GOING DEEP

Singapore is embarking on an innovation drive, and much attention has been targeted at high-potential deep-technology startups in the nascent medical technology, clean technology, and advanced manufacturing and engineering sectors

AS SINGAPORE kicks into high gear on its innovation drive, Spring Singapore has been actively rolling out initiatives to encourage and support businesses in their endeavours. These include the appointment of accelerators, the Partnerships for Capability Transformation (PACT) programme; the Business Strategy Innovation for SMEs; and the setting up of Centres of Innovation and Private Sector Translators.

To this end, much attention has been targeted at high-potential deep-technology startups in nascent sectors such as medical technology, clean technology (cleantech), and advanced manufacturing and engineering (AME) notes Edwin Chow, group director, industry development and innovation & startups, Spring Singapore.

In May last year for instance, Spring appointed seven accelerators for deep-tech startups in cleantech and AME. More recently, the newly launched Centre of Innovation for Complementary Health Products at Temasek Polytechnic will offer resources to help SMEs develop evidence-based complementary health products (CHP). "This will help SMEs meet increasing demand for CHP which has become an important part of consumer health care for health maintenance and disease prevention," says Mr Chow.

What is important to note is that the innovation chase should not be a blind one. Instead, companies should start by understanding why and how technology innovation can improve their business. If the aim is to improve internal processes and capacity, a company should have clear and quantifiable benchmarks to indicate successful implementation, says Mr Chow. If, on the other hand, the rationale is to capture a new market, the company needs to be clear about the size of the market that its technology will disrupt.

"Before jumping into developing innovation, companies can speak to potential customers and strategic partners who can help realise their innovative ideas and fast-track the commercialisation process. They can do so by partnering incubators and accelerators, large enterprises and MNCs (multinational companies), and/or Centres of Innovation," he adds.

BIG PLANS

An example of a startup that has benefited from this is DeNova Sciences, a spin-off from the Nanyang Technological University. Despite having been in operation for just slightly over two years, the young team has already secured a number of customers including MNCs and research labs. It also has big plans for the industry sector – it is in the midst of finalising a Singapore Standard with plans of putting it up for ISO certification.

The company, which provides a range of artificial skin models as well as tissue scaffolding, also offers services for product testing, validation and co-development using its range of skin models which are cultured in a serum-free environment.

There is something catching about the staff's unbridled enthusiasm. Two of the three co-founders – Kelvin Chong (CTO specialising in molecular biology analysis) and Tan Ming Jie (CSO/COO specialising in in-vitro skin modelling) have a tendency to run off with scientific jargon on cell and skin types before the third co-founder Daniel Tan (CEO) breaks it down during the interview. Dr Chong and Mr Tan Ming Jie met while pursuing their graduate studies and were subsequently introduced to Mr Daniel Tan who takes care of the business development, financing and expansion facets of the business.

RARING TO GO
Despite having been in operation for just slightly over two years, DeNova Sciences' Daniel Tan, Tan Ming Jie and Kelvin Chong (left to right) have already secured a number of customers including MNCs and research labs

PHOTO: ARTHUR LEE

According to Mr Daniel Tan, the company raked in revenues of almost S$200,000 in the first half of 2014. This jumped to S$500,000 last year. In the first quarter of 2016, revenue numbers are already in the S$250,000 range.

Part of what makes DeNova Sciences so successful is its innovative approach to the business. While there are other players in the market who make artificial skin models, the team believes that they are the first to combine the skin model with testing services. Says Mr Daniel Tan: "There are people who make artificial skin models but there is nobody else that we know of that combines service plus the skin model. What we see is they either buy the skin model and do the testing inhouse, or they buy the skin model and contact another contract research organisation (CRO) to conduct testing."

While DeNova Sciences works mainly with the cosmetics industry for products testing, it also does some pharmaceutical and pre-clinical trial work.

When DeNova Sciences spoke to *The SME Magazine* in May, it just obtained its proof of concept (POC) to research the world's first ageing and wrinkled model. Says Mr Tan Ming Jie: "This is our plan for the year – we are heading into ageing and wrinkled skin because we know there is a silver tsunami coming. It's an important model for people to test efficacy of drugs, cosmetics and medical therapeutics. Next year, after the completion of POC, we will try to move into getting proof of value (POV) where we start commercialising the various skin models."

THE BIGGER PICTURE

The company is also looking at expanding into tissue banking which will allow it to grow skin models that are closer to human skin. Providing stage two testing using actual human skin allows for testing which is even closer to real human skin conditions.

Says Mr Tan Ming Jie: "Right now, we grow skin from two major cell types, the keratinocyte (epidermis) and fibroblast (dermis). But all the skin we have on our body has more than these two cell types and a host of immune cells. If we can take the surgical waste from the hospital, we can grow it and do testing. That is nearer to human skin so it's more pre-clinical stage. This is where the tissue banking stage comes in. In this second stage, we can keep all the samples for future use. The third stage – we are trying to do CRO clinical trials where we can recruit patients and perform non-invasive cosmetic testing."

Having such a one-stop testing centre is not only more convenient for clients, it is also safer as the company will be aware of the entire testing history from early development through to end-product testing.

"If we can do skin banking, it can be a national effort. We can bank all the surgical waste, and if for example any country faces a disaster and they need surgically removed skin, we can send it to them as well. So it's how we turn the waste into something useful. It can be used for testing and saving people in the future."

Indeed, the company has big plans for growing this industry. It is particularly hopeful that the National Research Foundation (NRF) will support them in forming a cluster of companies in the personal care space. And this is where pursuing Singapore Standard certification and subsequently ISO certification factor in.

Says Mr Tan Ming Jie: "A lot of skin products are dermatologically tested only, not clinically tested . . . That's why we have proposed to the Singapore Manufacturing Federation that we should create a Singapore Standard, regulate the industry a bit, and protect consumers in Singapore. And, if possible – in five years' time – if this Singapore Standard is working well, we can push it up for ISO certification because there's no ISO for personal care cosmetics testing now."

The bigger picture for the company is to set up a translation institute in Singapore. This would involve clustering companies involved in the same industry. Explains Mr Tan Ming Jie: "We can do early development and testing for clients, and another company can do certain packaging and stability tests, for example. If you have a centre to house all of these personal care service providers, like a translation institute, it will be very useful because a lot of cosmetics companies are coming to Singapore and we have to keep them here. "So this is what we're trying to do, to tell NRF that there are a lot of good companies in Singapore that have the right technology – and it's about piecing them together, forming a cluster, and pushing more translation work for the personal care industry."

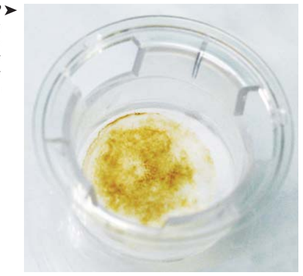
Indeed, a lot of local cosmetic companies go overseas to design their products because Singapore does not offer such services, points out Mr Daniel Tan. After designing the product overseas, they bring it back to Singapore for sale.

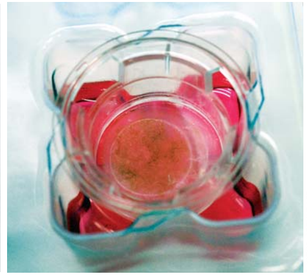
"Asia is well known to be the biggest consumer market for cosmetic products, and this has since led to an increase in the number of MNCs setting up research centres in Asia to look into Asian skin testing and research," says Mr Daniel Tan. "Having a translation centre for the personal care industry will not only provide academic research a route for translation studies and for commercialisation, MNCs can also explore potential active ingredients or products for acquisition. This will not only benefit Singapore but our surrounding neighbours such as Indonesia, Malaysia and even China."

MOVING UP THE VALUE CHAIN

Meanwhile, as DeNova Sciences was finding its feet back in 2012, ERS Industries was on the brink of calling it quits. The company, which was established in 1995 as a fabricator of low-end server racks used for information technology (IT) systems in the data industry, was being priced out of the industry by regional competitors who were selling these "me-too" products at below cost to break into the market. "Server racking is a very niche product in the market but the barrier to entry is not high. If you have the machine, if you have the facility, you can build (a server rack)," says CEO CK Cheong.

SKIN DEEP ➤
DeNova Sciences is looking at expanding into tissue banking which will allow it to grow skin models that are closer to human skin





PHOTOS: ARTHUR LEE

It was 2012 when an angel investor gave him the idea of redesigning the rack and leveraging technology to take the company out of the "me-too" space. Mr Cheong jumped right in. ERS carried out a technology gap analysis study with the Nanyang Technological University's (NTU) Institute of Environmental Science and Engineering department and was subsequently linked up with Seri Lee, a thermodynamic specialist from NTU, who became an adviser for ERS.

ERS was subsequently put in touch with the Institute of High Performing Computing at A*Star. Keni Wu, who was seconded to ERS to help improve the thermal performance of the cooling infrastructure of its server racks, conducted a Computational Fluid Dynamics (CFD) analysis on the heat dissipation paths for the server racks. This resulted in the development of a new, cooler server rack that took only three months to design; this is 70 per cent less than the usual time that it would have taken the company to develop the product on its own. Dr Wu also used computer-aided engineering to compare the thermal performance of the old and new server rack designs to determine its effectiveness.

According to Mr Cheong, the company has received positive feedback for the E@Rack which it brought to market at the end of 2013. End-user testing puts energy cost savings at about 20 per cent compared to conventional server racks. In a high-density environment, savings go up to about 30 per cent. The structure of the rack itself was also improved. ERS today uses a light aluminium structure – the frame itself is only 20 kg. All in, it weighs about 90 kg – compared with a conventional rack which weighs about 160 kg. The new rack has also been load tested up to 1,500 kg. Conventional racks can take up to 800 kg.

The company's second project, a cold aisle containment system, allows for savings of up to 50 per cent according to Mr Cheong. Hot aisle/cold aisle is essentially a layout design for server racks in a data centre. The goal of this layout is to conserve energy and lower cooling costs by managing air flow. The containment system comes with its own accessories, including chimneys and floor louvres which impact performance accordingly. Quips Mr Cheong: "Before we were just a rack company; now we are a rack solutions company!"

PHOTO: YEN MENG JIIN

> "BEFORE WE WERE JUST A RACK COMPANY; NOW WE ARE A RACK SOLUTIONS COMPANY!"
>
> ***– CK Cheong, CEO, ERS Industries***

ERS is currently working on a third project, a flexi data centre model that is at proof of value stage. While Mr Cheong declines to share too much details, he promises: "This one will be very disruptive!"

CREATING THE RIGHT PRODUCT

For companies that are looking to innovate, Spring's Mr Chow suggests that they look for indications through market research that the technology solution which they are trying to create to address a problem statement is one that has commercial value and will gain customers' interests.

One of the ways where companies can identify and develop a clear business roadmap is by undertaking a Business Strategy Innovation for SMEs to identify their strengths and weaknesses, develop ideas to tap market trends and opportunities, and turn these ideas into new or improved products, processes, services or business models.

What about whether to adopt technology innovation or develop your own? One of the pros of adopting technology is in the speed of implementation. But this, notes Mr Chow, often means being at the mercy of vendors selling these technologies. As vendors could sell a similar technology to a company's competitor, adopters could be at a losing end because there will be little competitive differentiation in the long run.

On the flip side, developing one's own technology may be disadvantageous as it takes a longer gestation time and is more tedious than adopting technology. "This might pose higher risks, given the uncertainty of committing time, resources and effort to achieve a feasible outcome, and raise other concerns such as intellectual property (IP) management, legal issues, the need for more resources for commercialisation, approval processes and market acceptance," says Mr Chow.

Companies also have to try and test a product's commercial potential and feasibility sufficiently and refine it further after pilot tests. The company needs to have relevant competencies and technical expertise in order to bring its technology innovation to market, also taking into consideration the regulations that it needs to conform to from its initial stages of development and planning.

He concludes: "There might be higher costs incurred in the long term if a company adopts rather than develops technology, as an end-user not only has to invest in the upfront costs but also recurring licensing fees for the period of IP usage. "If a company decides to focus on in-house R&D, the initial investment might be larger, but subsequent IP would be owned by the company with the freedom to use. This IP could be used for further commercialisation, licensed externally, or sold."

ERS in the meantime, with the right products in place, is working hard to ensure that it has the right processes in place too. Says Mr Cheong: "Once we have the 'right thing' (ie strategy), the next stage is to employ more people so that we can do the 'right thing' right. In the past, we did a lot of things right, but we were doing the 'wrong thing' right. Now we've changed our whole game plan, we are concentrating on making the right thing, then we can focus on the second stage, of doing the right thing right." ■

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