to pursue continuous improvement and innovations. Since Japan is prone to natural disasters, such as earthquakes, typhoons, and floods, well-established manufacturers have set up their own quality standards for enhanced performance with respect to earthquake resistance, structural integrity, and durability. Post-sale long-term warranty provides quality assurance to boost customer confidence. Apart from marketing strategies to deliver innovative and high-quality houses, some Japanese housing manufacturers are proactive in promoting sustainable development in the construction industry by setting sustainability targets and implementing sustainable procurement practices under effective environmental, social, and corporate governance.

References


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