

# Modular construction: faster, smarter, greener

Why has it not seen wider adoption?



Supplied

An assembly line of modular housing at a manufacturing site owned by Dubox

By Tanvir Shah

It was a 21-year-old student who originally made headlines with modular construction. Building on his university thesis, Moshe Safdie built Habitat 67 as the Canadian Pavilion for the Montreal World Exposition of 1967. Today, while his creation still stands as an architectural marvel, modular construction is still to attain main stream success.

The modular concept allows for quicker project execution; hence, lower cost and

earlier to market. Coupled within a controlled and safe construction environment, it results in a tangible positive return on investment (ROI) compared with on-site construction. Operational efficiencies include central oversight, 24x7 factory operation, health and safety standards making it the ideal solution for designers, developers and engineers. Why then has it not seen wider adoption?

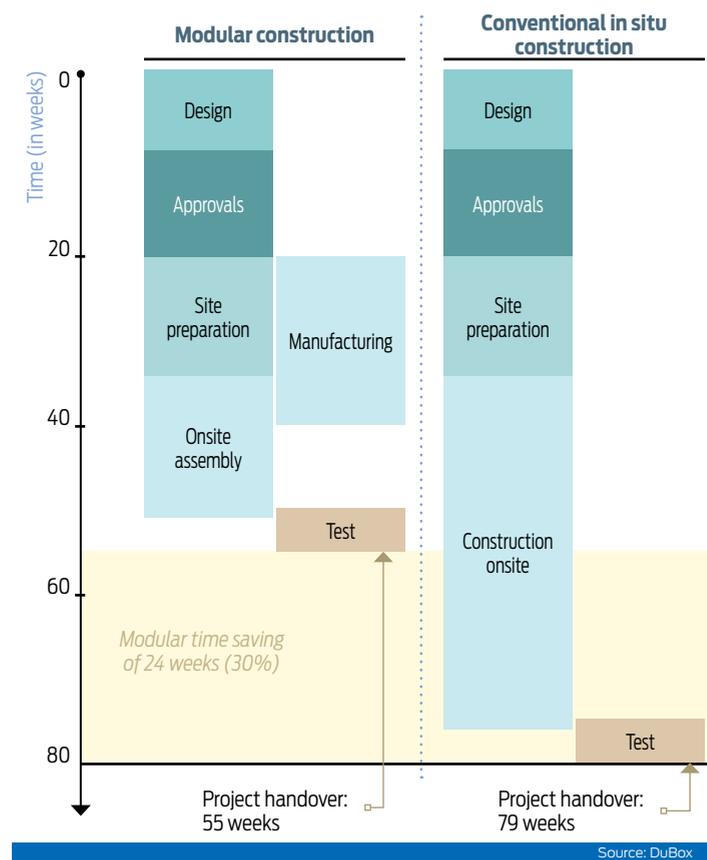
A key reason is the limitations around logistics, shapes and sizes. In ground-up de-

velopment, designers and developers like to get creative. The real advantage of modular has been replicating a “pod” over and over again. It is easier to construct boxes upon boxes of these pods in a factory setting, than on the job site. However, should the designers request a unique circular dome or curvatures for example, these elements will require on-site traditional construction. Also, the cranes that place the pods on top of each other can only go up six to eight floors in

## Typical timelines

### Modular vs conventional

Project: Hospitality accommodation (Abu Dhabi)  
2 Buildings | G+5 | 15,250 sq m built-up area | 530 rooms  
Estidama Pearl 1 Rating



most cases. There are creative ways to resolve these issues, but we aren't going to be building the Burj Khalifa or the new Abu Dhabi mid-field terminal entirely in a factory yet.

In 2012, Amana Contracting Group started operating a Dubai-based innovative concept, Dubox, which designs and delivers complete multi-storey buildings in concrete using modular methodologies. DuBox developed from the unfinished grey concrete module used by Safdie to the prefabricated prefinished volumetric concrete (PPVC) modules. Entire structures are manufactured off-site in a 62,000-sq-m factory in Dubai Industrial Park. DuBox has creative ways to resolve the challenges mentioned earlier to achieve open spaces vertically or horizontally by adopting hybrid construction methodologies.

Clients such as Adnoc have commissioned a 90,000-sq-m built-up guest house project in Al Ruwais, in the oil belt western region of the country. By adopting the disruptive modular method of Dubox, the whole project was constructed off-site using concrete modular

elements, and transported to the job site. Accordingly, Dubox delivered each of the eight G+2 buildings comprising 216 rooms each in a record time of 27 days. The whole project, including a mosque and a community centre, was delivered in 20 months. Dubox even obtained LEED Gold recognition on the project.

An 80-week project can be completed in 55 weeks using the modular methods in lieu of conventional construction. Reduction in completion time generates early income and higher ROI for investors.

Modular is faster, smarter and greener. Manufacturing construction in a monitored factory environment guarantees high-quality product, fully finished and furnished. Boxes are scalable and relocatable. Built in half the time of conventional construction with reduced waste, pollution and risk. This disruptive technology has been gaining foothold, especially with the booming trend of 3D concrete printing. ■

Tanvir Shah is managing director of The Partnerships Consulting. The views expressed here are his own.

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Phase II: 5 additional buildings

The following cost comparison model depicts two design-and-build construction methodologies: cast in situ (regular) and modular as specified by the client, in a like-for-like analysis. We have assumed building performance and infrastructure on initial concept drawings submitted in May 2015. Illustrated is the time-value contribution as a result of early building occupancies. The figures are illustrative only and subject to final design requirements.

Comparison model	Cast in situ construction	Modular construction	Modular – phase 2 Every 2 add-on buildings
Construction methodology			
Building handover + occupation	79 weeks 18 months	55 weeks 13 months	40 weeks 10 months
Revenue earning months @ 18 months	-	5 months	9 months
Construction cost (per sq m)	Dh4,250	Dh4,700	Dh4,700
<b>Key assumptions</b>			
Room revenue per month	Dh3,000	Dh3,000	Dh3,000
Available rooms	530	530	530
Cost of capital	8%	8%	8%
<b>Cost comparison</b>			
Total project cost	64,770,000	71,628,000	71,628,000
Early gross revenue generated	-	8,439,231	14,310,000
Time cost of capital	-	2,342,010	2,342,010
Effective build cost	64,770,000	60,846,759	54,975,990
Effective project cost differential	0%	6.1%	15.1%

Source: DuBox