JTC's tech efforts lead to jump in productivity

About 70% of firms involved in projects it oversees now willing to use technology

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National industrial estate developer JTC Corporation has been going digital in a bid to improve productivity, land optimisation and environmental sustainability.

Among other things, it implemented more standardised information requirements for firms involved in its projects and rolled out a common data platform in 2018 where all parties working on a development can collaborate and share data on scheduling, building models and safety.

JTC said about 70 per cent of the companies involved in projects it oversees are now willing to use technology, up from 20 per cent two years ago.

And the efforts are bearing fruit – productivity has risen by about 20 per cent, said JTC director of building projects Wong Wei Loong.

"Our approach is to take the lead and work closely with partners in the use of data and digital technologies from the start of each project," he said.

Mr Wong told The Straits Times: "Hopefully once

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Boustead Projects building information modelling coordinator Tan Teck Seng walking through a virtual reality simulation of a 3D model of what Kranji Green should look like when it is completed. ST PHOTO: ALPHONSUS CHERN

'Walking' through a building – even before it is constructed

Construction industry professional Tan Teck Seng looks like he is playing a high-tech video game when he examines a building on a screen, decked out in virtual reality (VR) goggles and controllers.

But his mission is more down to earth – to show an intricate model of Kranji Green, a multi-storey recycling facility being built by national industrial estate developer JTC. He is walking through a VR simulation of a 3D model of what the building should look like when completed.

VR allows contractors, architects, engineers and developers to experience the model in life-size proportions, which increases the chances of catching any design flaws before construction begins.

The 3D model also allows supervisors to use their phones or tablets on site to ensure that what is built tallies with what is approved in the model.

Mr Tan is a building information modelling (BIM) coordinator with construction firm Boustead Projects. VR walk-throughs are just one of the ways Boustead has been raising its digital game in recent years. In 2017, it created a mobile digital hub out of a retrofitted shipping container with VR tools that can be moved from site to site to facilitate meetings.

Boustead managing director Thomas Chu said better technology "creates that environment to attract talent and improve the way we construct our buildings".

He added that Boustead is also working with start-ups to test-bed ideas that may eventually be commercialised.

One initiative involves working with Airsquire to use 3D laser scanning and artificial intelligence verification to check whether the built outcome adheres to the BIM model as construction progresses.

Boustead has spent about $2 million on integrated digital delivery technology so far, said Mr Chu.

While he cannot put a figure yet on the returns, he hopes its methods will set it apart in the eyes of both clients and staff. He noted that the processes already improve the site environment, safety and productivity, and help the firm promote itself to clients.

The firm is also trying to implement other innovations such as Lean PlanDo, an application that facilitates information sharing and tracking, in overseas projects as Boustead expands into Malaysia, China and Vietnam.

"My dream is to create a new market and new higher skilled management-level job opportunities for local staff to go overseas," said Mr Chu.

The strategy has helped attract talent like Mr Tan, 32, who joined Boustead last year as he felt it was pushing the envelope in tech use.

He initially worked as a draughtsman when he first joined the industry in 2012. Now he uses VR, augmented reality, drones and lidar (light detection and ranging). He learnt his skills on the job as he had previously studied a different field – materials science.

"If you asked me 10 years ago, I would have thought construction is like (TV character) Phua Chu Kang, wearing yellow boots and going around doing drawings and taking measurements," he said. "Now, there is even coding, and we can run software to check our models."

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Benefits of tapping technology in construction projects

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they finish our projects and see the benefits of this integrated digital delivery (IDD), they will actually instil it within their organisations and also push it to other projects, not just in JTC, even with private sector or outside Singapore."

JTC has trained about 400 staff over the past two years in modelling and managing information, and has started training consultants and contractors, as well as staff of other government agencies such as the Building and Construction Authority (BCA) and the Infocomm Media Development Authority last year.

At the heart of the effort is the common data platform called CDE (Common Data Environment).

There are about 700 active users across five JTC projects, with that number expected to reach 2,000 this year as more projects start using the system to manage and track information throughout design, construction and maintenance.

JTC even offers a WhatsApp support group to users who need help troubleshooting.

It also worked with local start-up Lean Station to roll out a scheduling system called Lean PlanDo in three projects.

It is still studying the value-add from such IDD technology and is tracking the productivity performance on projects to eventually be able to measure the gains and costs, said Mr Wong.

Another tech advancement is the use of virtual reality simulations of 3D design models made using building information modelling (BIM).

In the past, professionals would need to be experienced enough with 2D to visualise how the plans come together and see if there are any clashes between elements such as doors being blocked by exit signs.

Software can now detect such clashes.

And virtual reality simulations allow designers and builders to experience the model in "real life" to fine-tune the design and agree on changes more quickly.

All this helps reduce the need for abortive work, the costly process of having to redo something after construction.

JTC director of building projects Wong Wei Loong says the use of digital tech in its building projects has boosted productivity. ST PHOTO: ALPHONSUS CHERN

Mr Soh Lip Hong, project manager at BHCC Construction – the main contractor for Block B at JTC CleanTech Two – said modelling software can save up to two to three months in the construction process as technical issues can be solved before work starts.

With prefabrication of building elements being used more widely, the need for manual labour is reduced and it opens the door for more efficient logistics systems as well.

The BCA said earlier this month that more projects are adopting design for manufacturing and assembly, where parts of buildings are made in a manufacturing setting before being sent to a site for assembly.

The adoption rate by the industry grew to about 30 per cent last year, up from 22 per cent in 2018, which is good progress towards the target of 40 per cent by this year, said the BCA.

BHCC uses a workflow software called Trimble Connect to track both the production and delivery of precast elements made in a factory in Malaysia.

In the past, staff would have to call or e-mail the supplier for daily updates on the number of elements cast, and their delivery status.

Now, QR codes are placed onto the elements during the casting process, and they can be scanned at various points during the production and delivery process so the status can be updated in real time.

One of BHCC's partners, a factory in Malaysia supplying precast structure elements to BHCC, also upgraded to the Trimble Connect system since coming onboard the JTC project in April last year and started using it for other projects as well.

BHCC also animates BIM models to use in safety induction videos, and is looking at using artificial intelligence software to detect defects such as cracks and wrong paint colours from photos of building facades, rather than conducting manual checks.

"Conventional methods have some good parts and we cannot just throw away the methods, but new technology allows us to do much more," said BHCC BIM manager Chris Bai.

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