

Industry to draw lessons from first public project using PPVC technology

Tharman, on a tour of NTU's new student hostels, says regulations and cross-agency collaboration need to be ironed out to boost building productivity

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REGULATIONS and collaboration among various government agencies still need to be ironed out as Singapore's builders look to improve their construction productivity, Deputy Prime Minister Tharman Shanmugaratnam said on Wednesday.

The minister, who chairs the National Productivity Council, made this point to reporters during a tour of the new residential halls being built in North Hill on the Nanyang Technological University (NTU) campus.

These are Singapore's first public buildings to use prefabricated, pre-finished volumetric construction (PPVC) technology, which involves stacking pre-built rooms on top of one another and bolting them tight.

He said: "This project has been a very useful learning experience. It has taught us about some of the problems that have to be ironed out. You need to have a project to learn what all the problems are."

How PPVC works

Case study with NTU North Hill



1. Each time, 40-50 empty modules manufactured in prefabrication plants in China are shipped to Singapore. They have floor tiles, windows, internal door frames and internal boards installed.



2. Modules arrive in Singapore's ports and are transferred to fit-out yards. Modules have to be fitted out within 1-2 weeks with lights, electrical wiring, sprinkler pipes, switches, fans, toilet piping, hot water supply, toilet floor casting and tiling, doors etc. Only the water closets and basins are left incomplete.



3. Every day, about 6-8 modules are delivered to the construction site to be lifted and assembled. Only after they are hoisted up are the sanitary drainage pipes connected manually to the units below them until everything is linked to the main drainage vertical stack. Mechanical and electrical services and floor tiling are then installed along the corridors to complete the project.

Lessons learnt

- Long-span structures are more challenging to build using PPVC as longer modules require more planning for transportation.
- It still costs more to use PPVC due to lack of economies of scale, and the high cost of shipping empty modules. Containers are charged by volume, not weight.
- Transportation of large modules has to be done within restricted hours at night.
- Designs need to be confirmed early, with minimal changes allowed afterwards.
- Planning has to be precise to minimise the need for storage.

He added that it is the government's job to ensure collaboration across agencies such as the Ministry of Manpower, the Land Transport Authority, the Building & Construction Authority (BCA) and even the Singapore Civil Defence Force, when it comes to fire-safety regulations in buildings.

"We're quite focused on that (collaboration). Our agencies are not resistant, we know what the objective is."

Mr Tharman estimated that, over the next year, the difficulties that cropped up in this project ought to be ironed out.

At a discussion held at the site office with industry representatives before the tour, one issue flagged with the use of PPVC was the need for additional land for the fitting-out and storage of the modules. Some contractors use land in Malaysia, but others need land in Singapore.

Mr Tharman said the government is looking into releasing more land for this purpose, but it is also important for contractors to do proper planning to ensure on-time delivery of modules; this way, what is delivered is just enough to be hoisted and installed that same day.

The BCA aims to have about 10 integrated construction and prefabrication hubs by 2020 for storing and fitting out modules. Four are already up at Kaki Bukit and Defu, and more land tenders will be called.

Another issue raised was the higher cost of using PPVC - a function of the current lack of economies of scale and the high costs of shipping the modules.

The NTU hostel project, for example, costs 18 per cent more than it would have, had it been built using traditional methods.

Paul Chain, the chief executive of NTU's Office of Development and Facilities Management, said that part of the reason for this is that when empty modules are transported, "we're basically shipping air". One solution to this lies in shipping the modules flat-packed.

Mr Tharman attributed the high cost to a classic principle of economics: "When it starts off small, you usually have to pay a premium... but that's the only way you can create demand and eventually force the price down."

To achieve economies of scale, the government is taking the lead to build up the demand, so more suppliers come on board. The public sector is in the best position to do this, he said.

Referring to the building sector as a whole, he added: "The construction industry is going through a transformation. It's quite a difficult period, particularly for the sub-contractors. But we have to go through this restructuring.

"We're going to be short of manpower for the long term and we want to offer higher-quality jobs; this is the way to go."

He said PPVC not only shaves manpower needs by 30 to 40 per cent, it also provides Singaporeans with more high-quality jobs in manufacturing and fitting-out processes, as opposed to unskilled jobs on construction sites.

"We want productivity in construction to make a quantum leap, and it can be achieved because we've seen it done abroad."

Site productivity has grown by an average 1.2 per cent per year in the last five years and the BCA is confident of achieving significantly more - well above 2 per cent per year in the next five years.

Mr Tharman believes this is possible. Measures such as the raising of buildability requirements and certain manpower restrictions kicked in only a year ago and will take time to show results.

"We're now going to see a whole new system in play because manpower constraints are now very real."

As NTU's Mr Chain weighed the pros and cons of doing PPVC during the discussion, he said every building method poses its own problems, and then quipped: "In the end, I believe if you have the will, somehow you will be able to get it done."

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