



PERSPECTIVES: THE SINGAPORE AGRI-TECH STORY

Listen to the voices of innovators in Singapore as they fuel this budding sector. Uncover pathways for Swedish enterprises to not only access but mold the burgeoning sector in this dynamic region.

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FOREWORD

Sweden is ahead of the curve in circularity, especially within Agri-food technology. Its innovations reacting and focusing on not just the environmental benefits, but the customer experience and expectations. From farmers who been early adopters of digitalised agriculture, to leveraging innovations from plant-based meats and eggs, legumes, fungi, wheat, seaweed, and yeast as ingredients to create protein rich food, the innovations in Sweden have led to rapid expansion of our Swedish companies to tackle the global challenge within food production.

To share about Sweden's innovations, Business Sweden have organized two agri-food technology delegation to Singapore. The objectives were simple, to bring these next-gen Swedish innovators to this region to learn, share, and understand the opportunities here in Singapore. The country is ripe, as Singapore is working on its "30 by 30" goals, which is to increase local food production from 10% to 30% by 2030. This led to a robust ecosystem that comprised government support, accelerators, research collaborations, and venture funds, attracting local and international startups to set up in Singapore.

Each time we host a delegation, it has left a profound impression of wanting more. From witnessing the cultivation of fish steaks in laboratory settings, to sampling animal-free ice cream and plant-based eggs or gaining insights into ways of utilizing black soldier fly larvae as fish feed and compost material. These revelations always left everyone in awe. Our delegation did not anticipate the vibrancy of this industry, which has seamlessly combined technology and food. It has opened the doors to the opportunities, challenges, and competition that one ought to watch out for. The need to address the challenges posed by climate change and global food shortages extends beyond the borders of Europe, but in Asia as well.

We felt that there was more to share than just from a delegation alone and wrote this report to share about the valuable insights from have learned on this journey. This report consists of six interviews with key figures in the local agri-food technology sector. This includes the Economic Development Board of Singapore (EDB), alternative protein start-up Umami Bioworks, vertical farmers Growy and Skygreens, to impact accelerators like GROW and institutions like Republic Polytechnic. Our aspiration is that these interviews will shed light on the opportunities that Singapore offers to our Swedish innovators, and the potential it has to revitalise the future of food production in Asia and beyond.



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THE GOVERNMENT

With Singapore's constrained land area and an expanding population, the Singaporean government has instituted policies aimed at actively advancing the safeguarding of food security and the development of long-term sustainability strategies. Entities like the Singapore Food Agency (SFA) and the Economic Development Board (EDB) have played proactive roles in the exploration and rapid implementation of agri-food technology solutions within Singapore. They actively foster the growth of agri-food tech by offering financial support, resources, and regulatory guidance.

EDB: SINGAPORE

The Singapore Economic Development Board (EDB) is a government agency under the Ministry of Trade and Industry. It is responsible for strategies that enhance Singapore's position as a global centre for business, innovation, and talent. To expand Singapore's developing ecosystem for the R&D and commercialization of agri-food technologies, including aquaculture, urban agriculture, and alternative proteins, EDB collaborates with innovators worldwide. In addition to helping Singapore achieve its aim of food security, this keeps Singapore abreast of emerging technology and advances in understanding of how to create a robust and healthy food system.

BUSINESS SWEDEN:

Can you provide an overview of the Singapore Economic Development Board's role in promoting agri-food technology in Singapore?

EDB REPRESENTATIVE:

The Singapore Economic Development Board (EDB) plays a crucial role in promoting agri-food technology in Singapore by working with global leaders in industry, academia, and other governments to create an ecosystem to develop and demonstrate the best technologies that can sustainably feed Singapore, Asia, and the world.

BUSINESS SWEDEN:

How does the EDB collaborate with other government agencies, research institutions, and industry partners to advance agri-food technology in Singapore?

EDB REPRESENTATIVE:

EDB works closely with other Singapore government agencies and institutions to encourage leading agri-food companies to anchor in Singapore and provide the infrastructure and support needed for agri-food companies to innovate and build up capabilities. These include the Agency for Science, Technology and Research (A*STAR), Enterprise Singapore (EnterpriseSG), the Singapore Food Agency (SFA), and institutes of higher learning such as National University of Singapore (NUS) and Nanyang Technological University (NTU).

EDB also develops strategies which establish Singapore as a hub for companies to develop, demonstrate, and deploy agrifood solutions to the region. ScaleUp Bio, a joint venture by global nutrition leader ADM and investment company Temasek, is an example of our efforts to accelerate innovations in food technologies, providing precision fermentation contract development and manufacturing services for food-tech start-ups seeking to springboard their products to global scale and success.

Singapore also actively fosters collaborations with global like-minded players. For instance, A*STAR has signed partnerships with Wageningen University and Research in the Netherlands and Massey University in New Zealand on joint research in novel foods such as alternative protein. Other partnerships include the set-up of a Protein Innovation Centre by global leader in taste and wellbeing Givaudan and global leader in food processing solutions Bühler, which supports ecosystem players on plant-based product development for Asia. INVE has recently signed a MOU with SFA to jointly set up a Hatchery Technology Centre at SFA's



Bühler teamed up with Givaudan to open the Protein Innovation Centre to develop end-to-end innovative plant-based food products that cater to the Asian palate
Photo Credit: EDB and Bühler

RECIPE FOR SUCCESS

Five ways Singapore is helping companies feed Asia and the world sustainably



1) READY-BUILT FACILITIES TO SCALE UP HIGH VALUE PRODUCTION

Agrifood companies can tap a range of specialised facilities to meet production needs. US agrifood major ADM and Temasek set up a joint venture [ScaleUp Bio](#), providing precision fermentation firms with technical expertise and support of up to 10,000L of fermentation capacity.

By 2030, firms can also utilise the high-tech, highly productive, and resource-efficient agrifood production cluster in [Lim Chu Kang](#) which spans 390 hectares of land.



2) ACCESS TO VENTURE CAPITALISTS AND ACCELERATORS

Singapore-based accelerators, such as [Big Idea Ventures \(BIV\)](#) and [GROW](#), help agrifood startups scale up through funding and partnership opportunities. Supported by BIV, cell-based seafood company [Shlok Meats](#) has raised [US\\$30 million](#) in seed funding.

3) TALENT WHO CAN POWER GROWTH

Tertiary institutes are developing homegrown agrifood talent with the [Nanyang Technological University \(NTU\)](#) offering Asia-Pacific's first undergraduate programme in alternative proteins. The [National University of Singapore \(NUS\)](#) has added an Urban Agriculture and Crop Biotechnology module to its Biotechnology graduate programme.

Singapore is open to [complementary global talent](#), especially those with specialised skills currently in shortage in the local workforce, including in agritech.



4) INVESTING IN RESEARCH AND DEVELOPMENT (R&D) AND INNOVATION

Global agrifood companies can benefit from Singapore's technical and commercial expertise to drive R&D.

For example, the [AquaPolls](#) programme enables strategic synergies between companies and research institutes to develop aquaculture solutions, with the [Marine Aquaculture Centre \(MAC\)](#) serving as the main anchor research campus.

The MAC also conducts R&D on hatchery technology and aquaculture nutrition for tropical marine species.

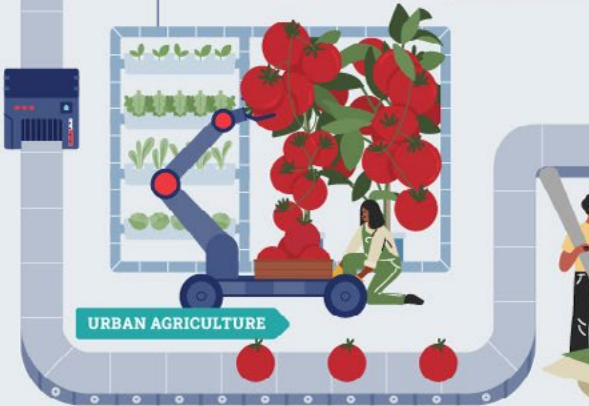


5) PROGRESSIVE REGULATORY FRAMEWORK

Singapore's forward-thinking regulations allow agrifood companies to operate from a trusted base.

[First to approve the sale of cultivated meat products](#), the city-state is currently developing a regulatory framework for gene edited products that facilitates innovation while ensuring safety.

It has also launched the [Future Ready Food Safety Hub \(FRESH\)](#) to accelerate regulatory readiness for novel food innovation.



Download the [Invest in Singapore](#) guide and discover how the city-state's world-class business capabilities can help companies drive innovations for a better tomorrow.



Marine Aquaculture Centre (MAC), bringing together INVE's specialised aquafeed expertise and SFA's capabilities to bolster the growth and sustainability of the marine aquaculture industry regionally.

BUSINESS SWEDEN:

Can you provide insights into the current trends and advancements in agri-food technology that are particularly relevant to Singapore's context?

EDB REPRESENTATIVE:

Agri-food technology spans a wide range of sectors, each with its own unique opportunities. In Singapore, we are focusing on alternative protein, urban agriculture, and aquaculture.

For alternative protein, the ability to efficiently scale up the production of alternative protein products that can compete pricewise with conventional meat options is a key priority. With a robust ecosystem of researchers and contract manufacturing services, Singapore can help de-risk companies' commercialisation pathways through scaling up in an asset-lite strategy.

Urban agriculture companies are similarly focused on tackling the current higher production costs of growing vegetables in vertical farms and active greenhouses, although innovations such as indoor-optimised seeds could unlock a pathway to commercial viability. In addition to investing in such upstream R&D, Singapore can provide promising companies an opportunity to optimise its operations at a demo-scale, before scaling up into large-scale production in future agri-food production districts, such as Lim Chu Kang.

With a growing aquaculture market both regionally and globally, improvements in upstream inputs such as genetics, nutrition, and health management will continue to be critical in supporting the growth and transformation of the industry. Through the Aquapolis programme, Singapore provides a platform for industry players to partner with leading research institutions, reaping strategic synergies in developing innovative aquaculture solutions.

BUSINESS SWEDEN:

Can you discuss any plans or future directions for the development and growth of agri-food technology in Singapore?

EDB REPRESENTATIVE:

Singapore will continue working with local and international partners to ensure agri-food technologies can quickly scale and access the market. This will be done through three main ways:

1. Facilitating access to Consumers
2. Developing and connecting Capabilities
3. Providing options for Capacity

1. Facilitating access to Consumers

When it comes to Consumers, two aspects play central roles: Regulations and Awareness.

On Regulation, SFA takes a progressive approach in ensuring that local food regulatory guidelines can support and facilitate industry innovations. For example, SFA runs the Novel Food Virtual Clinic on a bimonthly basis, where early-stage companies can hear from SFA and share their preliminary questions or suggestions with them.



Esco Aster Chief Executive Lin Xiangliang with a packet of cell-cultured meat at his firm's lab in 2021.

Photo Credit: EDB and SPH Media

As part of Singapore's 30 by 30 aim – to strengthen food security by sustainably producing 30% of our nutritional needs by 2030, consumers are exposed to novel food products and locally-grown produce at events and tasting sessions showcasing these products. Singapore also recognises local produce with the SG Fresh Produce (SGFP) logos, which identifies local produce from farms that have adopted Good Agriculture Practice (GAP) standards and/or sustainable practices with the efficient use of resources.

2. Developing Capabilities and Accessing Talent

Singapore is also partnering with the industry to build both upstream and downstream capabilities. For instance, the Singapore Food Story R&D Programme will invest over S\$300M in upstream R&D to address nascent areas or identified gaps in the ecosystem, while partners such as the Food Tech Innovation Centre (FTIC) and MAC provide support in product testing and commercialisation. Across the value chain, Singapore also provides a strong base of local and global talent with expertise in food and biotech. In addition to a thriving biopharma sector with over 5,000 skilled employees holding relevant skillsets, Singapore's work pass framework also recognises Novel Food Biotechnologists and Food Application Scientists as in-demand occupations needed to advance the sector.

3. Providing options for Capacity

Partnerships and services can help accelerate R&D processes and commercialisation pathways. As noted earlier, contract manufacturing services in Singapore allow companies to scale-up production in an asset-lite strategy. For example, ScaleUp Bio provides alternative protein companies with up to 10,000L fermentation capacity, while Esco Aster offers bioreactors of 500L capacity. Singapore will also work closely with industry players to design ready built infrastructure suitable for their pilot and demo scale plans. For example, the ongoing Lim Chu Kang Masterplan will transform 390-hectares of land into a high-tech agri-food production hub producing vegetables, mushrooms, and fish in a climate-resilient and energy-efficient manner. Working with best-in-class industry players, the agri-food production hub will incorporate an integrated design to drive greater productivity, such as a centralised district cooling system, efficient waste management and stormwater harvesting systems, and a possible centralised food processing facility. The Marine Aquaculture Centre also offers shared facilities such as a pilot aquaculture feed mill and replicated tank systems, which researchers can leverage for the rapid development and testing of optimised aquaculture nutrition solutions.



THE COMPANIES

Singapore's agri-food technology scene has been rapidly gaining momentum since 2019. According to study conducted by Forward Fooding, Singapore is the largest ecosystem in Southeast Asia, with 122 Agri-Food Tech companies and ~US\$ 1.3 billion raised since 2013. This accounts for almost half of all companies in the region, and 38% in funding. Leveraging innovation and technology all over the world to address the unique challenges faced by the city-state in food production and supply, startups to scale ups have been pioneering cutting-edge technologies such as vertical farming, aquaculture automation, and precision agriculture to maximize food production efficiency while minimizing environmental impact.

UMAMI BIOWORKS

Umami Bioworks is pioneering cultivated, 'not caught' seafood, by developing the production system for delicious, nutritious, and affordable cultivated fish, starting with IUCN Red Listed species that are difficult to farm and being driven extinct by human consumption. They are partnering with food producers to scale their cultivated seafood production system to provide people around the world with a stable, resilient, local supply of seafood free from mercury, antibiotics, microplastics, and ocean pollutants.

BUSINESS SWEDEN:

Thanks for having me. So tell me about Umami Bioworks?

ROHIT:

Umami Bioworks started as we felt a plateau in the industry on yields from the fish industry. There is a lack of snapper, tuna, and eel.

Our company helps to meet global demand for these products. What we do is we take a tissue sample from the fish, extract the stem cells that can become fat and muscle, and cultivate them in our lab. Once the cells are ready, we will harvest these cells and form them into food, like fillets. Right now, we cultivate Red Snapper, Bigeye Tuna, and Japanese Eel. We are a B2B technology provider. You can think of us like the Intel of the cell cultivated world. We produce the production process and systems to enable our customers to make cultivated fish for restaurants, markets, and so on.

Currently, we feel countries that eat a lot of fish, like Israel, Japan, or even Sweden are ideal markets for our products.

BUSINESS SWEDEN:

Can you briefly describe the how innovation in Agri-tech in the context of Singapore?

ROHIT:

So, before I start, I would like to share my recent trip to Israel. Well, my trip there has allowed me to understand why Singapore is such a good place to do business in. Israel has the same background as Singapore. Small nations, little resources, but very innovative countries. That is why both are hailed as the start-up nations.

Funding for start-ups by both economies are world leading. Enterprise Singapore (under the Ministry of Trade and Industry, like Business Sweden) provides a SGD30,000 (SEK 230,000) grant new companies starting up, and additional SGD50,000 (SEK 380,000) if owned by a Singaporean Citizen. The government will also co-match investments from private investors (this includes a cap). An account manager will also be provided, in which he or she will guide your company growth for one year.

Israel also provides funding, -USD850,000, USD150,000 from private over 2 years. Private companies, like Strauss Group, one of Israel's largest food companies, has established a food-tech incubator called The Kitchen Hub, which provides funding and mentorship to start-ups working on innovative food and beverage technologies.



Rohit Behl
Director of Strategic
Partnerships
Umami Bioworks



Lab grown Japanese eel (Unagi)

Cell-cultured meat of the Japanese eel and other exotic fish may be added to restaurant menus by 2024, thanks to a collaboration between Nanyang Polytechnic (NYP) and Singapore food-tech start-up Umami Bioworks.

Photo credit: Umami Bioworks
Source:
Umami Bioworks, The Straits Times

BUSINESS SWEDEN:

So it seems Israel and Singapore are very similar then?

ROHIT:

I am not sure if Israel has the same level of government support like that to Singapore. Singapore really guides your business growth. Every quarter, Enterprise Singapore will send a representative to come to the start-ups and evaluate your progress. They will verify if the grants are used effectively and provide suggestions on where to use the funds if its unused. They will also link you with distributors, suppliers, marketing firms, and so on. They will subsidise trips overseas and help you connect to accelerators local and abroad. This 30-by-30 agenda (to produce 30% of food locally by 2030) is important for Singapore and helping firms such as ours is essential to ensure Singapore's long-term sustainability.

BUSINESS SWEDEN:

Can you highlight to me the challenges you face doing business in Singapore?

ROHIT:

Like what I have mentioned, there is a plateau in fish. The aquaculture sector is seeing a lot of regulations and led to an overall reduction of overfishing. This is a good thing. But because demand for protein continues to increase, prices of seafood will inflate higher and higher.

We at Umami Bioworks see opportunities for sure in selling cultivated fish. Eel for example, Japan must import it. We can solve this supply issue with our cultivated fish, starting with eel and then taking it to large scale with multiple species. We can also produce domestically at lower financial and environmental costs than imports.

BUSINESS SWEDEN:

Well, I have heard that alternative proteins in Singapore still lacks customer interest. Do you have any issues in marketing, selling, and overcoming the challenge in cultivated meats?

ROHIT:

It is all about synergies, where everything must come together. Here we promote no mercury, no antibiotics, and no microplastics. Fish also contains the healthiest fat (omega 3) across all proteins. We also have lower carbon emissions if you were to account for the entire supply chain. We are working with restaurants and major seafood producers for now to bring our first products to market. But for supermarkets, they require huge volume and consistency that start-ups in this field cannot reach as of this moment.

BUSINESS SWEDEN:

Last question, will you be participating in this year's Agrifood technology expo in Singapore? I will be bringing together a cohort of Nordic companies.

ROHIT:

Well yes of course. I will be glad to meet them here in Singapore.

BUSINESS SWEDEN:

Well, thank you for your time today. It is indeed very interesting to see your business grow so fast. Is there anything else you would like to say?

ROHIT:

If there are any Nordic companies looking at doing business with us, please reach out to us. And likewise, thank you Business Sweden. It has been a pleasure.



Bigeye Tuna

Umami Bioworks is currently working on tuna, for the wide variety of ways. This includes everything from sushi to more common mass market tuna applications like a tuna steak.

Photo credit: Umami Bioworks
Image courtesy from Umami Bioworks



Red Snapper

A tempura version of a fish fillet. "In this first tasting, we showcased a cultivated product that flakes, tastes, and melts in your mouth exactly like fish should" says Mihir Pershad, Umami Bioworks cofounder and CEO.

Photo credit: Umami Bioworks
Image courtesy from Umami Bioworks



Sky Greens is the world's first low carbon, hydraulic driven vertical farm. Employing environmentally friendly urban solutions, it aims to produce safe, fresh, and flavourful vegetables while preserving scarce land, water, and energy resources. Sky Greens functions as the hub for commercial farming and innovation within its parent entity, Sky Urban Solutions Holding Pte Ltd. Business Sweden facilitated an interview with Roshe Wong, Deputy CEO of Sky Greens, to explore his journey in pioneering this ground-breaking technology and his strategy for seizing global opportunities.

BUSINESS SWEDEN:

So, tell me about yourself and why you join Sky Greens?

ROSHE:

At the start I was working in the financial sector. Later, pivoted to the F&B-industry working in quick-service restaurant chains and then unto rice processing and wholesale trading. Somehow, I ended up further upstream within agriculture. Sky Greens' core business is in Agri-tech, not farming per se. I did not plan this path, but I am happy to have ended up in this space because it is a very interesting sector.

BUSINESS SWEDEN:

Can you tell me a little bit about Sky Greens?

ROSHE:

Sky Greens primarily serves as a technology solutions provider. While we maintain a vertical farm in Singapore, it functions primarily as a commercial-scale Research and Development (R&D) demonstration facility. We have undertaken projects in various locations across the region, including Malaysia, Thailand, Vietnam, China, Denmark, and even Canada.



Jack Ng
Founder and CEO
Sky Urban Solutions
Holding Pte Ltd

BUSINESS SWEDEN:

Interesting. Why those countries? Shouldn't they have large parcels of land ready for cultivation and not face the land constraints like Singapore?

ROSHE:

Well, we have come to realize that the importance of available arable land outweighs the sheer size of a country. In China, for instance, 40% of its arable land is already contaminated or degraded, making land a precious resource even for large nations. As for Sweden, it's uncertain, but it's likely that not all areas are suitable for agriculture.

What may not be widely known is that the global arable land area is steadily decreasing. Since the 1980s, we have been losing up to 1% of arable land annually. This alarming trend is often overshadowed by the focus on climate change, yet the impending food crisis could be the most immediate catastrophe we face. While it may not have fully dawned on the world yet, this realization is something we must confront eventually.

BUSINESS SWEDEN:

Thank you for sharing. Just to pivot, does Sky Greens only grow leafy greens?

ROSHE:

Our farm in Singapore exclusively concentrates on cultivating leafy greens, as mandated by our license from the Singapore Food Agency. Nevertheless, our proprietary system is adaptable for growing various crops that can fit within small-to-medium planter boxes or pots. Currently, we have extended our system to support initiatives with organizations such as Nparks (National Parks Board) for growing flower seedlings and Gardens by the Bay for their floral projects. We have also undertaken a project in Canada to grow strawberries.

Notably, our system has attracted interest from companies in Australia and China interested in cultivating wheatgrass for animal fodder, as well as companies in the United States and France exploring its application for cultivation of medicinal plants.

In summary, although our primary focus remains on leafy greens, our technology offers numerous other versatile applications.

BUSINESS SWEDEN:

Would it be more complicated because to use the solution you have is split between different crops? For example, if it is optimized to grow leafy greens, would it be difficult to pivot and optimize to grow strawberries?

ROSHE:

Not really. The hydraulic design of our system is highly robust and industrial, characterized by mechanical simplicity. Customizing it for different crops is straightforward and the hardware can adapt to various growing media such as soil, substrate, or hydroponics. The key challenge lies in effectively managing environmental conditions like temperature and humidity for specific crop types. There are already existing advanced technologies in the greenhouse space, with solutions from countries like Sweden, the Netherlands and Israel.

What is important is the matter of efficiency. Automation can achieve improvement, but it may not be always the case. I know of a fully automated system using robotics in growing and harvesting currently is still unable to replace human beings completely. In the United States and Europe, where automation is prevalent, human workers remain significantly faster at crop cultivation. This is not a matter of technological complexity but rather an economic consideration.



The vertical farming system

Comprising revolving tiers of cultivation troughs, the system harnesses natural sunlight, eliminating the necessity for artificial lighting. The rotation is also driven by a distinctive patented hydraulic water-based system that capitalizes on the kinetic energy of flowing water and gravity to turn the troughs.

Photo credit: Sky Urban Solutions Holding Pte Ltd

BUSINESS SWEDEN:

To bridge the topic on automation, you mentioned about manpower. Do you find it difficult to hire?

ROSHE:

Yes, very difficult. To begin, our operations take place within a small country that isn't a significant food producer. We have a limited number of educational institutions specializing in farming and agriculture, and among those that do, graduates often opt for positions at Singapore National Parks or the Singapore Food Agency.

It is important to note that urban farming differs significantly from traditional farming, with a primary emphasis on constructing and maintaining machinery. While our urban farm work is less physically demanding, it remains a challenge for the agriculture sector to attract Singaporean talent.

BUSINESS SWEDEN:

Can you hire foreign workers to replace manpower shortages?

ROSHE:

Yes, but there is a limit on how many we can hire. Right now, the foreign worker quota for our sector is 1:1, meaning one Singaporean or Permanent Resident to a foreign worker. With limitations and bottlenecks, we know that technology can only bring us so far in our expansion. We hope there is a change in policy for us to hire more foreign workers and increase our productivity.

BUSINESS SWEDEN:

Energy supply and cost has been mentioned as a common problem? How much energy would you say like a bag of leafy greens, e.g., cabbage, would take to produce in terms of per kilogram kilowatt hour?

ROSHE:

Firstly, a key distinction sets us apart from other vertical farms, often referred to as "plant factories" or indoor farms. While they typically rely on artificial lighting, we harness natural sunlight, eliminating energy concerns. Our system incorporates hydraulic components, featuring a low-power water pump that not only facilitates movement but also irrigates the towers simultaneously.

To illustrate, we conducted a previous calculation. For a single A-frame tower (either six or nine meters in height), it consumes approximately forty watts of electricity, equivalent to the energy usage of a small light bulb. Based on this calculation, the cost of producing one kilogram of vegetables in terms of electricity is just five cents, equivalent to the expenses incurred by traditional open-field farming. Our energy consumption is minimal, and the entire farm operations can potentially be powered by solar energy or operate off the grid.

BUSINESS SWEDEN:

So, what is do you think is the biggest overhead for farms?

ROSHE:

Well, it depends on the type of farm. Ours being semi-automated makes labour the biggest cost factor. You would be surprised that energy and logistics have less impact. Fully automated indoor farming systems would be energy-intensive, and it creates staggering electricity costs.

This is the reason why it is difficult to compete against imported products. 60-70% of our vegetables in Singapore comes from Cameron Highlands, but it is still very profitable for the farmers there despite a distance to transport vegetables of 400-500 km. Even vegetables from Europe can still end up cheap, despite shipping the products over long distances. Logistics usually make up less than 10% of the cost of sales, and therefore it is not always cheaper to be closer.



Closed loop hydroponics system

Crops are irrigated and fertilised using a flooding method, eliminating the need for a sprinkler system. Only 0.5 litres of water is used to rotate the 1.7 ton vertical structure.

Photo credit: Sky Urban Solutions Holding Pte Ltd

BUSINESS SWEDEN:

So, end of the day, it is a trade-off unless the technology improves significantly?

ROSHE:

Indeed, our primary concern revolves around capital expenditure (CAPEX). In comparison to conventional farms, our CAPEX is relatively higher, but our operating expenses (OPEX) are lower. Conversely, high-tech indoor farms, which heavily invest in capital expenditure through LED lighting and climate control equipment, tend to incur even higher operating expenses (OPEX). As a result, I anticipate that many indoor farms may encounter challenges in the future.

Currently, vertical farming is not yet a mainstream practice. However, looking ahead, as food security concerns grow in significance and available arable land becomes scarcer for traditional crop cultivation, coupled with technology advancements reaching critical thresholds, the adoption of vertical farming will become widespread. It is no longer a question of if, but rather when this transformation will take place.

BUSINESS SWEDEN:

There has been in the news that Singaporean not buying domestically produced leafy greens. Is this something you have experienced?

ROSHE:

Fortunately, our primary customer is FairPrice, the largest supermarket chain in Singapore. However, I believe that price is the most significant factor in our market. In Singapore, supermarkets hold approximately 30% of the market share, while the remaining 70% of produce is sold at wet markets.

Products sold at wet markets in Singapore tend to be more affordable compared to supermarkets. This cost difference arises because imported greens in wet markets often come from wholesalers that do not require extensive packaging, resulting in a lack of traceability. Supplying supermarkets and established brands involves certifications and processes, which can lead to higher prices for end consumers. Although we can also explore direct sales to restaurants and hotels to boost our revenue, the margins in the food service industry are even slimmer.

So, the competition is challenging, especially when it comes to disparities in pricing and costs. So even though the Singaporean customers are well-educated, sustainability and traceability come as a lesser priority than dollars and cents.

BUSINESS SWEDEN:

Our last question, how can Business Sweden represent companies overseas to help a company such as Sky Greens?

ROSHE:

We are eager to introduce our solutions to Sweden and the Nordics, where we already have upcoming projects in Denmark. I see great potential in leveraging the similarities within the Nordic region, particularly since land availability is less constrained. This presents an excellent opportunity to demonstrate the economic benefits of our solutions.

I know that the Nordics have a well-functioning ecosystem with unions and community that are well-connected to leverage green solutions and technology. Therefore, it would be highly beneficial to collaborate with like-minded Swedish companies and peers to explore innovative ways to integrate and apply our solutions in different contexts. It's important to note that our technology is not bound by geographical limitations, opening opportunities for networking and engagement with stakeholders in the Swedish ecosystem. We are enthusiastic about sharing our knowledge and collaborative approaches with others in this endeavour.



Each frame can be as high as 9 meters tall.

With 38 tiers of growing troughs, which can accommodate the different growing media of soil or hydroponics. Made of aluminium and steel, these modular structures are robust and yet highly customisable and scalable.

Photo credit: Sky Urban Solutions Holding Pte Ltd



Sky Green's greenhouse

Operating within a sheltered environment guarantees that the system can remain maintenance-free and rely on minimal manpower

Photo credit: Sky Urban Solutions Holding Pte Ltd

GROWWY

Dutch Agri-tech company Growy is building a farm like no other. Housed in a logistics centre, this mega vertical farm aims to cultivate leafy greens, herbs, and microgreens in a climate-controlled system, producing up to 500 tonnes per year. Mr. Ard van de Kreeke, Ms Kerstin Koehler, and Ms Yusnida Yunos, farmers at Growy, sat down with Business Sweden to share their experience operating in this small island of Singapore.

BUSINESS SWEDEN:

Thanks for having us. How would you describe Growy as a company, compared to your peers?

ARD:

Our primary emphasis is on farming. However, even though we might be one of the most technologically advanced and data-driven companies in the industry, at our core, we are farmers dedicated to cultivating salads, herbs, and microgreens.

Our initial objective was to provide tasty, healthy and affordable food globally. Becoming a high-tech company was not our primary aim, and this sets us apart from other vertical farms.

BUSINESS SWEDEN:

How did you end up establishing a vertical farm in Singapore? Could you walk us through your journey until now?

ARD:

In 2019, I embarked on a venture into vertical farming in Holland. Initially, it was a modest 100-square-meter farm catering to Michelin-starred chefs and their restaurants. Our produce experienced a remarkable surge in demand, prompting us to expand our operations. However, our expansion had a broader purpose—to make a significant global impact in the field of vertical farming.

Instead of opting for procurement, we made the strategic choice to construct our facility from the ground up. We found that vertical farming technology was prohibitively expensive and not fully automated. Our core principles revolved around maintaining low capital, labour, and operational energy consumption costs. After brainstorming various concepts, this vision materialised with the establishment of our first large-scale facility, covering 1000 square meters in 2020. At present, we have an all-encompassing, in-house vertical farm that optimizes every aspect of the process, from seeding to harvesting and packaging.

The agricultural sector is on the cusp of significant transformations. In Amsterdam, our team consists of approximately 70 individuals, with more than 50-60 of them being engineers specializing in various fields such as software, hardware, electronics, firmware, and data science. We boast a substantial development team dedicated to advancing vertical farming technology, and we are fully prepared to implement our solutions on a global scale.



Business Sweden visit to Growy

Second to left is Yusnida Yunos, Assistant to VP Business Development & Sales APAC, and to her right is Kerstin Koehler, CEO of Growy Singapore
Image courtesy from Growy

BUSINESS SWEDEN:

What inspired you to start a farm in Singapore?

ARD:

I have previous experience in Singapore from my tenure with other companies and living there from 2003 to 2008. I can personally attest that conducting business in Singapore is comparatively easier than in Jakarta or Hong Kong. Singapore not only offers a safe environment but also maintains political stability, which enhances the predictability of business operations.

From a business perspective, Singapore holds immense appeal for several reasons. Firstly, there is a robust demand for high-end summertime microgreens, especially among the upscale restaurants in the city. Secondly, Singapore is the ideal launchpad for our expansion into the region. Thirdly, Singapore's well-organized infrastructure and business-friendly environment make it a highly suitable city to launch any enterprise.

When we decided to expand, our attention quickly turned to Singapore. We came across a company named Kalera that had made the decision to divest its international operations outside the United States. Capitalizing on this opportunity, we acquired their international ventures. Consequently, we now have established farms in Kuwait and Amsterdam, with a farm currently under construction in Singapore, expected to complete in Q4 2023. This is how our journey led us to cultivate our presence in Singapore.

BUSINESS SWEDEN:

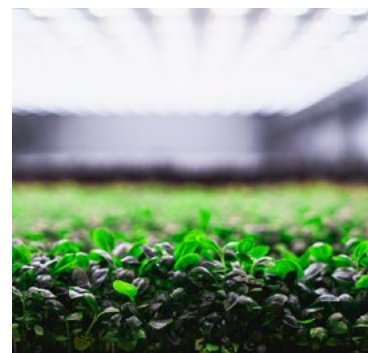
When it comes to investors and attracting investments, how have you managed this?

ARD:

We are currently in contact with 5-6 investors, including individuals from Sweden and Norway. Recently, I organized a trip to Singapore to introduce the farm and our team to stakeholders as part of our ongoing due diligence process. Our primary focus is on the investors who possess expertise in consumer markets and the food industry, particularly in the realm of new food alternatives and innovations. These investors have the potential to assist us in refining our sales strategy and providing substantial value. Furthermore, their extensive network of industry connections can pave the way for establishing new farms in various locations.

It's crucial to emphasize that the key to winning over investors lies in presenting an economically viable model. Any investor exploring opportunities in the vertical farming sector will be hesitant if they perceive that the financials do not align with long-term sustainability. Looking back just two or three years ago, funding was not a significant challenge. It seemed that the more money you spent, the higher your valuation became, and you could secure additional funds easily. However, this landscape has drastically changed over the past two years. Investors now prioritize comprehending the viability of business models. Liquidity has been a major obstacle in our growth journey in recent years, prompting us to actively seek additional investment.

While securing funding is an ongoing challenge, we have reached a pivotal juncture where we are transitioning from venture capital to growth capital. This marks a significant milestone as it reduces our financial risk, and we anticipate achieving positive cash flow next year with our farms in Amsterdam, Singapore, and Kuwait. This transition will put an end to burning through capital and align us with a sustainable financial trajectory.



Growy's Farm Interior in Singapore

Their technology is fully controlled – crop growth, technology, finances, etcetera. Data is collected, monitored, and adjusted accordingly

Photo Credit: Growy

BUSINESS SWEDEN:

How has the Economic Development Board of Singapore (EDB) helped you when it comes to regulatory and logistical hurdles when expanding here?

KERSTIN:

Our initial introduction to Singapore came through the Singaporean Ambassador to Germany. Subsequently, we participated in and emerged victorious in the Indoor Ag-Con Asia pitch competition in 2019, marking our initial foray into Singapore.

Following our success in the competition, the Economic Development Board (EDB) recognized our potential and became a vital partner in our Singaporean operations. They provided us with access to valuable contacts that we would not have been able to reach on our own, offering us a platform for expansion. Even during the challenging times of COVID-19, EDB assisted to ensure that critical meetings could continue with minimal disruption. There were instances where I found myself on an almost empty plane.

The Singapore Food Agency (SFA) awarded us the 30-by-30 express grant, a distinction shared by only 8 other companies. While SFA primarily focuses on food security, EDB and A*STAR have played a crucial role in opening doors for research and development collaborations. Further building on our R&D partnerships, we recently signed a Memorandum of Understanding (MOU) between Growy, Wageningen University & Research (WUR), the Faculty of Science under the National University of Singapore, Republic Polytechnic (RP), Amsterdam Institute for Advanced Metropolitan Solutions, and Nanyang Technological University Singapore. The MOU builds a bridge between the Dutch renowned horticulture expertise and Singapore's thriving food security R&D ecosystem, allowing our facility to serve as a testbed for cross-country collaborative ventures.

BUSINESS SWEDEN:

You mentioned capital expenditure (CAPEX) and operating expenditure (OPEX) being so low. We heard in the market that setting up a vertical farm CAPEX is very high. So how did you manage to go around that?

ARD:

Central to our approach has been the meticulous consideration of all the requirements associated with vertical farming, tailoring solutions to suit this specific requirement. Much of the available technology is standardized and commonly used in hydroponics and greenhouse farming, but it is seldom purpose-built for vertical farming. Right from the outset, we addressed this gap and achieved the creation of an affordable, dependable, and scalable concept.

In 2020, the initial investment needed to establish a vertical farm averaged around US\$4,000 to US\$5,000 per square meter. My objective was to bring this cost down to US\$1,000 per square meter, a goal that was initially met with scepticism. To accomplish this, we posed crucial questions: "What are the necessities? What are our objectives? What do the plants truly require?"

Initially, our focus was on operational expenditure (OPEX). Achieving affordability while maintaining low operational costs required a trade-off, which led us to prioritize "zero labour" or 100% automation. Concurrently, we adhered to a mindset of avoiding unnecessary expenditures or actions. Through gradual steps in our development process, these efforts have borne fruit.

Today, we have successfully reduced our CAPEX to approximately US \$1000 - \$1500 per square meter. We anticipate that we can eventually reduce these costs with another 10 to 15%. This achievement is made possible by leveraging in-house development, tailoring to our specific requirements, and focusing on streamlining processes.

Returning to the topic of automation, our investments have yielded significant benefits by keeping labour costs minimal. In comparison, a similar farm in the United States employs between 80 and 100 individuals. In Singapore, our workforce will consist of approximately twelve employees for operations, while the Amsterdam

facility will require around ten. We aspire to further reduce this number to as few as five employees for future farms, and instead ramp up our R&D personnel.

BUSINESS SWEDEN:

How do you regard the energy-aspect of running a vertical farm?

ARD:

Energy consumption is a critical factor we carefully consider. Currently, the industry average for producing one kilogram of salad stands at approximately 40 kilowatt-hours. For the Growy farms, we have achieved a rate of approximately 15 kilowatt-hours per kg and we still see room for improvement in the coming years.

Investors scrutinizing our company's financial models often express disbelief at the remarkably low energy consumption. Some have even engaged consulting firms for due diligence, and their findings have consistently shown that our estimations are, if anything, conservative. This serves as further evidence that our approach is not only viable but also highly effective.

Affordability is a paramount goal for us. Our aim is not to price a bag of salad at US\$4.50 in supermarkets; rather, we aspire to offer it at US\$3.50, enabling us to compete with suppliers from Malaysia and Australia.

BUSINESS SWEDEN:

Are you focusing on Asian greens or microgreens? And why focus on HoReCa, or instead of your grocery stores?

ARD:

Our business caters to two distinct markets: Hotels and Restaurants on one hand, and Retail and Consumers on the other. We also operate under two distinct brands: "Growy" serves as our brand for retail and consumer products, while "Chef's Farm" is dedicated to high-end restaurants.

The high-end restaurant-segment has been my focus since 2015. In Holland, we supply to several high-end Michelin star restaurants with microgreens and mixed salads. They are of high quality, but it fetches a high price, around US\$200 per kilo. Chefs are valuing these high-quality greens and it can guarantee us a good income stream when we continue to deliver quality products. The other route is retail where we supply leafy greens, salad mixes and herbs.

BUSINESS SWEDEN:

Others in the industry have mentioned that the margins are usually very low in Hotel Restaurants, and Cafes (HoReCa) usually. Do you have any thoughts on why that might be?

ARD:

Our approach centres on comprehending our core clientele. Over the past 5 years, we have successfully forged connections within the networks of renowned chefs. Given the tightly knit nature of the industry, once you establish relationships with 5 Michelin-starred chefs, you gain access to all 55. While it can be challenging to initially break into these circles, it operates on a principle of exclusivity—you either have access or you do not.

However, once one of these chefs discovers an exceptional product, they are inclined to share their discovery with their peers and enthusiastically recommend it. This is the dynamic that governs the industry, and it mirrors precisely what we accomplished in the Netherlands: deliver an exceptionally high-quality product, and if it aligns with the chefs' preferences, they will readily make a purchase.

BUSINESS SWEDEN:

When it comes to retail, do you go directly to supermarkets, or you go to the distributors or wholesalers? Have you thought about the wet markets in Singapore as well?

KERSTIN:

In Singapore we haven't explored wet markets yet, as it is a very different sales channel. This might be on top potential for the future. Our current focus is to kick off our micro-greens concept "Chef's Farm", and focus on retail in the next phase.

ARD:

In Singapore, local supermarkets offer 100-gram bags of salads imported from Australia at a price of US\$3.00, while Singaporean farms are selling them at US\$4.50. This means that starting at US\$4.50 makes the local product 50% more expensive. Naturally, consumers consider factors such as taste, quality, and, most importantly, price when making their choices. Our objective is to provide a cost-effective solution, produce with high efficiency, and create a top-quality blend that is not only delicious but also locally sourced, environmentally friendly, and free from pesticides. Currently, our focus revolves around perfecting the product and its composition, ensuring it meets the criteria for supermarket placement on their shelves.

KERSTIN:

Creating a connection between Asian cuisine and Western-style salads, we will offer an Asian salad mix that is suitable for raw consumption. We have created a growing recipe that is highly efficient and requires minimal handling. The development of this specific seed mix has been a meticulous process, involving collaboration with chefs to gather their input on taste, color and texture. Additionally, we visited various hawker centres and restaurants throughout Singapore distributing small samples to collect feedback from consumers. This endeavour has been time-consuming, but we believe the distinctive taste it imparts will set it apart once it becomes available in supermarkets.

BUSINESS SWEDEN:

Do you feel there are competition in the market and how do you regard your competitors?

ARD:

I don't think we have any competitors, but rather colleagues who are also in the same market and industry. The market is so big that there is plenty for everybody. Therefore, we do not see anyone as a competitor and know that we should not be afraid of others. We have a common challenge to reach Singapore's "30-by-30" goals, and we need all hands on deck to get there. That is also why we are quite open to share what we do.

KERSTIN:

That is something beautiful about Singapore. Since it is small, everyone is like a family, and no one is afraid of sharing. It is a very collaborative environment and one of the wonderful things about Singapore.



Growy's farm

Housed inside a logistics centre in the east of Singapore.

Photo Credit: Growy

BUSINESS SWEDEN:

Do you think it is difficult to find and retain talent in Singapore? Is there something you are doing particularly well in this aspect?

YUSNIDA:

There is a push in Singapore by stakeholders that promote agricultural technology, and graduates are increasingly looking towards this industry. With initiatives such as SFA's 30 by 30 as well as the introduction of an increasing number of diplomas and courses geared towards Agriculture Technology and Urban Farming in recent years, we are receiving considerable interest for our company.

We are also in close touch with learning institutions such as Republic Polytechnic and ITE East, giving feedback on programs, or to support with recruitment opportunities where possible. Additionally, visibility through research collaborations, and being featured in the newspapers have also contributed toward attracting potential talent.

We have been fortunate with recruitment and talent retention. We have an amazing team at Growy and have managed to retain our core team who joined us as the pioneer batch.

KERSTIN:

Also engaging with the community is important. We are a part of CapitaLand's East Coast Initiative, "Vibrant", where we are opening our doors to our neighbours by presenting "A Day in the life of a vertical farmer."

ARD:

If I can just echo what Yusnida and Kerstin expresses, we see the same thing in Amsterdam with a high engagement on our job advertisements. Many recruitment agencies have been reaching out to us, although we currently do not require their services, as we have an abundance of applicants. While we acknowledge the general challenges associated with recruiting specific types of specialists, we have not encountered these difficulties ourselves. However, in our sector, and for the kind of company we aspire to become, talent attraction is paramount. Businesses in our field aspire to produce high-quality, sustainable, innovative products that benefit people worldwide. The production of healthy foods is a cause that resonates with each individual. We are fortunate to have a talented team, including data scientists who have transitioned from well-established companies, expressing sentiments like, "I'm no longer interested in what I used to do. I prefer to work for a company that makes a meaningful impact rather than going for the highest paid job."

I believe the younger generation, those around 25 to 30 years old, approach employment differently than a decade ago. They evaluate job opportunities by asking themselves, "Can I contribute positively to the world?" This has become a significant consideration, with salary and other factors following in importance. This shift is quite evident, and a company that successfully positions itself as an attractive employer finds it easier to attract talent. While recruiting certain specialized professionals may take time, we have experienced remarkable growth, increasing our team from five to seventy people in just two years. At Growy, everyone embodies a farmer's ethos first and then assumes roles as data scientists, engineers, or accountants.



Growy's grow cells

It cultivates a comprehensive array of crops, encompassing micro-greens, baby leaf salad blends, and herbs.

Photo Credit: Growy



THE ACCELERATORS

Singapore's global financial prominence serves as a catalyst for attracting and facilitating investments in agritech, particularly for startups and scaleups. The city-state boasts a thriving financial ecosystem, encompassing a wide spectrum of investors, including venture capital, private equity, and institutional players. This rich investment landscape simplifies the process for agritech ventures to secure the essential funding for their research, development, and expansion efforts.

The Singaporean government is also playing a pivotal role in propelling the agritech sector forward by providing critical funding support. As of Q4 2022, an allocation of USD 220 million has been designated for this industry, with a primary focus on bolstering and optimizing production capabilities. In addition, the government has instituted programs in collaboration with esteemed global business mentorship entities such as GROW, Trendlines, and Innovate 360.

Collectively, these funding opportunities, coupled with a favourable regulatory environment and robust business support initiatives, are ushering in a transformative era for the agrifood industry in Singapore.



GROW is an ecosystem catalyst advancing innovation, sustainability, and resilience in the food system. Their fund and accelerator initiatives have empowered startups from around the globe to kickstart their global expansion from Singapore. Business Sweden and Joshua Soo, CEO of GROW, shared about his motivations and the world of impact investing.

BUSINESS SWEDEN:

Hi Joshua. Thanks for having this meeting with us. I would like to ask, what motivated you personally to establish an accelerator?

JOSHUA:

I was motivated by two things, the desire to transform the agriculture and food system, and fast track the most promising founders globally to scale their ventures. As such, GROW was setup as a dedicated agriculture and food technology impact accelerator with a global mandate.

In addition to this, it felt like a “perfect” time in history. When we established GROW, it was at the same time Singapore launched her efforts to catalyse the local Agrifoodtech startup ecosystem. It’s been an absolute privilege being part of how Singapore is writing her “food story” at the very beginning and be part of history in the making.

BUSINESS SWEDEN:

How do you identify like promising startups in your program and what are the key criteria?

JOSHUA:

GROW has many different programs each with different objectives. As such, we curate a cohort based on two things, finding “best in class” ventures and alignment to the program objectives. Allow me to elaborate.

For best-in-class, we look for three things: firstly, the founder and team composition. Do they have a mix of technical and commercial capability. We want to see their entrepreneurial fire and grit! Secondly, we look at the agrifood technology and innovation. Is it novel, differentiated and how does it tangibly deliver benefits to the various stakeholders in the agrifood system. Lastly, commercial traction or track record, depending on the startup stage.

For program objectives, I’ll talk about this with reference to two programs from our portfolio of programs. Our flagship accelerator, which is the AgFunder GROW Impact Accelerator is all about investing in the most promising founders. There is an investment committee and a Fund mandate, as such we look for global startups that can demonstrate strong impact and sustainability outcomes. We look for highly investible startup ventures with strong technology and IP.

Our market expansion programs are where we help international startups expand into Asia via Singapore. For these programs, we look for solutions that have high relevance to Asia’s context. This can be in the form of a business, process, service or product innovation, and does not necessarily have to be a pure technology play. We typically deliver these programs with support from an overseas government agency, as such there is an element of finding entrepreneurs that represent the best of the respective country.



Joshua Soo
CEO
GROW

BUSINESS SWEDEN:

Can you share what are some of the challenges that companies mention when they are scaling up? And how does the accelerator help them overcome these?

JOSHUA:

I'd say that the challenges that companies face when scaling up an agrifood tech or innovation are twofold. They need to demonstrate their solutions can work in a real context at a commercial level before they can secure actual customers, which can be a "chicken and an egg" situation. Financing their growth is also a challenge when agrifood is somewhat specialised, coupled with the fact that these businesses need to operate in accord with nature's rhythms and food safety regulations. The timeframes are much longer and stakes are high.

To help founders overcome this, it helps with GROW being a specialist in the business of agrifood tech and innovation. We help founders through strategic advisory and providing them access to our networks. We work closely with them on their business models and increasing overall investibility.

On the first challenge, we recognise the importance for startups to have trusted scaleup partners. We help them identify the right partners that also appreciate the complexities of scaling up a new venture and are prepared to go along with the founders for the long haul.

We have a network of experienced and very supportive coaches and mentors. They are practitioners who have worked in the agriculture and food sector across several markets in Asia, and are very generous in sharing their knowledge, wisdom and time to help the founders unlock their full potential.

Lastly, we work with AgFunder to build interest and channel more capital into the agrifood sector. Hence, providing our startups with access to our investor network has also been really beneficial in helping startups scale.

BUSINESS SWEDEN:

What are your upcoming plans and initiatives for GROW?

JOSHUA:

Over the past four years, we've laid a strong foundation and learnt a lot. We now want to be even more impactful and deliberate with our programs in driving positive outcomes to the sector, to investors, and to our founders.

We love to see the diversity of countries where our founders come from. This year, the AgFunder GROW Impact Accelerator welcomed our first Swedish company, OslAro, an AI-enabled crop development company that has developed a salt-tolerant wheat.

We will soon be announcing applications for the next Agfunder GROW Impact Accelerator to take place in 2024. Hopefully we can gain more interest and attract more Swedish and even Nordic companies to apply.

If we receive sufficient interest, it would also be nice to explore a program to help Swedish companies explore markets here in Asia, perhaps with Business Sweden?

BUSINESS SWEDEN:

Thank you very much Joshua. We look forward to collaborating soon.



Grow x Innovate UK

Hosted an invite-only event on 19 April to introduce to 8 Agrifoodtech UK companies and present their innovative solutions and cutting-edge technologies.

Photo Credit: Grow



Photo Credit: Grow



THE INSTITUTIONS OF HIGHER LEARNING

The government's initiatives have effectively accelerated the growth of agri-food technology, but this rapid progress has resulted in a shortage of available talent.

One significant challenge facing Singapore is the scarcity of skilled manpower. This issue is exacerbated not only by the aging population and the country's relatively small population, but also by a general lack of awareness regarding the career opportunities within the agritech sector. This is compounded by the fact that individuals may perceive agritech as less innovative or less glamorous compared to other technology sectors. This perception can deter potential talent from entering the field.

To overcome these challenges, schools in Singapore are taking proactive steps. They are expanding their course offerings to encompass a wide array of specialized skills, thereby cultivating a pipeline of local talent. Additionally, they are exploring avenues to attract international talent and fostering collaborations with global leaders in the agritech field. Agencies across Singapore are also actively looking at promoting the industry, making the sector more attractive to work in.



REPUBLIC POLYTECHNIC

DISCOVER. TRANSFORM. ACHIEVE

Republic Polytechnic is an educational institution in Singapore actively engaged in the field of agri-food technology. Working to help Singapore achieve its “30 by 30” goals, not only does the school provide continuing education, but it also fosters industry partnerships with training and research. Business Sweden had an opportunity to speak with two programme directors to hear how they are preparing the next generation of future farmers with competencies to spearhead technological development of hi-tech urban farming and cultivation of alternative proteins.

BUSINESS SWEDEN:

Can you tell us about your role as an educator in the agri-food technology program? What inspired you to pursue a career in this field?

SERENE:

During my time as a polytechnic student pursuing a Diploma in Biotechnology, I found the application of what I was learning to be incredibly motivating. This experience inspired me to become an educator in this field.

SAMUEL:

My food science lecturers, who genuinely cared about my learning, had a profound impact on me. Their dedication inspired me to join the educational sector, where I aim to emulate the passion and zeal to impact lives. Additionally, my love for food has also played a role in my career choice.

BUSINESS SWEDEN:

How do you prepare students for the unique challenges and opportunities in the agri-food technology industry?

SERENE:

As the agri-food industry evolves, we believe that foundational skills in basic science, technology, engineering, and mathematics (STEM) will continue to be crucial and relevant in our training of students.

SAMUEL:

We are committed to providing flexible learning pathways that align with students’ interests, facilitating their discovery, exploration, and achievement of their educational goals with Republic Polytechnic.

BUSINESS SWEDEN:

Are there any specific career pathways or job opportunities that graduates of your program typically pursue within the agri-food technology sector? How do you support students in their transition from education to employment?

SERENE:

Our programme produces graduates with diverse interests, resulting in a range of job roles. Majority enter roles such as Quality Control/Quality Assurance, Research & Development, Sales & Marketing.



Samuel Aw
Senior Manager
Formulation & Nutrition
Science Technology
Centre, School of
Applied Science
Republic Polytechnic

We would like to offer an authentic learning experience for our students and hence in our curriculum, we offer Final Year Student Project which are industry-linked. This way, students learned about the real issues faced by companies and learned to collect relevant experimental results, analyse the data, and offer possible solutions to the industry partners.

SAMUEL:

Our industry internship programme, spanning 4 to 5 months, allows students to gain hands-on experience in various sectors, from vegetable farm to research institutes and food companies. A dedicated module on Food Innovation & Sustainability empowers students to develop new products for companies. This brings about the translation of skills acquired in the various modules to tangible prototypes for company's adoption and future commercialisation.

BUSINESS SWEDEN:

Looking ahead, what are your plans for further advancing your agri-food technology program? Are there any upcoming initiatives or partnerships that you are excited about?

SAMUEL:

Republic Polytechnic has been appointed to be the Centre of Innovation for Urban Agri-Technology in Singapore. We are actively involved in training manpower for the Agri-Food Industry, offering numerous short courses, part-time and full-time diploma courses. Recently, we have launched the Specialist Diploma in Environmental and Corporate Sustainability to help enterprises groom talent in sustainability.

SERENE:

Our school is also part of the Future Food Alliance, under Enterprise Singapore, which champions food innovation and sustainability for our nation. We are proud to be in this movement of levelling up the innovation capabilities of companies to compete in the global agri-food markets.



Inside The Greenhouse

Republic Polytechnic is the first Institute of Higher Learning in Singapore to feature a teaching and research facility dedicated to growing plants in naturally ventilated and climate-controlled conditions

Photo Credit: Republic Polytechnic



Photo Credit: Republic Polytechnic

CONCLUSION

This report could not have been possible without the contributions and openness from all the companies and agencies that participated in our interviews. By sharing this knowledge, we have gained deeper insights into the agri-food landscape of Singapore. We understand both the strengths, challenges, and opportunities that lie on this little green dot, and humbled to be able to share this across Swedish communities.

To our friends in Sweden, Singapore has the opportunity for you to expand and grow. From startups to scale ups, consider Singapore if:

- Your organisation has relevant technology, services, or solutions suitable for agri-food tech landscape of Singapore.
- Your organisation is looking for business development, innovation, and R&D partners within this region.
- Your organisation is exploring opportunities within Asia and would like to strengthen your presence in this market including looking for local projects, potential partners, agents, and more.
- Your organisation would like to build and confirm your go-to-market international strategy.
- Your organisation is willing to set aside time and resources to follow up with business opportunities.

Look at R&D capabilities of public sector institutes or private sector partners, which can help jumpstart market trials for Swedish companies. Businesses like yours are also eligible for funding if it intends to start local manufacturing of biotech-based protein or sustainable urban food production like leafy greens or berries.

Start sharing and monetising on best practices and technologies. Sweden has built one of the highest standards of sustainable food production and food quality. Regulations for monitoring animal feed and alternative protein safety are still in the early stages. Swedish best practices and technological innovations for safe food, proper storage, and sustainable food production both downstream and upstream opens for potential business development and consultation opportunities in Singapore.

Use Singapore as a testbed for the “Asian taste buds”. Even though Swedish businesses are in the forefront in healthy foods and alternative proteins, to tap into the Asian or Southeast Asian market requires that the product goes well with Asian flavours. Since Singapore is a melting pot of races and cultures, it presents a good testbed for Swedish companies to understand the market, and recalibrate flavours, before committing fully to expand their business to the rest of Asia.

APPENDIX

SOURCES

[Top 190+ startups in AgriTech in Singapore - Tracxn](#)

[Asia-Pacific AgriFoodTech Investment Report 2022 | AgFunder](#)

[Innovations that are harvesting for future generations from Singapore | Singapore EDB](#)

[AgriFoodTech in Southeast Asia – 2023 Ecosystem Report | Singapore EDB](#)

[Singapore Food Agency Corporate Report 2023](#)

[Addressing the talent gaps in Singapore's budding cultivated meat space | Singapore EDB](#)

[How and why Temasek became a major agrifood investor | The Straits Times](#)

[An Exciting New Facility to Support Agricultural Training and Research | Republic Polytechnic](#)

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