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Invention with intention

These buzzy, home-grown concepts have been tested and are raring to hit the market

Chantal Sajan
Senior Correspondent

Ms Rinkoo Bhowmik has been developing her idea for flat-pack homes for pavement dwellers along Chatawallah Gullee or Umbrella Lane, a neglected street in Kolkata's Chinatown precinct, since 2014 and is finally seeing her passion project take shape.

The founder of The Cha Project, an urban design and place-making studio in Singapore, started her company so that she could help provide transient abodes for the homeless while they make a living and save up for formal housing options.

The Kolkata-born Singapore permanent resident collaborated with home-grown designer Jackie Lai and inventor of lightweight pop-up structures Samuel Vedanaigam to come up with a flat-pack home unit called Doonya Shop+Home. It can be set up in about eight hours by four people using just one allen key to secure it.

"What makes Doonya exciting is that it is both a living and livelihood solution for the under-served in society, and is inspired by the iconic Singapore shophouse," says Ms Bhowmik, 57, whose idea includes a single-storey home with a loft, which can also be used as a place for business.

Her idea comes at a time when United Nations Habitat, which operates in more than 90 countries, has reported that about 40 per cent of the world's population will need access to adequate housing by 2030.

A slew of other Singapore-based inventions are also getting ready for the market.

These include a high-tech film developed by the National University of Singapore (NUS). It lowers the perceived temperature inside personal protection gear, keeping health workers cool over long hours.

Another innovation is the Virtual Reality in Agitation Management (VRAM) curriculum developed by the NUS Yong Loo Lin School of Medicine for medical and nursing students to manage patients who show potential signs of aggression in the hospital ward, which also creates a safer learning environment for the students.

Mr Isaac Soh, 22, a second-year NUS nursing student, found the VRAM approach helpful, saying it gave him an opportunity to work within certain scenarios "without any fear of making mistakes that could be dangerous to both the patient and myself".

He adds: "It also helps me create a mental image of what I should do in such situations, which we may not always have the chance to experience during our clinical attachments."

There are also recent releases of products for the home from Singapore's Agency for Science, Technology and Research (A*Star), such as advanced air sanitisers and low-glycaemic index (GI) cookies.

Taking an innovation from concept to market is a lengthy process. Ms Bhowmik's Doonya Shop+Home idea took almost a decade to get off the ground.

Mr Pan Yi Cheng runs the only architecture and design group in Singapore that incorporates a laboratory that produces prototypes to help convert an idea into reality.

"Most products need to go through multiple stages of testing and refinement before they can be robust enough to be market-ready, not to mention the myriad complex safety and quality certifications one has to navigate and achieve," says Mr Pan, 42, who is a co-founder of three companies: Type0 Architecture, Produce and Superstructure.

Type0 Architecture, set up in 2018, focuses on the development and transformation of building types and typologies that are relevant and critical to the city.

Superstructure, which started in 2017, aims to be at the forefront of technological production. It is where the group develops computational tools and processes for fabrication and assembly, as well as investigates novel and smart systems for construction.

Produce, which was set up in 2013, is a design studio with a prototyping workshop that delivers customised design solutions from concept to construction.

Since its inception, Produce has bagged several awards, including the World Architectural Festival awards in 2012 and Golden Pin Design Awards in 2018.

Mr Pan stresses that each failure in the course of certification poses a setback to the whole process and may require more follow-up research and development.

"Each of these developmental steps requires funding, from salary and machine-running to maintenance costs and raw materials."

He adds that most funding models for inventions are done through reimbursements, which means that the product developer has to first raise the initial capital to realise a working prototype.

"Funding is applied only when the product is essentially 'market-ready', contrary to the concept of applying for funding to accelerate the development of a product towards market readiness," he says.

Even after an invention is produced, it can be refined and improved with further upgrades.

Ms Bhowmik is working with Dr Christine Yogiaman, Assistant Professor of Architecture and Sustainable Design at the Singapore University of Technology and Design (SUTD).

She says that SUTD joined the Doonya Home+Shop team at the time the first Doonya prototype was made last year, when two students from the architecture and sustainable design department used the Doonya housing unit to study social and community spaces.

A team of four students from the faculty is now working in Kolkata's Chinatown to adapt Doonya to the needs of the poor.

Ms Bhowmik says the research by SUTD's students has been an eye-opening experience for the Doonya team, which includes professionals, students, academics and ordinary citizens.

She is also working with Singapore's Ecolabs Centre of Innovation for Energy to add plug-and-play low-tech solutions that include energy, water and sanitation to further refine the Doonya Home+Shop template, in order to create a self-sustaining prototype that can be used even in off-grid areas around the city.

EcoLabs is jointly established by Nanyang Technological University, Enterprise Singapore and the Sustainable Energy Association of Singapore as an innovation cluster that supports the energy sector.

Getting Doonya market ready has taken Ms Bhowmik close to a decade, but she is glad she dug in her heels and fended off naysayers.

"It's been a long, sometimes circuitous but often frustrating, journey, but my team and I keep going because we believe it's a problem that can be solved only when we all come together."

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Flat-pack living

The team behind the Doonya flat-pack homes – (above, from left) Mr Sam Vedanaigam, Ms Rinkoo Bhowmik and Mr Jackie Lai – taking a break in one of the units. Each unit can be set up by four people in about eight hours. ST PHOTO: GIN TAY

DOONYA SHOP+HOME
The Cha Project

When Ms Rinkoo Bhowmik came up with Doonya Shop+Home in 2014, she had no idea it would take almost a decade to see the fruition of her efforts to create affordable transient homes that transform slums into housing estates.

The 57-year-old founder of Singapore-based The Cha Project worked with designer Jackie Lai of Jia Studios in 2020 to create architectural renders that could be shown to manufacturers.

And the Tubelar Modular System created by Mr Samuel Vedanaigam of home-grown company Pod Structures was the perfect fit for the ambitious project to tackle global poverty and homelessness.

In 2008, he invented a proprietary lightweight aluminium structure that can be flat-packed and easily configured to fit almost any building shape.

His company builds pop-up stores and flat-pack homes using Tubelar technology, which won in the Gold category at the Singapore Interior Design Awards last year for Best in Pandemic Solutions.

Mr Lai – who has won design awards locally and abroad, including the Singapore Good Design (SG Mark 2020) award – often lends his talents to humanitarian initiatives.

He is involved in Project Kampong Lorong Buangkok, an initiative supported by the Singapore Institute of Technology to preserve Singapore's last mainland kampung, in Hougang.

He also completed the design for a mobile library inside a bus in Kabul, Afghanistan, in 2018, which was initiated by The Cha Project.

He led the design initiative with the Doonya team and put together a prototype using Tubelar technology. The lightweight home can be set up by four people, each using one allen key (an L-shaped metal bar to turn screws and bolts), in about eight hours.

The Doonya house is a solar-powered single-storey home with a loft that doubles as a shop for a family of about six. It is designed to upgrade slums without displacement and requires no land acquisition.

Ms Bhowmik says: "We have approached the governments of West Bengal and the Philippines, and are looking at a pilot implementation in Kolkata by year-end." Doonya will initially be sold to governments, but there are plans to sell to other users in the future.

Governments will work with non-governmental organisations to raise funds to distribute the flat-pack home units. Each unit will be rented to a user who can set up a home business, get a loan and save up to put down a deposit for a more permanent home for his or her family.

Former slum dwellings will gradually be replaced with a cleaner and healthier neighbourhood.

"This is one tool to fight both poverty and homelessness," says Ms Bhowmik, who was previously a journalist in India and Singapore. The prototype costs $10,000, but her studio is working on a smaller unit that will be priced at $5,000. Mass production will be cheaper due to economies of scale.

Her company is also catering to multiple demographics, from those living in poverty to millennials looking for transient housing. Future Doonya units will come in an array of shapes, sizes and prices.

"In the developing world, people living in informal settlements have no address and no identity, and therefore cannot get a bank loan. Doonya comes with a GPS-based address which can be life-changing for the very poor," Ms Bhowmik says.

Info: thechaproject.com/doonya

Research-backed home and lifestyle products

AIR CLEANERS AND HEALTHIER COOKIES
A*Star

PHOTOS: NUTRIIENT, PLASMA SCIENCE

Plasma Science and Nutriient – the spin-off companies of Singapore's Agency for Science, Technology and Research (A*Star) – have collaborated with the agency's research institutes and other partners to bring two nifty inventions to the market.

One is a series of virus-zapping air sanitisers and the other a line of cookies that satisfy one's sweet tooth without causing deadly spikes in sugar.

The Trident air sanitisers (below), which went on sale on June 13, come with Plasma Science's "Safe Air Dome" technology, which rapidly disinfects and prevents viral transmission over large swathes of floor area or poorly ventilated indoor spaces.

The technology, developed with A*Star's Institute of Materials Research and Engineering, combines cold plasma ions, advanced graphene electrostatic plates and built-in ultraviolet-C to disinfect bacterial, viral and other microbial species, as well as remove airborne pathogens to prevent transmission. It also greatly reduces bacterial and fungal growth on carpets and in humid areas.

This contrasts with conventional air purifiers that remove only dust and allergens.

Another product, by Nutriient, developed in collaboration with the Singapore Institute of Food and Biotechnology Innovation, is a range of clinically validated, low-glycaemic index (GI) cookies (above). The cookies, which took eight months of research to make, contain plant-based ingredients and are the first in Nutriient's pipeline of low-GI food products.

Low-GI foods release glucose into the blood more slowly, which helps in the reduction of weight gain, obesity and corresponding chronic diseases such as diabetes.

Nutriient's cookies are also said to have about 20 per cent less fat, lower calories and higher fibre content than similar products.

Info: The Trident air sanitisers are priced from $799 and available on Shopee, Lazada and other online shopping platforms, as well as on tridentair.sg. The Nutriient line of cookies are priced at $3.42 each (minimum order of 30 cookies). Go to str.sg/wL4M

Future-centric design

GRAPH AND SOUNDCAVE
Pan Yi Cheng

PHOTOS: GIN TAY, SUPERSTRUCTURE

Mr Pan Yi Cheng is the co-founder of a group of home-grown companies – Type0 Architecture, Produce and Superstructure – which have worked together on building systems and products.

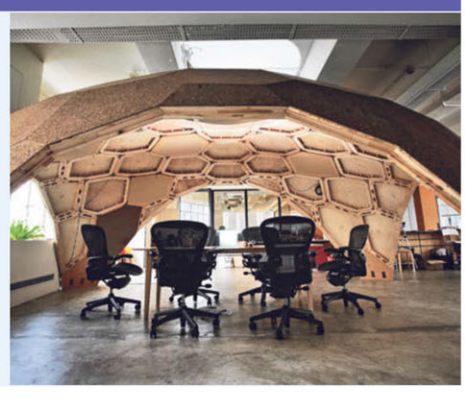
The companies, which are staffed by 20 professionals from a range of design and architectural backgrounds, operate from a design studio in Kampong Bugis and a building facility in Sungei Kadut.

One of their latest inventions, a market-ready modular furniture system designed by Superstructure called Graph (right), can be repeatedly deconstructed, reconfigured, relocated and repurposed to meet the changing demands of modern life.

"Graph's re-buildability and modularity allow reconfiguration to fit new purposes, activities and intentions," says Mr Pan, 42, adding that Graph is also recyclable, reducing waste in the furniture industry.

Created for modern work and living spaces, the Graph system is designed for "urban nomads" who are always on the move, he says.

Another invention launched in 2020 is SoundCave by Produce. It was born out of the increased demand for versatile home-entertainment spaces with good acoustics.



While such spaces tend to be cluttered with speakers, the SoundCave (right) is an aesthetically pleasing option made from recyclable materials. The shell structure projects surround sound, with components such as state-of-the-art "invisible" speakers, sound-absorbing and sound-reflecting modules, and lighting systems.

The cave, says Mr Pan, is "customised to different seating configurations and concentrates the waves to a 'sonic sweet spot'", referring to a point in the design where the user enjoys focused sound quality.

The team is working on a self-supporting prototype that can be used for indoor and outdoor events.

Info: superstructure.com.sg/soundcave