FORWARD FOODING

POWERING THE FOOD REVOLUTION

# AGRIFOODTECH IN SOUTHEAST ASIA

## 2023 ECOSYSTEM REPORT

In partnership with EDB SINGAPORE

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POWERING THE FOOD REVOLUTION

# FOREWORD

**ALESSIO D'ANTINO**

**CO-FOUNDER AND CEO**

Since 2015, Forward Fooding has been an ecosystem enabler for sparking connections and facilitating meaningful collaborations between entrepreneurs, corporates, and investors in order to create a brighter future for our Food System. From its inception in the UK, our team has continued to operate globally and is physically spread across Europe, allowing us to develop a ‘birds-eye’ view of the global AgriFoodTech landscape.

We are thrilled to present you this report that aims to shed light on the AgriFoodTech ecosystem in Southeast Asia. This quadrant of the world features a thriving and growing ecosystem. Singapore, for example, is already at the forefront of alternative protein innovation and a is a true 'testing platform' at a global scale, while the overall region is one of the very few areas of the world that received more investment in 2022 than 2021, showing very strong resilience and, we believe, a bright future ahead.

**SAMUEL CHAN**

**VP AND HEAD OF AGRIFOOD**

Asia, the world’s fastest-growing region, is expected to double its food spending to more than €7.4 trillion by 2030. Singapore’s ambition is to be a global hub for companies to develop, commercialise, and scale sustainable agrifood solutions to address the food challenges faced by the region and world.

As a land-scarce nation that imports more than 90 per cent of its food, food security has been a pressing concern for Singapore. Our “30 by 30 initiative”–to sustainably produce 30 per cent of our nutritional needs by 2030 – has led us to commit around €206 million to invest in the research of alternative proteins, urban agriculture, aquaculture, and food safety science. These areas offer growth opportunities for global agrifood companies, which can tap into Singapore’s strategic location, robust infrastructure, access to funding and world-class research ecosystem to bring quality, nutritious, and appealing products more quickly to market.

This report will give you an overview of the agrifood landscape and growth opportunities in Southeast Asia, while providing insights into how Singapore can partner businesses to feed Asia and the world sustainably. Reach out to the Singapore Economic Development Board (EDB) if you are keen to establish operations in Singapore or Southeast Asia.

# ABOUT FORWARD FOODING

FORWARD FOODING
POWERING THE FOOD REVOLUTION

**Forward Fooding** is the world's first collaborative platform for the food and beverage industry, fostering innovation via FoodTech Data Intelligence and corporate-startup collaboration. Headquartered in London with satellite offices in Barcelona and Rome, we have been running a global network of AgriFoodTech entrepreneurs powered by entrepreneurs since 2015. We act as an ecosystem enabler to provide the necessary support and velocity to foster meaningful collaborations and partnerships between established food organizations and AgriFoodTech startups and scaleup companies. Forward Fooding is also the creator of the **FoodTech 500**, the *Fortune 500* of the AgriFoodTech industry.


## OUR SERVICES

### DATA and INSIGHT

Helping Food and Beverage corporates and investors to stay on top of the latest trends through our fully customisable data intelligence platform and dedicated reports.

### SCOUTING and MATCHMAKING

Connecting Food and Beverage corporates and investors with selected entrepreneurs from our global AgriFoodTech startup network.

### STARTUP NETWORK

Providing exposure to international FoodTech companies via our own FoodTech 500 and FoodTech Innovation Hubs.

## FORWARD FOODING IN NUMBERS

**9K+** International AgriFoodTech startups within our propietary database

**25K+** Newsletters subscribers including AgriFoodTech entrepreneurs, corporate executives, investors, ecosystem partners, and journalists

**30K+** Monthly visits on the Forward Fooding website

**15K+** Social Media followers

**3** Food Innovation Hubs established in London, Barcelona, and Milan counting 45+ resident companies and community members

**40+** Corporate clients including seven Fortune 500 companies

**To learn more visit: forwardfooding.com or contact us at: info@forwardfooding.com**

# ABOUT EDB

**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. It manages investment promotion and industry development while working with international businesses, both foreign and local, in three main ways: providing information, connecting partners, and supporting access to government incentives in their investments. EDB's mission is to create sustainable economic growth, with vibrant business and good job opportunities for Singapore.

For market insights, industry guides, and exclusive events related to SEA's business landscape, **subscribe to our monthly newsletter here.**

If you are looking for partners to facilitate your setup in Singapore, you can connect with EDB's curated network of partners through the Connections Concierge.

Ready to take the next step and/or have questions? **Reach out to us here.**

- Visit our website
- Get in touch with EDB: Contact the Singapore Economic Development Board | Singapore EDB
- Subscribe to our Insights newsletter: Insights Subscription | Singapore EDB
- Follow us on LinkedIn: Singapore Economic Development Board (EDB) | LinkedIn

# METHODOLOGY AND TAXONOMY

## DATA SOURCES

Data for this report has been sourced from our proprietary **FoodTech Data Navigator** database. Supplemental information on the SEA's agrifood sector, funding, and MandA activities has been meticulously validated by our team. Funding information presented in this report was last updated on 1 April 2023 and refers to private funding only–all post-IPO rounds have been excluded from the analysis.

Additional sources are listed at the end of this report.

## ANALYSIS METHODOLOGY (SEA AgriFoodTech Ecosystem section)

For the purpose of this report, We based our analysis on the data listed in the FoodTech Data Navigator. As of 1 April 2023, the following countries were represented in our database: The Philippines, Vietnam, Malaysia, Singapore, Thailand, Indonesia, and Myanmar.

Considered as 'outliers', the companies **Grab** and **Gojek** were excluded from the calculations except when specified, given they cumulatively raised over €13.3B, which represents more than 80% of the overall SEA AgriFoodTech investments.

The currency conversion rates applied in this report were based on Euro foreign exchange reference rates by the European Central Bank as of 22 May 2023.

## AGRIFOODTECH PROPRIETARY TAXONOMY

Forward Fooding proprietary taxonomy, split into **three 'layers',** covers the entire food supply chain. Companies are categorised as below:

### First layer - Activity

**FOOD DELIVERY**
Direct-to-consumers food delivery services on-demand, B2B marketplaces and delivery technologies.

**AGTECH**
Services and technologies used to increase farming efficiency and sustainability and novel farming systems.

**CONSUMER APPS AND SERVICES**
Apps and services that facilitate access to food and the information behind it.

**FOOD PROCESSING**
Technologies or services that leverage innovative techniques to process food or to improve the functionality of food ingredients.

**NEXT-GEN FOOD AND DRINK**
Products and processes that leverage science and technology to create new types of foods and beverages.

**FOOD SAFETY AND TRACEABILITY**
Tech-powered solutions to sanitise food processing equipment, assess products' freshness and increase their shelf life.

**KITCHEN AND RESTAURANT TECH**
Smart kitchen appliances for consumers as well as smart equipment or technologies that help restaurants manage their operations more efficiently.

**SURPLUS AND WASTE MANAGEMENT**
Products and solutions that help reduce food waste and improve efficiency.

### Second layer - Domain

Each of the above Activities is then split into sub-domains (e.g. Next-gen Food and Drink domains: Plant-based, Cellular agriculture, Protein fermentation, Insects, etc.). Each company is categorised with only one Activity and one Domain.

### Third layer - Technology 'meta-tags'

Among a range of 150+ tags, relevant ones are applied to each company to further deep-dive into their technologies, ingredients, or market applications (e.g. IoT, Blockchain, Algae, Mushrooms, Precision fermentation, Dairy alternatives, etc.).

# THE CONTEXT

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## INTRODUCTION

Southeast Asia (SEA) is a major agriculture production hub for domestic and international markets. Common agrifood commodities include **palm oil, sugar, coffee, rice, fruits, and seafood,** as well as the production of the world's staple crops. **Vietnam and Thailand are the top rice producers in SEA**, whereas Indonesia is the top sugarcane and palm oil producer. In SEA, the employment of agricultural economic activity is the highest in Myanmar and Laos, followed by Cambodia, Thailand, Vietnam, the Philippines, and lowest in Malaysia, Brunei, and Singapore (ASEAN Key Figures 2022). In general, SEA countries have diverse socio-economic classes with more than 25% of their population residing in rural areas.

### IMPACT OF THE AGRIFOOD SECTOR IN SEA

**€747.3 B**
Agrifood sector GDP contribution in 2021

**126.7 M**
Jobs

**€96.1B**
Tax revenues supported by the agrifood sector

*Source: FIA Oxford Economics 2022*
*Indonesia, Malaysia, Thailand, Vietnam and the Philippines*

The GDP of the Association of Southeast Asian Nations (ASEAN) is €3 trillion. **If ASEAN were a country, it would rank as the 5th largest economy worldwide after Germany** (ASEAN Key Figures 2022).

With a growing middle class (fastest growing GDP in Singapore, The Philippines and Indonesia) and the third largest population (663.9 million in 2021) in the world after India and China, the **demand for higher-quality food products is on the rise** (ASEAN Key Figures 2022).

Capital into SEA is pouring in regionally and internationally to support the growth of innovation centres and new infrastructure (featured extensively in this report). Many CPG companies' regional offices are situated in Singapore, where it heavily invests in R&D to overcome its natural resource constraints.

# THE CONTEXT
## SEA FOOD SYSTEM OVERVIEW

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### MANUFACTURING AND COST PARITY

In recent years, the geopolitical situation of the region has impacted regional trade. Lower manufacturing and labour costs in SEA have led to outsourced manufacturing opportunities. In addition, as SEA countries industrialise, agriculture employment sectors are expected to transform into more specialised food manufacturing and advanced food distribution services.

**Worker productivity in SEA is high**. The **Asian Productivity Organisation (APO)** lists productivity/GDP per worker in 2020 at €46,202 for Malaysia and €28,368 for Thailand, which is more than the Chinese worker productivity at €26,335 (APO Databook 2022).

**Mike Maté**
VP @ Kickstart Ventures

*In SEA any solution that will result (1) **better prices/quality** for the **consumer** and (2) **higher income/productivity** for the farmer will be adopted no matter how innovative it is. Thus, if aquaculture or vertical farming lead to more cost-efficient operations for the farmer and better prices and more options for the consumer, then significant value can be created.*

Kickstart Ventures

### SALES AND DISTRIBUTION

Regional integration in SEA is expanding, which has led to increased trade between state members and improved the mobility of agricultural and perishable goods. Infrastructure projects have supported this increased trade. Examples are the **ASEAN Free Trade Agreements (FTAs), ASEAN Integrated Food Security Framework** and the **ASEAN Highway Network**, which is upgrading designated Transit Transport Routes intended to link seven SEA countries (Singapore, Malaysia, Thailand, Cambodia, Vietnam, Myanmar, and Laos).

Singapore has more than **27 FTAs** globally, including the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the Regional Comprehensive Economic Partnership (RCEP), which has created support for international business expansion. Furthermore, Singapore's 2030 goal is to bolster its trading sectors with the aim to become a global trading hub for agro-commodities (Enterprise Singapore).

### SINGAPORE AGRIFOOD SECTOR HIRING PROJECTION

**4,700**

**targeted new roles in agrifood** that Singapore aims to create, supporting production and distribution in agrifood

# THE CONTEXT
## SEA FOOD SYSTEM OVERVIEW

Singapore is highly connected with any SEA country found within a six-hour radius. This makes Singapore an **ideal entry point for companies to access the SEA region and its growing consumer market**. The city-state is cosmopolitan, with state-of-the-art culinary schools and Michelin restaurants to tap into, and a savvy population open to innovative foods.

*Singapore trading port*

As a developed travel destination and aviation hub, language is not a barrier and the lingua franca is English. There is also a high literacy rate among the predominant urban population. Whereas in other parts of Southeast Asia, language diversity may pose as a challenge for international business operations and may require distinctive approaches to product localisation.

**Jolene Lum**
Head of business development
@ Nurasa

*"Singapore is a **mature market for next-gen foods**, while Malaysia, Indonesia and Thailand with large populations, are ideal testing grounds to conduct consumer education and develop creative marketing campaigns to **influence public opinion**."*

NURASA

Advanced food technologies may not always be relevant for domestic SEA markets as many economies in SEA are still in the developing stage. As a result, consumers are likely to be more price-sensitive in comparison to Western countries. Moreover, consumers are faced with limited and oftentimes expensive options when it comes to novel food products.

Today, **Singapore is an outlier in SEA with a higher consumer purchasing power**. It has strongly embraced novel food technologies. The next section will cover what makes Singapore unique and how this benefits the broader SEA region.

# THE CONTEXT
## SINGAPORE AGRIFOODTECH HUB

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### AGRIFOODTECH INVESTMENTS

Singapore imports more than 90% of its food. The government has implemented the '30 by 30' initiative to boost food security aiming "to produce 30% of nutritional needs by 2030". This led to the establishment of Singapore as one of the strongest food technology hubs in APAC. As a matter of fact, and as further detailed in this report, **Singapore is the biggest country for AgriFoodTech investment in SEA with €1.3 billion raised by startups since 2013**, followed by Indonesian startups with €1.0 billion, and Vietnamese startups with €454.0 million during the same timeframe.

**SEA AGRIFOODTECH INVESTMENTS SINCE 2013**

| Singapore | Indonesia | Vietnam |
|---|---|---|
| **€1.3B** | **€1.0B** | **€454.0M** |

*Source: FoodTech Data Navigator*

**Kelvin Ng**
Chief Scientific Officer @ Bloom8

*"Not every company wants to produce in Singapore. Rather, Singapore is a **strategic hub in SEA**, with a culture looking forward to embracing technology, making it the ideal test bed for AgriFood Tech. The diverse demographic in Singapore makes it a **melting pot culturally** and a neutral culinary environment for SEA cuisine."*

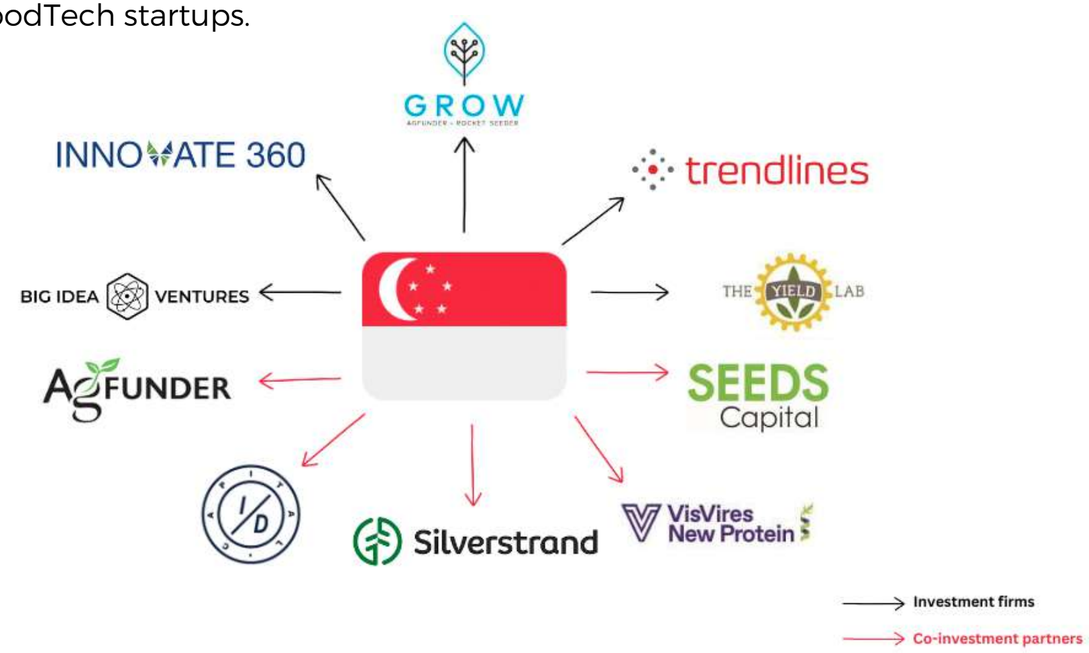
**Barbara Guerpillon**
Innovation and Sustainability @ Dole

*"In Singapore the power of the ecosystem has reached a sizable magnitude of importance that plays the role of an advanced ecosystem. **Powerful networks have been incubated over the last 10 years**. This slow and steady growth has made the red dot visible to the world."*

# THE CONTEXT
## SINGAPORE AGRIFOODTECH HUB

### INTERNATIONAL FINANCIAL CENTRE

Singapore excels in financial services, representing a diverse range of incubator, accelerator, and venture capital (VC) firms. Singapore has dedicated AgriFood investment firms and co-investment partners to catalyse funding into AgriFoodTech startups.




Moreover, Singapore is an international capital market, with one of the leading agrifood investors, the sovereign wealth fund **Temasek**. This global investment company attracts private equity, venture capital funds, family offices, and high net-worth investors from around the world. Such dynamics have been accelerated in recent years during the Covid-19 pandemic, with over 100 family offices approved by the **Monetary Authority of Singapore (MAS) within the first quarter of 2022.**

Singapore easily attracts investment because it has been recognised as the world's best business environment for 15 consecutive years (Economic Intelligence Unit) and has one of the best regulatory environments for financial institutions in Asia and globally.

**Francois Vervial**
Co-founder @ AquaEasy

*"Singapore is an ideal place to fundraise, source talent and find co-founders. AquaEasy benefitted from the Bosch accelerator with **fast expansion** into SEA."*

### INSTITUTIONS

Singapore provides programmes and incentives to prioritise technology investments that suit Singapore's food security needs. The Singapore Food Story R&D Programme led by the **Singapore Food Agency** and **A*STAR** provides grants to support R&D at institutes of higher learning and research institutes (often in partnership with industry players). Another scheme introduced in 2021 is the €55.4 million **Agrifood Cluster Transformation Fund,** which encourages investment in sustainable food production as a domestic source of food security.

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## REGULATORY FRAMEWORK

Singapore has a rigorous regulatory framework and an openness to developing novel food guidelines and commercialising agrifood innovations. It is no coincidence that Singapore was the **first country in the world to approve the commercial sale of cultivated meat**, granted to **Good Meat** in December 2021. Singapore was also among the first countries to approve products from **Impossible Foods** and **Perfect Day** that make use of precision fermentation technology,

*Good Meat approved to sell serum-free cultivated meat in Singapore*

While **insect protein** is already widely consumed in places like Thailand, Vietnam, and Cambodia, Singapore is in the process of formalising the food safety framework for the human consumption of insects, which ensures the safety and quality of products. The Singapore Food Agency recently announced that **16 species of insects, including crickets and silkworms, would be approved for human consumption for the second half of 2023**, supporting Singapore to source and produce more sustainable and affordable foods.

**Anton Wibowo**
CEO @ Trendlines Group

*"Singapore has a unique approach to AgriFoodTech development. From the ideation phase to spinning off IP from academia. There is a lot of support from **Enterprise Singapore and the Singapore Food Agency** for further commercialisation. Singapore also has a strong reputation within SEA for not compromising on **Food Safety and Quality Assurance** and for leveraging the 'Made in Singapore' as a premium brand."*

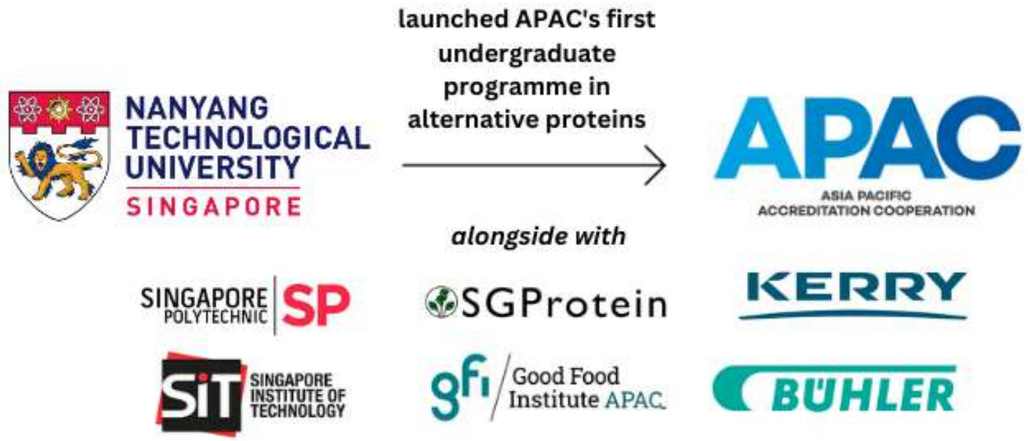
trendlines

# THE CONTEXT
## AGRIFOODTECH OPPORTUNITES IN SEA

### TALENT IN SINGAPORE

To keep up with global AgriFoodTech innovation, local and regional talents in SEA need to upgrade their technical skills in food production to align with international industry standards.

Singapore has a strong network of institutes of higher learning, producing world-class graduates in science, technology, and engineering. The academic sector is integrating Agrifood-related courses to prime and update the skill sets of technicians and engineers. Academic-corporate partnerships are currently flourishing in Singapore:




These partnerships support industrial training and enhanced commercialisation of innovative AgriFoodTech solutions. In May 2023, the **Communication Leadership in Future Foods (CLIFF)** initiative was launched and backed by the **Agri-biotech Knowledge Centre Limited (ABKCL**). CLIFF aims to safeguard the booming novel foods sector and avoid predictable pitfalls that threaten growth, via consultation services.

**Mirte Gosker**
Managing Director @ Good Food Institute (GFI)

*"International companies are increasingly moving to Singapore, attracted by the **open regulatory environment** for innovative and novel food. It can be challenging to hire a large diverse team, specialized in cutting-edge agrifood technology. GFI is involved in **talent development initiatives** in Singapore and SEA. These initiatives aim to close talent gaps and map out the opportunities, through **academic partnerships.** GFI has active engagements with several universities in SEA including the National University of Singapore (NUS), Nanyang Technological University (NTU) and Universiti Sains Malaysia."*

gfi Good Food Institute

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## COLLABORATION

In SEA, extensive resources have been invested into R&D, creating a vibrant ecosystem that encourages innovation and full integration across all sectors.

**Academic, private, and government incubation hubs have created a test bed environment for venture building and prototyping** supporting the transition of lab-scale AgriFoodTech developments towards commercialisation. However, startups face challenges scaling their technology due to increased costs and a lack of affordable infrastructure to utilise.

**Multinational Corporates (MNCs) provide support to adopt innovative agrifood technologies** by providing startup support and access to infrastructure, such as through joint venture projects, leveraging their regional and global expertise.

This **enables companies to thoroughly assess their technologies and supply chain in a small market like Singapore**, perfecting the process through end-to-end (E2E) testing, and ensuring that companies are well-prepared for their future regional and international expansion.

Examples of these collaborations and initiatives are featured in this report.

*Nanyang Technological University in Singapore*

# THE SOUTHEAST ASIA AGRIFOODTECH ECOSYSTEM

Powered by FOODTECH DATA NAVIGATOR powered by FORWARD FOODING

# THE SEA AGRIFOODTECH ECOSYSTEM
## KEY NUMBERS

FOODTECH DATA NAVIGATOR
powered by FORWARD FOODING

**270+** AGRIFOODTECH STARTUPS

**250+** INVESTORS

**10+** ACCELERATORS

**10+** ECOSYSTEM SUPPORTERS

**€3.3B***
INVESTMENT 2013–2022

**€1.1B***
INVESTMENT IN 2022
(6X SINCE 2018)

**Excluding Gojek and Grab*

Source: Forward Fooding FoodTech Data Navigator

# THE SEA AGRIFOODTECH ECOSYSTEM
## INVESTMENT OVERVIEW

FOODTECH DATA NAVIGATOR
powered by FORWARD FOODING

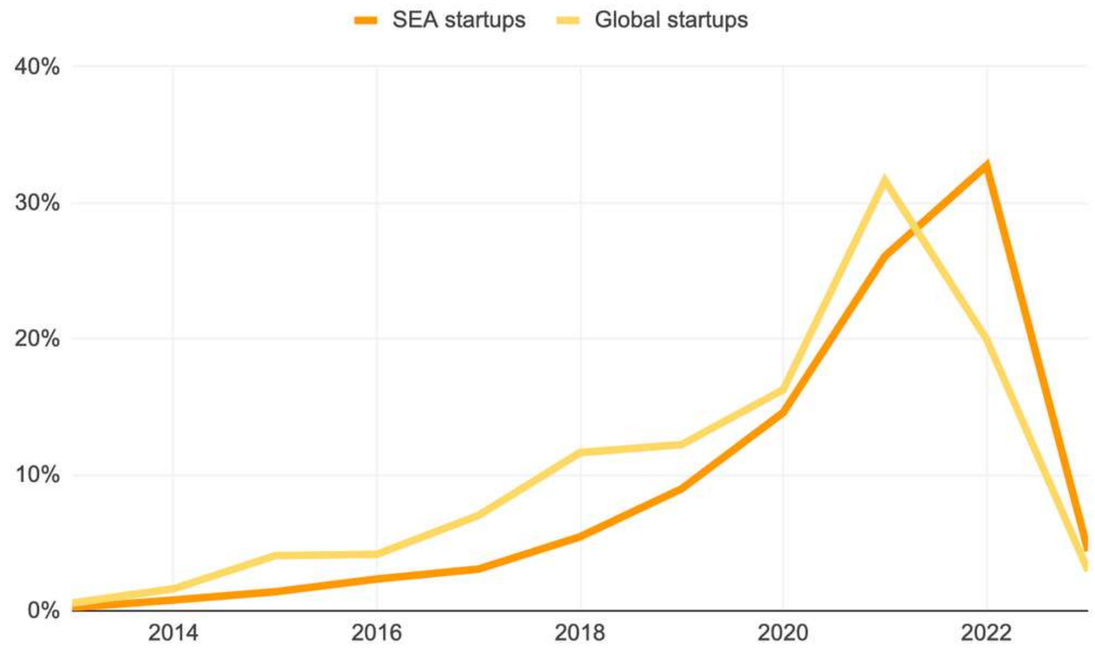
The AgriFoodTech startup market in SEA has experienced tremendous growth over the past few years. Since 2013, **more than €3.3 billion** has been funnelled into AgriFoodTech companies throughout SEA **across 265 rounds,** with investments steadily rising until 2022.

While **global investment in AgriFoodTech companies declined in 2022, SEA startups managed to raise €1.1 billion**, accounting for 34% of the total funding raised in the region since 2013 and representing a **25% increase** from the previous year. By comparison, the global ecosystem raised only 18% of its total funding since 2013 in 2022 and experienced a significant 37% decline compared to 2021.

Additionally, **2022 marked the year with the highest median funding round since 2018, at €4.2 million**, up from the €4 million median in 2021. This suggests that the SEA AgriFoodTech sector may have been less affected by the global investment downturn.

The growing trend of SEA companies also becomes evident when comparing the Compound Annual Growth Rate (CAGR) of the region against the global ecosystem. Over the last three full years (2019–2022), **the SEA ecosystem grew at a remarkable 54% CAGR, in contrast to the 13% CAGR recorded for the global startup ecosystem during the same period.** This further demonstrates the region's resilience in terms of investments amid the challenges posed by the global financial crisis and the COVID-19 pandemic within the same timeframe.

**SEA AGRIFOODTECH STARTUPS FUNDING**
SEA VS GLOBAL STARTUPS




% of total funding by region since 2013

# THE SEA AGRIFOODTECH ECOSYSTEM

## SPLIT BY COUNTRY

FOODTECH DATA NAVIGATOR
powered by FORWARD FOODING

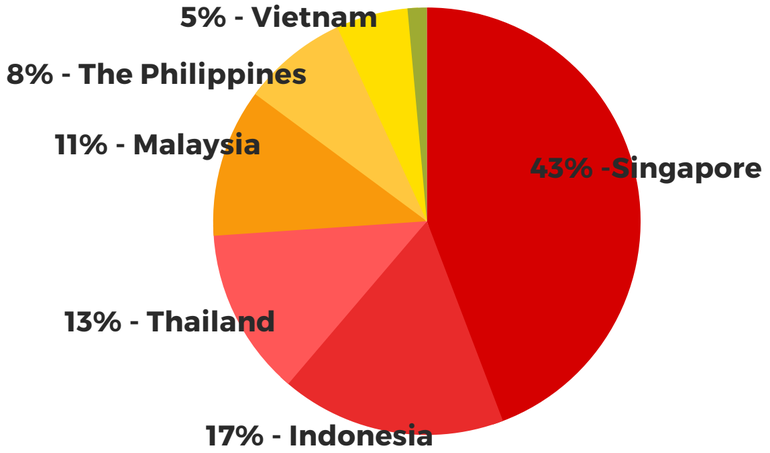
**Singapore** is the largest ecosystem in the region based on both the number of AgriFoodTech companies (122) and funds raised (€1.3 billion since 2013), accounting for 45% of all companies in SEA and 38% in funding. **Indonesia** comes in second with 17% of total number of companies (47) and 30% of total funding (€1 billion), followed by **Thailand** with 13% of all companies (35) and 12% of the region's total funding (€413 million).

Interestingly, **Indonesia features the highest median round amount of the entire region at €6.1 million** for 71 rounds, while Singapore lags behind with a median round of €1.8 million for 128 rounds, mostly in the seed stage.

This could be interpreted as a sign that while Singapore is the biggest ecosystem in the region, it excels at supporting the early stages of company development, whereas Indonesia focuses on reinforcing its growing ecosystem at a later stage.

This difference can be mostly explained by the **maturity of the startup ecosystem** itself, as well as **mature financial market diversification in funding models that include pre-seed to IPO**. Indonesia's financial market is less mature, resulting in the availability of mainly late-stage funds, with investors being more risk-averse to developing technologies locally. On the other hand, Singapore is more focused on incubating new technologies and building the ecosystem to support their development.

### GEOGRAPHY SPLIT BY NUMBER OF COMPANIES




### GEOGRAPHY SPLIT BY FUNDING (2013–2023)

# THE SEA AGRIFOODTECH ECOSYSTEM

## FUNDING BY ACTIVITY

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Since 2013, SEA AgriFoodTech investments have been heavily focused on **Agtech, Food Delivery, and Next-Gen Food and Drinks**.

**Food Delivery represents the majority of funding in the region, accounting for 48% of the total**, but only 24% of the total number of companies (65). In contrast, Next-Gen Food and Drinks (mainly alternative proteins) is the vertical that accounts for the most number of companies, with 25% of the total companies (70 companies), although it represents only 10% of the total funding in the region.

Moreover, **Next-Gen Food and Drinks' CAGR stands out as being 192% in a three-year period, far ahead of any other vertical**. As explained in the next section of this report, this is driven mostly by Singapore, which has been acting as a catalyst for alternative protein development in recent years, attracting a considerable amount of investment and new business creations.

**Agtech represents a thriving segment** with a sizable amount of funding and a significant number of companies. Startups operating in this vertical have raised over €581+ million in total funding to date (the second highest share after Food Delivery, accounting for 15% of the total) and representing 23% of the total active companies across all verticals in the region.

FUNDING SPLIT BY ACTIVITY

| ACTIVITY | NUMBER OF COMPANIES | FUNDING SINCE 2013 | CAGR 2019–2022 | MOST FUNDED COMPANIES<br>Latest round<br>Total funding | |
|---|---|---|---|---|---|
| **Agtech** | **62 (22%)** | **€581.3M** | 92% | eFishery | Series D<br>€214.7M |
| **Next-gen Food and Drinks** | 70 (25%) | €321.7M | **192%** | nextgen | Series A<br>€140.8M |
| **Food Delivery** | 65 (24%) | **€1.6B** | 81% | M W | Series B<br>€140.8M |
| **Consumer Apps and Services** | 18 (7%) | €444.5M | **-71%** | trax | Series A<br>€362.1M |
| **Kitchen and Restaurant tech** | 21 (8%) | €131.3M | 9% | rotimatic | Series C<br>€24.4M |
| **Food Processing** | 15 (5%) | €38.8M | 11% | SEPPURE | Series A<br>€14.7M |
| **Food Safety and Traceability** | 4 (1%) | €2.6M | **NA** | DIMUTO | Series A<br>€2M |
| **Surplus and Waste Management** | 21 (8) | €302.5M | 9% | RWDC INDUSTRIES | Series B<br>€234.7M |

# THE SEA AGRIFOODTECH ECOSYSTEM
## KEY TECHNOLOGY CLUSTERS

FOODTECH DATA NAVIGATOR
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In light of this bottom-up analysis of the AgriFoodTech startup ecosystem in the SEA region, a prevalence of companies emerged, which we can **divide into 3 main 'clusters': Alternative proteins, Agtech, and Food Services**. Statistically, these clusters represent **82%** of the entire SEA ecosystem in terms of the number of companies while accounting for **98% of the total funding** raised by companies in the region.

| CLUSTER | MAIN DOMAINS | TOTAL FUNDING | NUMBER OF COMPANIES | NOTABLE COMPANIES* |
|---|---|---|---|---|
| **Alternative proteins** | • Plant based<br>• Fermentation<br>• Cellular agriculture | €313.8M | 65 | OATSIDE, impacfat, growthwell, nextgen, TurtleTree, UMAMI Meats |
| **Agtech** | • Aquaculture<br>• Vertical farming<br>• Climate resilience | €514.7M | 63 | JALA, UMITRON, eFishery, terraviewos, Singrow, delos |
| **Food services** | • Hospitality and retail tech (B2B)<br>• Food delivery (B2C) | €2.1B | 98 | KAMEREO, Pop Meals, Palette, trax, Chope |

In the next section of this report, we will take a deep dive into each of these clusters as well as a number of case studies to analyse what makes SEA such a unique and attractive region.



*Disclaimer: This list is not exhaustive.

# KEY CLUSTERS DEEP DIVE

# ALTERNATIVE PROTEINS

Alternative proteins were developed to provide a complementary solution to cope with the growing meat demand in SEA, given that the current meat sources heavily rely on regional and international imports. The rising cost of energy and fluctuations in the supply of animal feed have resulted in chicken and egg shortages in SEA, significantly impacting countries like Singapore, which imports the majority of its food. Additionally, viral outbreaks in meat and seafood have prompted SEA to invest in achieving protein self-sufficiency. Responsible protein production needs to embrace sustainability and circularity, enhance the feed-to-food conversion ratio, and improve carbon neutrality and food safety to meet consumers' expectations. SEA is actively supporting technological advancements towards the protein transition, and Singapore in particular has established itself as a key enabling hub for precision fermentation and cellular agriculture.

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## THE PLANT-BASED LANDSCAPE

Alternative proteins in SEA have a long-standing tradition and presence, with the populations in the region being early adopters of soy, tempeh, jackfruit, and mung beans as meat and dairy analogues. This has allowed regional plant-based meat brands to thrive, such as **Next Gen Foods—Tindle**, **Shandi Global**, and **Dyna Meat**. The presence of plant-based seafood and egg analogues is also well represented. For example, **Growthwell Foods** launched Happiee, a seafood analogue using konjac to recreate calamari, fish sticks, and patties, while **Float Foods**, an egg analogue company, provides plant-based eggs in all formats, such as sunny-side up, tamago (Japanese omelette), and even poached eggs.

*Float Foods plant-based poached egg*

SEA startups find it beneficial to register their holding company in Singapore to support fundraising efforts in preparation for international expansion. Despite having a small consumer base, Singapore is suitable as a first product launch market to trial products, before expanding to larger regional markets.

Creating localized products is key to thriving in SEA. **Oatside** oat milk leverages supply chains within APAC by sourcing oats from Australia and natural spring water from Bandung, Indonesia, making it an iconic Asian brand. Oatside has expanded into Malaysia, Indonesia, and Hong Kong, providing more affordable and high-quality plant-based milk options. Following this trend closely is **Mad Foods**, APAC's first oat milk coffee beverage. **Green Rebel** and **Meatless Kingdom** from Indonesia recreate meat analogues from indigenous mushrooms, crafting iconic Indonesian dishes like vegan rendang.

**Kevin Ng**
Executive VP @ Float Foods

*"Float Foods' egg analogues target current **egg shortages**. In SEA, Malaysia had to import eggs from India, Australia, Japan, and the US. Countries facing food shortages can charge premium prices, and this trend is expected to keep **growing at 33% YoY**. As animal eggs become more expensive and shortages push prices up, egg analogues will eventually catch up and reach **price parity**."*

FLOAT FOODS

FORWARD FOODING

**More Meat** from Thailand also utilizes indigenous mushrooms high in beta-glucan to create a flexible textured protein that can be shaped and molded into various Thai dish applications. Lastly, **Phuture** from Malaysia has developed an oat protein-based, high-fibre chicken product, targeting health-conscious consumers aiming to reduce their glycemic index in efforts to prevent diabetes and other chronic diseases.


*Greendot franchise in Singapore*

## SALES AND DISTRIBUTION

Singapore boasts both experimental restaurants and vegan franchises. **Love Handle** is the first plant-based butcher in SEA and features multiple plant-based brands, showcasing them in a delicatessen-type format alongside a casual dining concept for newcomers to taste these plant-based dishes. Other vegan franchises include Singapore's largest vegetarian restaurant chain: **Greendot**. There is an increasing demand for food preferences and inclusive dining, with options that are allium-, dairy-, and egg-free. Restaurants are promoting alternative protein, embracing food innovation and food sustainability through local/regional sourcing and food waste management.

**Andrew Yip**
Head For Future Food @ Monde Nissin

*"Companies can utilize **taste innovation centers** to gain sensory insights into their products. However, they should **not overlook the perceptions of the mainstream market**, which can be explored through focus groups, tapping into consumers' memory bank of how food is supposed to taste and what they find tasty."*

Monde Nissin

# ALTERNATIVE PROTEINS
## PLANT-BASED

FORWARD FOODING

### PRODUCTION FACILITIES AND RESEARCH CENTRES

#### Yeo's - Oatly Oat Milk Facility


In October 2021, Asian food and beverage company **Yeo Hiap Seng Limited** (Yeo's) and Swedish plant-based oat brand **Oatly** announced the opening of their joint oat milk facility. It is the first Oatly facility outside of Europe and North America, supporting Oatly's expansion into new and existing markets in Asia - ***More info here***

#### Milo - Nestlé Malaysia


**Milo** is a 70+ year-old malt milk drink that launched a plant-based edition in August 2021 using almond milk. This was powered by the **Nestlé's R&D center** in Singapore, which serves as the regional innovation hub for the development of plant-based dairy alternatives in Asia. The centre collaborates closely with Nestlé's global R&D network of around 300 scientists, engineers, and product developers. In July 2021, **Nestlé Malaysia** opened the first plant-based meal production site in ASEAN, investing €30.6 million. The manufacturing site in Selangor, Malaysia has established infrastructure, trade links, and access to talent and capabilities. As a 6,000 sq m facility and annual production capacity of 8,000 tonnes, the site is equipped with the latest food processing machinery and highly automated packing lines - ***More info here***

#### Thailand's NRF Foods - Nutra Regenerative Protein Company Limited (NRPT)


A joint venture with **NRF Foods** and **PTT Public Company Limited** was established in August of 2022. The Thai plant-based production facility has an estimated production capacity of 3,000 tonnes per year - ***More info here***

# ALTERNATIVE PROTEINS
## PLANT-BASED

### Bühler-Givaudan Plant-based Protein Innovation Centre (PIC)


The PIC is a joint venture between two Swiss companies, **Givaudan,** a global leading company in taste and wellbeing, and **Bühler**. Opened in April 2021, the PIC offers a pilot-scale production of plant-based meat, using Bühler's enhanced texturisation technology with dry and high moisture extrusion (HME). Coupled with Givaudan's expertise in taste, ingredient and product development. The 400 sq m facility provides a product development kitchen, storage facilities, meeting amenities, and a viewing area for live demonstrations - ***More info here***

### SG Protein

SGProtein
*Scalability on demand.*

Founded by Dominique Kull, **SG Protein** is a Singapore-based contract manufacturing platform for plant-based meat and seafood. It serves as an outsourced production partner for companies that choose not to invest in large-scale manufacturing facilities. The facility features HME capabilities and recipe support. SG Protein is Halal and ISO FSSC 22000 certified - ***More info here***

### Cremer Sustainable Foods


This plant-based protein contract manufacturing facility (CDMO) was established in July 2022. It is a joint venture between **Nurasa** and the German food industry leader **CREMER**. The 1,020 sq m CDMO facility provides high moisture extrusion technology (HME) to produce texturised plant-based meat with a production capacity of 1,300 tonnes per year - ***More info here***

### Green Protein Hub


**Monde Nissin** launched a new plant in January 2023, the Green Protein Hub, a Singapore Food Agency and Halal-certified facility. This facility works to incubate, co-develop and co-manufacture innovative hybrid alternative protein products. Apart from shared infrastructure access, the Green Protein Hub serves as Monde Nissin's first R&D and production hub in Asia Pacific for its own alternative protein products - ***More info here***

# ALTERNATIVE PROTEINS
## PLANT-BASED

FORWARD FOODING

### Thai Union's SPACE-F


**Thai Union's Space-F incubator** and accelerator is a collaboration with **Mahidol University** and Thailand's **National Innovation Agency (NIA)**. SPACE-F provides equity-free funding with small grants and opportunities for strategic partnerships. Their verticals of interest include upstream and downstream food technologies, food safety, nutrition, and hospitality technology. Thai companies **More Meat Innotech** and **Let's Plant Meat** are part of the Space-F accelerator - ***More info here***

### Food Innovation and Resource Centre (FIRC) Singapore Polytechnic


**FIRC** provides technical support to food enterprises for all product development related steps. This includes support during food formulation, process development, packaging, shelf life testing, sensory evaluation, and pilot production for market testing. In addition, they aim to improve companies' shop floor productivity via automation and digitalisation - ***More info here***

### DSM-Firmenich Culinary and SmartProteins Innovation Hub


Established in May 2021, the DSM-Firmenich Culinary and SmartProteins Innovation Hub serves as a regional R&D hub for Asia Pacific and a global center of expertise in alternative proteins for meat and dairy analogues for the Swiss Company **DSM-Firmenich** - ***More info here***

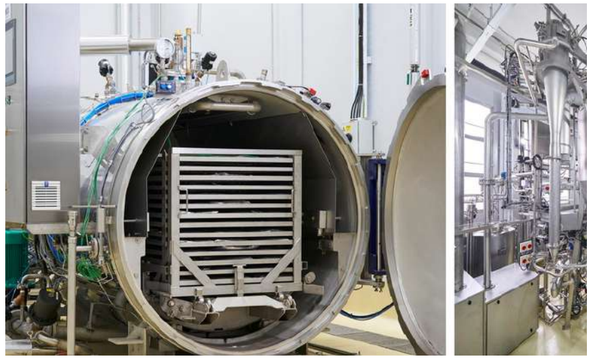
# ALTERNATIVE PROTEINS
## PLANT-BASED

FORWARD FOODING

### Innovate 360

Innovate 360 is Singapore's **first food accelerator** with industrial food manufacturing facilities, shared R&D labs, food-licensed kitchens, co-working offices, warehousing and more. They provide opportunities for **corporate partnerships**, funding and mentorship - ***More info here***

### Food Plant



**FoodPlant** is Singapore's **first shared facility** for **small-batch food production** to support innovation in the food manufacturing industry. Services include small-batch production, R&D consultancy and training courses - ***More info here***

### Growthwell JTC Foodhub - Senoko

In October 2021, **Growthwell** opened Singapore's first fully automated vegan meat and seafood factory, which produces 4,000 metric tonnes of vegan protein annually at the **JTC Food Hub.** - ***More info here***

### Float Foods - Hersing Kitchen Pilot plant

**Float Foods** plant-based egg pilot plant is situated at **Hersing Kitchen**, a **Singapore Food Agency-approved** and Halal-certified food factory - ***More info here***

# ALTERNATIVE PROTEINS
## FERMENTATION

### THE FERMENTATION LANDSCAPE

Fermentation is deeply rooted in Asian culture, dating back to the creation of soy sauce with its rich and deep flavours. This traditional process now serves as a quick solution for developing nutritious protein, either through mycoprotein and mycelium or via genetic modification through precision fermentation (PF). In SEA, startups are reviving traditional fermentation practices and creating unique offerings through waste valorisation. For instance, companies like **Sophie's Bionutrients**, **Algrow**, and **Pullulo** ferment food waste to generate new protein sources.

### MYCELIUM AND MYCOPROTEIN

Tempeh, a traditional fermented food from Indonesia, uses yeast as a microorganism and soy as the substrate. During the fermentation process, a mycelium layer grows around the soybeans, providing added texture, higher protein content, and vitamin B12. In Singapore, tempeh is currently being reinvented as an alternative protein source

*Angie's Tempeh products*

**Angie's Tempeh** is Singapore's leading premium tempeh brand, having perfected a traditional fermentation process while upholding the highest quality standards. Expanding beyond soy, Angie's Tempeh has incorporated chickpea, quinoa, and okara (a by-product of soy milk production) to create tempeh blocks for food service and ready-to-eat analogues, such as nuggets, bak-kwa jerky, and satay. The company was incubated in the commercial kitchen **Incubaker** before scaling up its operations at the **FoodXChange** Factory, a larger production facility in Singapore.

**Angeline Leong**
Co-founder @ Angie's Tempeh

*"In Singapore, there are excellent **incentives and grants** provided by the government to nourish startups in a conducive environment. I met my co-founder in Singapore, and together we commercialised a traditional fermentation technique. Angie's Tempeh is the sole tempeh company in SEA to have **ISO22000 certification**. Singapore boasts a talented pool of individuals, and we were able to source **FoodTech graduates** equipped with the right skills and knowledge of food technology innovation."*

ANGIE'S TEMPEH

FORWARD FOODING

**Angie's Tempeh** has academic partnerships with the **Singapore Institute of Technology (SIT)** to develop food products with an enhanced nutritional profile and faster fermentation turnaround processes. Additionally, the company is utilising the **FIRC** to develop the first shelf-stable and frozen tempeh products for international expansion. In a notable milestone from 2023, Angie's Tempeh achieved another first-of-its-kind innovation, creating ambient temperature tempeh that is ready-to-eat: tempeh rendang (an Indonesian meat stew).

**Quorn**, a UK-based company, was acquired by Filipino MNC **Monde Nissin** for €774.3 million. Quorn produces mycoprotein from the microfungus *Fusarium venenatum* and uses corn as a substrate, resulting in highly nutritious filamentous growth on the microfungus. In January 2023, Monde Nissin launched a new plant called the **Green Protein Hub**. This facility serves as an incubator, where innovative hybrid alternative protein products are co-developed and co-manufactured. Among the ongoing projects is a collaboration between Angie's Tempeh and Monde Nissin to develop gyoza dumplings and truffle oil tempeh bak kwa.


*Quorn products*

**andSO** (pronounced as 'and-so') is a new homegrown Singapore brand of meat-free products from Monde Nissin. It features a unique blend of plant protein and mycoprotein, perfectly suited for SEA and easily incorporated into convenient and familiar Asian cuisines, inspired by local chefs and hawker food stalls.

**Andrew Yip**
Head For Future Food
@ Monde Nissin

*"Quorn has a dedicated team based in Singapore, including a **Future Food kitchen Lab**, and its products are widely available across SEA and globally. Mycoprotein is thought to be widely accepted in SEA due to its familiarity with tempeh. Specialty food distributors have also played a vital role in Quorn's success. In APAC, Quorn was initially distributed by **FoodXervices**, and since then, Monde Nissin has established its own dedicated sales and distribution team."*

Monde Nissin

FORWARD FOODING

## PRECISION FERMENTATION - DAIRY

**Perfect Day**, a US company producing a variety of dairy proteins via precision fermentation technology (PF), has a strong presence in SEA and actively engages with fermentation startups to foster collaboration. In October 2022, they launched their first product in Singapore: an ice cream made from non-animal whey protein. This was followed by **Coolhaus** PF dairy ice cream and **Very Dairy** whole milk and chocolate-flavoured milk in January 2023. These products were distributed by **Classic Fine Foods**, a leading distributor of alternative protein and the first distributor of **Impossible Foods** in SEA. Classic Fine Foods has since expanded its distribution to include **Karana** and **Tindle** products. The '**Classic Fine Foods Taste Lab**' in Singapore serves as a test bed for culinary advancements in alternative proteins.

*Classic Fine Foods Taste Lab*

Another PF company is **Turtletree Labs**, which debuted its first commercial product, a carbonated health drink featuring their trade secret gut logic PF lactoferrin, at the COP27. In Thailand, **Muu** is a PF whey and casein dairy company tailored to SEA consumers. They focus on producing casein through a PF process to develop whole milk, liquid, and solid yoghurt.

**Chanapol Tantakosol**
CEO @ Muu

"*We set up our holding company in Singapore because it is **easier to fundraise and Singapore** has the **best regulatory framework for PF novel foods**. The language barrier in Thailand, Thai laws and regulations make it challenging for international investors, especially when it comes to negotiating and signing term sheets.*

***In Thailand lab scale facilities are abundant and Thai universities are equipped with bench-scale bioreactors and basic 10L fermentation tanks.** Thai startups are able to leverage academic MOU/JV collaborations. However, unlike Singapore, there are no lab or pilot-facility rental options open to the private sector in Thailand, especially for special requirements such as genetically modified (GM) approved facilities.*"

muu

# ALTERNATIVE PROTEINS
## FERMENTATION

**Muu** collaborates with multinational corporations (MNCs) and various regional and international companies in Thailand and South Korea for product formulation and downstream processes, with a focus on confectionery, milk, and cheese. Similarly, **Phyx44 Labs**, an Indian PF dairy company, found it beneficial to establish their holding company in Singapore to access APAC funds. Recently, Phyx44 Labs secured funding from **Better Bites Ventures**.

While Precision Fermentation remains an early-stage technology with limited infrastructure for scale-up, the global landscape is gradually evolving. The emergence of shared and co-manufacturing facilities for PF is paving the way for further development and growth in the industry.


*India's Phyx44 raised €1.1M for animal-free dairy fats and proteins*

**Kelvin Ng**
Chief Scientific Officer
@ Bloom8

*"These are indeed exciting times for the alternative protein industry in SEA and APAC. Many countries, including **Malaysia and Thailand, have established large-scale co-manufacturing facilities for alternative protein**, taking inspiration from pilot-scale production in Singapore. These facilities **integrate both upstream and downstream processes**, enabling unique formulation combinations, such as hybrid products. Similar to electric vehicles, these hybrid models are **driving efficiency and affordability in the market**. The increasing combination of plant-based and fermentation-based ingredients has gained mainstream acceptance in SEA, largely due to the familiarity of umami flavors derived from staples like soy sauce."*

Bloom8

# ALTERNATIVE PROTEINS
## FERMENTATION

FORWARD FOODING

### PRODUCTION FACILITIES AND RESEARCH CENTERS

**Food Tech Innovation Centre (FTIC)- Nurasa - A*STAR - ADM**

Launched in 2023, the **FTIC** is a partnership between ScaleUp Bio (a JV between **Nurasa** and **ADM**) and Singapore's national research agency **A*STAR**, which serves as a pilot and development facility for alternative proteins. The 4,000 sq m facility has pilot-scale HME extruders, fermenters, and high-pressure processing technologies.
As a one-stop shop, FTIC offers long-term lease schemes and fees for operating services, as well as lab spaces (e.g. shared benchtop spaces and private suites) and well-equipped demonstration and test kitchens. FTIC partnered with Givaudan to allow for priority access to the latest flavour solutions at the Taste and Colour Lab at the Givaudan Taste & Wellbeing department **- *More info here***

**Bio Base Asia Pilot Plant (BBAPP) Thailand**


In March 2022, the **Belgian Bio Base Europe Pilot Plant (BBEPP)** and the **Thai National Science and Technology Development Agency (NSTDA)** announced the launch of BBAPP, a multi-purpose biorefinery pilot plant. The Facility is built on "**Biopolis**", a transnational research hub for the biobased industry, situated at the **Eastern Economic Corridor of Innovation (EECi)**, Thailand - ***More info here***

**ScaleUp Bio**


**ScaleUp Bio** is a JV between Nurasa and ADM and features a 10,000 L fermentation capacity. This allows companies to optimise their production process and enable the commercial sale of products through end-to-end testing and licensing, contract development and manufacturing organization (CDMO) services in microbial fermentation from lab to pilot scale - ***More info here***

FORWARD FOODING

## REGULATORY LANDSCAPE

Fermented products are nothing new in SEA and the broader APAC rergion. There are many traditional fermented food items ranging from soy sauce, tempeh, natto to kimchi. For companies seeking to expand into Malaysia and Indonesia, Halal certifications are essential to appeal to mass markets. This is why Halal food regulators such as **JAKIM** (Malaysia's Halal authority) and **MUIS** (Singapore's Halal Authority) are granting certifications to fermentation companies. The critical steps include ingredient tracing, Halal assurance management systems (HAS) and alcohol contamination/traces. Currently, both **Quorn** and **Angie's Tempeh** products are Halal certified. Halal authorities are closely studying novel foods such as PF and cellular agriculture to establish a novel food HAS.

*Impossible Foods's leghemoglobin*

PF has long been used to produce enzymes and vitamins for the food industry for a while now, but the application of PF in alternative protein is recent. Impossible Food's leghemoglobin, derived from PF through GM yeast, was one of the first novel ingredients to be used in the plant-based meat sector.

This novel ingredient was granted regulatory approval in Singapore through the **Singapore Food Agency's Novel Food Regulatory Framework**, which was established in 2019. More recently, the Singapore Food Agency granted approval for **Perfect Day**'s PF dairy proteins, casein, and whey and their commercial applications in ice cream and milk.

Singapore leads the way both globally and regionally on novel food safety guidelines. Since 2019, the Singapore Food Agency has been organising roundtables on novel food regulations during the annual Singapore International Agrifood Week (SIAW) event. These discussions provide a platform for local and overseas regulators and industry players to discuss challenges in the safety assessment of novel food.

**Anton Wibowo**
CEO @ Trendlines Group

*"Within SEA, innovative foods are not in demand, and nutritional foods are of higher priority than sustainability. The **SEA consumer market will ideally mature in the next 3–5 years**, moving into middle-income status. SEA does not need to leapfrog this moment, especially because it has not reached peak meat consumption, and meat demand is on the rise due to aspirational affluence. This may change if there is a major supply chain disruption such as the Covid-19 pandemic."*

trendlines

FORWARD FOODING

## THE CELLULAR AGRICULTURE LANDSCAPE

In SEA, there is a notable focus on cultivated seafood. This emphasis may be driven by factors such as concerns for disease transmission through aquaculture and the high seafood demand in Asia. More seafood is consumed per capita in Asia than anywhere else globally. Asian consumers will account for more than 70% of future growth (Asia Research and Engagement's (ARE) Report).

Moreover, with the growing middle class in SEA, consumers are seeking transparent supply chains and quality assurance when it comes to seafood consumption. While aquaculture can produce a handful of species, cultivated seafood can be applied to both freshwater and saltwater fish, crustaceans, molluscs, and even organs such as fish bladder (fish maw), which is rich in collagen.

In Singapore, there is robust infrastructure for cellular agriculture startups, providing access to shared labs and contract manufacturing services for different stages of development.

*Umami Meats cultivated fish*

## EARLY-STAGE COMPANIES IN SEA

*Life Sciences Incubator Singapore (LSI)*

Biotechnology incubators and accelerators in Singapore offer flexible and affordable rental schemes. These include the **Life Sciences Incubator** (LSI), which has incubated companies like **Fisheroo**, **Wasna,** and **Singcell.** These companies focus on developing bioreagents and biomaterials for cultivated meat and seafood sectors. Other notable mentions include **NSG Biolabs**, **A*STARTCentral Block 79**, **A*STAR Accelerate**, **Temasek Life Sciences, Accelerator,** and **Biofactory**.

Producing cell-based products still comes with a significant cost, but combining cultivated food production with plant or fermentation ingredients is a viable option to lower the final cost. For instance, Japanese startups **Next Meats** and **Dr. Food** are collaborating with Singapore's **ImpacFat** to co-develop hybrid plant-based products with cultivated seafood fats.

*Plant-based pork with ImpacFat sample*

## PROMINENT CELL-BASED STARTUPS IN SEA

As cell-based companies secure funds, they face the need to scale and grow. Prominent cell-based seafood companies in SEA have employed various approaches to achieve this.

**Avant Meats**, a Hong Kong-based company and the first cell-based company in China, expanded to Singapore in September 2021. It formed a partnership with **A*STAR's Bioprocessing Technology Institute** (BTI) to advance the scale-up of Avant's proprietary process, which would enable cost-effective food-grade production of cultivated fish.

**Umami Meats** is a Singaporean company focused on developing proprietary seafood cell lines, such as tuna and eel.

**Mihir Pershad**
CEO @ Umami Meats

*"Asia is a hub for **70% of seafood production** and coming to Singapore was a natural choice to set up **Umami Meats**. In Singapore, you can find supply chain innovation, talent, and capital. Most SEA nations are not first movers when it comes to policies and regulations, making Singapore even more attractive with its robust regulatory framework for novel foods."*

Leveraging shared infrastructure in Singapore, Umami Meats began by renting a single lab bench in **A*STAR Central**. The company was later incubated at the Biofactory and collaborated with **Nanyang Polytechnic** to develop myoblast (muscle) and mesenchymal (precursor) seafood cell lines, leading to licensing and patent filing. Umami Meats and **Cell Agritech**, the first cultivated meat company in Malaysia, recently announced a joint venture project, working towards licensing Umami Meats' cultivated technologies.

*Umami Meats' cultivated eels*

## SCALE-UP MANUFACTURING


*Esco Aster facility in Singapore*

In 2021, **Esco Aster**, a traditional vaccine developer, diversified its services to support cultivated meat, becoming the world's first CDMO to produce cultivated meat for **Good Meat** in Singapore. In March 2023, Esco Aster announced its plans to construct a new 7,400+ sq m production facility to further support cultivated meat production.

Simultaneously, in Malaysia, **Cell Agritech** announced that it was constructing a cultivated meat production facility, which is expected to be complete in Q4 2024. The facility's bioreactors will be powered by solar energy.

FORWARD FOODING

## INTERNATIONAL EXPANSION

There have been numerous recent collaborations in the cellular agriculture space that align with the expansion strategies of well-established international cellular agriculture companies in Southeast Asia.

*Meatable and Love Handle*

**Meatable**, a Dutch cultivated meat company, has teamed up with **Love Handle**, Asia's inaugural plant-based butcher, to establish a partnership in preparation for Meatable's entry into the Singapore market. The collaboration aims to create innovative hybrid products that combine plant-based and cultivated meat components.

This collaboration paves the way for the establishment of the **Future of Meat Center**, **expected to be operational in 2023–2024.** It is set to be a pioneering facility globally, dedicated exclusively to the research and development of hybrid products combining plant-based and cultivated meat elements (Green Queen).

This initiative is in line with the strategies of several well-established cellular agriculture companies, including **Aleph Farms**, **Mosa Meat** and **Meatable**, who have all unveiled their intentions to collaborate, potentially through service agreements, with **Esco Aster** as they plan to enter the Singaporean market.


*Esco Aster signs agreement with Mosa Meat*

FORWARD FOODING

## INCUBATORS AND ACCELERATOR RESEARCH LAB FACILITIES

### Temasek Life Sciences Accelerator (TLA)

TLA leverages multidisciplinary departments of the National University of Singapore (NUS) and is a joint venture between Temasek Life Sciences Laboratory (TLL) and Vertex Holdings (VH). It is Singapore's first agri-bio-sci-tech incubator that aims to incubate, nurture, and grow disruptive life science innovations into early stage companies. The Hatchery, fully developed and supported by TLA, is Singapore's leading incubator dedicated to bringing innovative ideas in the areas of Agri-Food Technology, Industrial and Synthetic Biology, as well as Human and Veterinary Sciences to the market - ***More info here***

### NSG Biolabs

NSG Biolabs is Singapore's primary biomedical research hub. It is the only certified BSL-2 wet-lab and office co-working space that comprises two fully-equipped laboratory and office facilities spread across 2,043 sq m. With an investment arm NSG Ventures, a global biotech venture capital firm and NSG Tomorrow, a sponsorship and grant programme for early-stage biotech companies, the NSG group supports companies and entrepreneurs - ***More info here***

### Life Sciences Incubator (LSI)

LSI is a co-working lab in Singapore's Life Science Hub. It facilitates BioTech, MedTech, and FoodTech companies to develop and grow in an agile, fully-equipped lab, with flexible rental and lab space schemes.
LSI works with the German trade commission leveraging German and European biotechnology equipment and reagents - ***More info here***

## PRODUCTION FACILITIES

### Esco Aster

Esco Aster is a vertically integrated contract research, development, and manufacturing organization (CRDMO) founded and deeply rooted by scientists. The organisation enables fellow scientists to translate their benchwork into life-saving diagnostics, medicines, therapies, cosmeceuticals, and cellular agriculture at affordable prices for the self-sufficiency of the country. Esco Aster, a traditional vaccine developer, diversified its services to support cultivated meat, becoming the world's first CDMO to produce cultivated meat - ***More info here***

### Cell Agritech

Cell Agritech is the first cultivated meat company in Malaysia, focusing on bioprocessing with expertise in good manufacturing practices (GMP); quality management; regulatory affairs; risk management ISO 14971; clean room sterilisation; and aseptic, anti-microbial, and sterile packaging.. Cell Agritech announced that it was constructing a cultivated meat production facility, due to be complete in Q4 2024, that will feature solar-powered bioreactors - ***More info here***

# ALTERNATIVE PROTEINS
## CELLULAR AGRICULTURE

FORWARD FOODING

### A*STAR SUPPORT

The Agency for Science, Technology and Research is a statutory board under the Ministry of Trade and Industry of Singapore. The agency supports R&D that is aligned to areas of competitive advantage and national needs for Singapore.

**A*STAR's Bioprocessing Technology Institute (BTI)**

BTI is a national research institute funded by A*STAR, with core expertise in bioprocess science and engineering. BTI has integrated capabilities to accelerate innovation in biologics, cell and gene therapy, and cultured meat. Integrating upstream and downstream processing, product innovation, cell line and media development, analytical science, and process development and scale-up - ***More info here***

**A*START Central (A*SC) and A*STAR Accelerate (A*ccelerate)**

A*SC is an open innovation platform by A*STAR, an incubator and accelerator of deep-tech startups. A*SC collaborates with researchers, corporates, startups, investors, and entrepreneurs across diverse disciplines, offering shared lab facilities with opportunities for collaboration with A*STAR and for fundraising. - ***More info here***

A*ccelerate is the financing arm of A*STAR, supporting technologies developed in A*STAR through co-investment and venture co-creation initiatives - ***More info here***

**Corning - A*STAR Joint Lab**

Corning, a global-leading innovator in materials science, announced the launch of a lab in collaboration with A*STAR. This facility is dedicated to cell culture technologies and biomanufacturing processes. Established in March 2023, the joint lab will begin its first biomanufacturing exploration, cultivated meat development - ***More info here***

FORWARD FOODING

## REGULATORY LANDSCAPE

Singapore is the first country to approve the commercial sale of cultured meat, granted to **Good Meat** in December 2021. In January 2023, the **Singapore Food Agency** approved the production of serum-free cultured meat. Organisations such as **FIRC** and **Future Ready Food Safety Hub** (FRESH) were instrumental in Good Meat's regulatory approval process and in supporting novel food applications in general.

To further boost the acceptance of cultivated meat in APAC, the **APAC Society for Cellular Agriculture** was established to develop a strategic framework to spur innovation in the sector. More than 35 industry stakeholders, including cultivated food companies in APAC, signed a MOU aligning behind the shared terminology "cultivated" to describe food products grown directly from cells.

Singapore is leading the adoption of novel alternative proteins in SEA by providing rigorous quality assurance and issuing legal certification status coupled with IP protection rights. This ensures confidence for startups with novel technologies, as Singapore is ranked #2 globally and the top in Asia as of 2022 for best IP protection according to the **International Property Rights Index**.

*Singapore is the first country to grant regulatory approval for the commercial sale of cultivated meat*

Overall, thanks to a favourable regulatory landscape and consumer base, key partnerships, initiatives, and infrastructures, alternative proteins startups in SEA are scaling up, with plant-based leading the way, followed by fermentation and cellular agriculture. Companies must prioritise nutrition, convenience, and affordability for mainstream consumer adoption in SEA.

# AGTECH

Agtech solutions are classified as upstream food production systems that aim to improve traditional farming methods through the integration of digitalisation and biotechnology, optimisation and cost-saving efficiencies. In this report, the main focus is on aquaculture, a sustainable solution to commercial fishing and the fastest-growing food production system in the world. Aquaculture requires plenty of water, making SEA ideal because of its coastline, warm weather conditions (ideal for tropical species), and generally affordable labour (which makes up to 20% of operating costs). This report will mainly cover aquaculture-related technologies in SEA, while also covering vertical farming and other relevant innovations relevant to agriculture in SEA.

FORWARD FOODING

## AQUACULTURE IN SOUTHEAST ASIA

Despite being one of the largest producers, **SEA has an aquaculture landscape that is still highly fragmented, with many smallholder farmers and different species** that are farmed. This has implications for the types of investments feasible for farmers/companies and the overall technological advancements or 'industrialisation' of aquaculture in SEA.

The aquaculture industry is valued at **€267.6 billion** globally, outpacing commercially caught seafood. Notably, China stands as the world's foremost aquaculture producer, largely catering to its domestic market. Within SEA, the primary aquaculture players are **Indonesia** and **Vietnam**, followed by Thailand, Malaysia, and the Philippines.

### AQUACULTURE IN SEA - KEY NUMBERS

**€267.6B**
global total aquaculture industry value

**48.3%**
of SEA's total fisheries production in 2019 was contributed by **Indonesia**

**17.7%**
of SEA's total fisheries production in 2019 was contributed by **Vietnam**

**46.77M**
metric tonnes - total fisheries production of SEA region in 2019

**6.08%**
average annually increase in production over the past 15 years.

*Sources: Vantage Market Research - Southeast Asian Fisheries Development Center.*

Aquaculture products in some SEA countries is often cost-prohibitive and primarily oriented towards export markets rather than domestic consumption (Asian Development Outlook 2021 Update: Transforming Agriculture in Asia).

Sustainable aquaculture must consider the environmental impact of activities such as mangrove clearing for new farms, while simultaneously striving to enhance yields and mitigate production losses. These losses necessitate additional resources for generating new feed and energy for water filtration.

In this section we will focus on three main technologies for aquaculture: **sensor based** (Internet of Things), **big data analytics,** and **disease management solutions**.

*Traditional aquaculture setup*

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## IOT + BIG DATA ANALYTICS

Notable mentions include shrimp aquaculture solutions companies**JALA** from Malaysia and **AquaEasy** from Singapore. JALA, incorporated in 2016 and incubated by Singapore's **Hatch Accelerator Program** in 2018, offers a comprehensive end-to-end (E2E) solution to enhance the productivity and efficiency of shrimp farms. Jala achieve this through the utilisation of IoT sensors and AI-driven data analytics for tasks such as water quality management, animal health monitoring, farmer training, financial management, and inventory and data recording.

**Anton Wibowo**
CEO @ Trendlines Group

*"SEA is a diverse archipelago region with variations in culture and politics, which contributes to market complexity.* ***Localised approaches are necessary in SEA****, and technologies must be user-ready with a strong product-market fit. Farmers in SEA have directly transitioned to mobile literacy, skipping desktop technology. As a result, there are significant prospects for* ***IoT services*** *and e-commerce. The utilisation of microfinancing Agtech tools enables access to lenders, optimising farmer productivity and enhancing supply chains from farm to fork."*

trendlines


*AquaEasy IoT and AI sensing system*

In 2022, JALA initiated further expansion within SEA through the **Kick-Off Pilot Program** in Ca Mau, Vietnam, aligning with the Vietnamese government's drive to digitise shrimp farms. This showcases the ease of access across SEA and the extension of technologies into significant aquaculture markets.

**AquaEasy**, a Bosch Company and part of the **Bosch incubator** in Singapore, integrates IoT and AI sensors into shrimp farming. The company offers a digital archive and farm analysis of water quality (achieved via a patented HYDROPURE filtration system and nanobubble technology), feed consumption, and shrimp growth. AquaEasy asserts a 90% efficiency rate and can streamline time and resources for farmers.

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In 2020, **AquaEasy** and **Qian Hu** formed a strategic partnership to validate their technologies through a pilot-scale fish farm in Choa Chu Kang, Singapore. **Qian Hu Fish Farm Trading** serves as an integrated “one-stop” service provider encompassing farming, importing, exporting, and distributing ornamental fish. Based in Singapore, Qian Hu exports to Singapore, Malaysia, Thailand, and Indonesia.

**UMITRON**, a Singapore- and Japan-based company, employs IoT sensors in conjunction with AI analytics for the real-time monitoring of fish health using their proprietary smart fish body measurement tool called Umitron Lens. This technology also tracks feed consumption and employs satellite remote sensing to analyse fish school behaviour and oceanic data. Notably, their solution has the potential to reduce feed waste by up to 70%.

*Umitron sensing technology for fish size estimation*

*"SEA is ideal for the aquaculture industry as there is everything, from the family pond to **multi-billion dollar companies**. Singapore is a strategic location, well connected in Asia, and even **supports expansion grants** into Brunei and other neighbouring countries. "*

**Chris Amhoff**
Business Development @ Umitron

UMITRON

In 2019, Umitron initiated a collaborative project with **Charoen Pokphand Foods** (CPF) in Thailand, the largest enterprise in the shrimp industry. The goal of the project was to establish a sustainable and forward-looking model for shrimp aquaculture, transitioning a significant portion of shrimp production to indoor facilities. This initiative directly contributes to the well-being of Thai farmers by enhancing growth efficiency and substantially reducing feed waste.

## MICROFINANCE FOR SMALLHOLDER FARMERS

Indonesian company **eFishery** has raised €231 million, which includes the latest Series D round in May 2023 (not included in the analytics). This stands as the largest funding round for a SEA aquaculture company. The financing round was led by the UAE-based **G42 Global Expansion Fund (42XFund)**, in partnership with the Artificial Intelligence AI firm **G42** and the **Abu Dhabi Growth Fund**.

Launched in 2013, **eFishery** caters to 100,000 farmers and sells up to 12,000 tonnes of fish per month. It exports to premium markets such as China, Japan, South Korea, and the Gulf Cooperation Council (GCC). eFishery initially developed auto feeders for shrimp farms in order to educate and convince farmers to use their technology for free.


*eFishery autofeeders for shrimp farms*

Over time, they amassed data from nearly a million small- and large-scale shrimp farms and leveraged big data analytics. This led to the creation of a bank for shrimp farmers, providing credit scores to assess risks accurately. This innovation is crucial given that aquaculture is perceived as one of the riskiest sectors for insurance providers. eFishery diversified its business model to support upstream processes, downstream channels, and distribution.

Following a similar approach and extending beyond aquaculture, **JIVA**, a spin-off from **Olam**, a global agribusiness, is aligned with Olam's global commitment to supporting smallholder farmers' livelihoods. In 2020 at the height of the Covid-19 pandemic, Olam and the **Asian Development Bank (ADB)** established an €86.6 million loan agreement to support thousands of smallholder farmers in Vietnam, Indonesia, and Papua New Guinea. This initiative aimed to mitigate the impact of supply chain disruptions on their operations.


*JIVA app*

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## DISEASE MANAGEMENT SOLUTIONS

Similar to terrestrial livestock, marine aquaculture is susceptible to disease outbreaks. In the case of shrimp, the white spot syndrome virus (WSSV) can decimate farmed aquatic life, resulting in major losses amounting to €5.5 billion per year. This situation has prompted the emergence of biotech solutions aimed at **improving marine animal health.**

**TeOra**, a Singaporean company with operations in India and Indonesia, has developed innovative oral vaccinations and disease management solutions. Unlike injectable vaccine solutions, which are expensive and have to be administered manually, often requiring anesthesia and causing stress to marine animals, TeOra's oral vaccines provide a more convenient and less stressful alternative. These oral vaccines have undergone verification by external parties in controlled environments, using shrimp, Asian seabass, and salmon as test subjects. Notably, when challenged with WSSV, the shrimp exhibited a survival rate of 78%, underscoring the efficacy of TeOra's oral vaccines for crustaceans like shrimp.

*An example of a shrimp affected by WSSV*

TeOra has benefitted from the advanced ecosystem in Singapore, collaborating with **Republic Polytechnic's Sustainable Aquaculture Technology Centre (SATC)** and **Temasek Polytechnic's Aquaculture Innovation Centre (AIC)**. SATC is focused on applied research and development in genetics, disease, health management, and feed and fish nutrition; while AIC supports the aquaculture industry by enhancing farming productivity through integrated aquaculture systems, energy and space optimisation.

**Rishita Changede**
CEO and Founder @ TeOra

*"Singapore is a regional hub in SEA and serves as a good place to connect with the **major aquaculture players** Indonesia and Vietnam. Disease management tools differ from IoT-based solutions as they can support the aquaculture industry **without increasing other inputs**. On average, TeOra's oral vaccine should only reduce the farmer's profit margin by 3% (from ~50% to ~47%) vs the ~20%+ risk of losing all its production."*

TeOra unlocking nature's

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To ensure the safety and efficacy of TeOra's oral vaccines, they are conducting clinical trials on shrimp and sea bass via third-party double-blind trials in Vietnam with a variety of large and small scale aquaculture farms. TeOra was incubated at A*STAR with shared infrastructure for lab scale production and joined the **Space-F's accelerator** program. TeOra won a €687,100 cash prize at the 6th edition of the **Temasek Liveability Challenge (TLC)**, a global search for solutions to the world's toughest sustainability challenges of urban cities, presented by the **Temasek Foundation** and organised by **Eco-Business** in partnership with **Ecosperity week.**

**Chris Aurand**
Open Innovation Leader
@ Thai Union

*"Thai Union processes a **third of shrimp produced in Thailand**, mainly for international export. Both domestic and international startups can receive support from Thai Union's SPACE-F program to **test and pilot their technologies**, furthering the development of the local food ecosystem. There is also a strong chance for incubated companies to receive funding from Thai Union's CVC arm."*

Thai Union


*Thai Union Space-F Accelerator program*

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## INCUBATORS, ACCELERATORS AND RESEARCH FACILITIES

### Hatch

HATCH

Hatch is a global catalyst for a climate-smart, truly sustainable and just (sea)food transition. Hatch specialises in the aquacuture industry and has offices in the US that provide incubator, venture studio, and accelerator programs - ***More info here***

### Grow Platform -Bosch Incubator

grow platform
A Bosch Company

Grow Platform is a fully owned subsidiary of the Bosch Group, financing and scaling business model innovations originating from internal divisions and entities, with a broad scope of digitilisation and deep technology - ***More info here***

### Aquaculture Station by Adisseo (ASA)

ADISSEO
A Bluestar Company

Adisseo Asia Pacific, the world's leading experts in feed additives, launched the ASA, an R&D facility situated on St. John's island in Singapore, supporting aquaculture through partnerships with academia in the APAC region. ASA is part of the Singapore Food Agency and the Marine Aquaculture Centre (MAC), focused on enhancing expertise in tropical aquaculture. MAC has shared facilities such as a seawater intake pump house system and designated incubator spaces - ***More info here***

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## RESEARCH AND INNOVATION FACILITIES

### Temasek Life Sciences Accelerator (TLA)

TLA is a joint venture between Temasek Life Sciences Laboratory (TLL) and Vertex Holdings (VH). TLA supports the broader agtech sector with a focus on urban agriculture and aquaculture. It is Singapore's first agri-bio-sci-tech incubator that aims to incubate, nurture, and grow disruptive life science innovations into early-stage companies. The Hatchery, fully developed and supported by TLA, is Singapore's leading incubator dedicated to bringing innovative ideas in the areas of Agri-Food Technology, Industrial and Synthetic Biology, as well as Human and Veterinary Sciences to the market - ***More info here***

### Republic Polytechnic's Sustainable Aquaculture Technology Centre (SATC)

Republic Polytechnic's SATC focuses on applied research and development in genetics, disease, health management, and feed and fish nutrition. The Centre is committed to developing technologies for aquaculture and supporting the farming sector in enhancing local food production. With a focus on applied science, genetics and breeding, disease and health management, fish feed, engineering, and infocomm technologies, SATC supports the aquaculture industry through high-quality and extensive research projects - ***More info here***

### Aquaculture Innovation Centre (AIC)

AIC, a part of Temasek Polytechnic focuses on water, waste valorisation, digitilisation, safety, quality assurance, and life cycle assessment solutions. It supports SMEs in the aquaculture industry with the aim of enhancing farming productivity. AIC collaborates with institutes of higher learning, agencies, and research institutes - ***More info here***

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## COMMERCIALISATION CHALLENGES

Farmer adoption is a significant concern in SEA. Companies need to convince farmers that their technology will improve yields without affecting profit margins. ASEAN strategies of enhanced digitalisation in agriculture could support small holder aquaculture farmers to educate and implement new technology solutions.

**Rishita Changede**
CEO @ TeOra

*"Most farmers and countries want to increase their production and use fewer antibiotics, but losses can be detrimental to the industry and climate. It is unclear who will **lead the standards in SEA**, but from a farmer's perspective, the solutions will be a result of **cross-border collaboration**."*

TeOra

## REGULATORY LANDSCAPE

Certified sustainable practices in aquaculture and fishmeal and fish oil quality, are all defined by several bodies, including the **Institution of Aquaculture Singapore (IAS)** and **Friend of the Sea (FOS)** - World Sustainability Organisation.

The IAS innovation centre partners with academic institutions like **Temasek Polyechnic's AIC** and investors such as **Hatch** to ensure best practices in aquaculture are up to date and adhered to during academic training and startup incubation. Aquaculture standards are not uniform across SEA. The Standard on **ASEAN Good Aquaculture Practices** for Food Fish and the Singapore Food Agency's launch of the Aquatic Animal Health Services (AAHS) that help farms diagnose, prevent and control diseases are efforts to provide standardisation in the field.

Consumers are concerned about traceability, supply chain data, or the violation of labor rights (Food Navigator), and gaps remain in government regulations for aquaculture. Internationally, there is a need to standardise farms to be compliant with the **Aquaculture Stewardship Council (ASC)** standards, the Global Gap, or other certifications required for international advanced aquaculture markets, with transparency in supply chains and traceability.

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*The Aquaculture Stewardship Council certification*

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## URBAN AGRICULTURE IN SEA

Vertical farming is a solution for urban agriculture in populous cities with poor access to fresh produce. Technologies within vertical farming include sophisticated LED lighting, hydroponic or aquaponic irrigation systems and IoT sensors, and big data analytics to optimise the production process and scale.

Countries like Singapore are an ideal candidate for vertical farming, with limited land for agriculture (<1%). Current technologies have shown success with developing leafy greens, tomatoes, and strawberries.

For example, **Growy** a Dutch company, announced the launch of a vertical mega farm that can produce up to 500 tonnes of leafy greens in Singapore. Situated in the Changi Logistics Centre with a 8,000 sq m capacity, the facility is partially funded by the Singapore Food Agency's 30x30 Express grant, with academic partnership from Republic Polytechnic's (RP) Agriculture Research and Innovation Centre. **Invertigro**, an Australian company incubated by the Singapore Food Bowl and powered by the Grow Accelerator, is backed by Enterprise Singapore and Dole Packaged Foods. Invertigro provides hardware and software solutions to support different configurations of indoor vertical farming systems. **Just Produce**, founded in 2020, is a vertical farm that produces leafy greens, accounting for 1% of daily vegetables grown in Singapore.

## GENE EDITING - RESILIENT CROPS

In April 2023, **Singrow** from Singapore, announced its partnerships with franchise farms in Malaysia and Thailand, **TreeGrow** Sdn Bhd, and **PREINO** Co. Ltd.

Focusing on cultivars suitable for the SEA climate, Singrow is the world's first genomic and precision agriculture transformation platform, utilising gene editing tools such as CRISPR-Cas9 to develop proprietary crop varieties that are fast growing and energy efficient and have optimum taste profiles.

*Growy's mega farm to produce up to 500 tonnes of leafy greens in Singapore*

In Malaysia, **Kairos Agriculture**, an indoor vanilla farm in Penang increased yields by 42% in comparison to traditional farming methods. The company achieved this through a controlled environment and proprietary vermicompost (upcycled plant waste digested by worms and converted into nutrients). An academic partnership with **University Science Malaysia** used data analytics to provide optimised protocols and further enhance yields.

In June 2022, **Sunway XFarms** in Malaysia announced the largest indoor vertical farm in Kuala Lumpur. Spanning three floors and a total area of 3,437 sq m. XFarms aims to produce 13,000 kg of fresh vegetables per month. The facility is equipped with state-of-the-art IoT sensors and cameras to provide real-time data analytics for farm managers. XFarms is partnering with Sunway's various business divisions, including various HoReCa and food service channels.


*Singapore's first hybrid tomato greenhouse by Pure Harvest*

**Jolene Lum**
Head of business development
@ Nurasa

*"Commercial distribution for urban agriculture products is scarce, with **limited infrastructure available for retail**. Premium urban agriculture produce has to compete with Grade B produce at lower costs. SEA countries, excluding Singapore, have fast access to fresh produce through robust supply chains, eliminating the need for fresh premium hydroponic products. **Higher value products like water-intensive crops** such as avocados should be prioritised to balance out expensive production costs."*

NURASA

## HIGH TECH GREENHOUSES

Singapore benefits from technology transfer from companies in Europe, the US, and the UAE. **Pure Harvest Smart Farms** is developing Singapore's first hybrid tomato greenhouse with the Singapore Food Agency. This project demonstrates the commonalities of arid landscapes in the Arabian Gulf and the scarcity of agricultural land in Singapore.

Technology transfer requires advanced engineering and novel agricultural skills to address lowering energy costs, training manpower, and the development of seed cultivars adapted for the SEA climate.

## CLIMATE AND DEFORESTATION

Challenges for agricultural productivity in SEA are multifaceted. The Asia-Pacific (APAC) region witnesses a greater number of weather-related disasters with increased frequency and severity (EM-DAT 2020 International disasters database). Deforestation in SEA is a great concern as **the region is home to 15% of the world's tropical forests but experienced a deforestation rate of 80 million hectares of forest between 2005 and 2015** (Nature)**, 73 % of which was commodity-driven** (European Parliament). The clearing of land for agriculture or mangrove clearing for aquaculture leads to a lack of biodiversity and disruptive carbon sink.

## CARBON-NEUTRAL RICE

One of the core staple food products in SEA is rice, **providing 50% of the calorie intake for its population.** Vietnam and Thailand are among the top 3 rice-exporting countries, producing 30% of the world's rice (IRRI).

Rice cultivation accounts for 15% of the global methane emissions (WWF). Methane is formed by the naturally occurring anaerobic metabolism of organic matter by bacteria in flooded rice paddy fields.
In February 2022, **Wavemaker Impact**, **Breakthrough Energy Ventures**, **GenZero**, and **Temasek** announced the intention to form a new rice AgriTech venture to decarbonise rice cultivation. This is a venture-building collaborative effort to develop and commercialise technologies for sustainable carbon-neutral rice cultivation and production.

## SUSTAINABLE AQUACULTURE

Umitron is promoting the consumer adoption of aquaculture products. Consumers can scan a QR code to view the production footprint and traceability of farms using Umitron technology, supporting stronger quality assurance measures and care. Championing climate efforts, **ENEOS**, a Japanese oil, mining, and metals company, formed a strategic partnership with Umitron to collect data on **carbon sequestration by sea grass**.

*Rice accounts for 50% of the calorie intake of the whole SEA population*

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## PERMACULTURE

Permaculture is a farming method that integrates the sustainable use of land, resources, labour, and the environment through mutually beneficial synergies and the adoption of waste valorisation (FAO).

The TLC's (Temasek Liveability Challenge) 6th edition grand prize was doubled to €1.4 million to include prizes for two categories: 1) Food and Nutrition and 2) Climate, with notable funding going to **Seaforestation,** a Philippines–US company developing deep-sea marine permaculture to accelerate the regeneration of seaweed forests, which removes atmospheric carbon and acts as feedstock for bioplastics. Seaforestation received a total investment of €274,838 from **Planet Rise**, **Rumah Group**, and **Quest Ventures**.

*Hydroneo aerators to enhance water quality*

## SOLAR AND HYDRAULIC ENERGY SOLUTIONS

Energy-intensive agriculture processes, such as water filtration, can be greatly affected by fluctuations in energy prices. This affects agtech industries like aquaculture and vertical farming.

There are solutions in SEA that develop renewable energy solutions for the aquaculture industry. **Hydroneo**, a German company, uses solar cells to run aerators to enhance water quality. **Hydroneo** was accelerated in SPACE-F, Thai Union's accelerator in Thailand. Similar initiatives have been taken by vertical farming companies to adopt the use of renewable energy.

**Sky Greens** in Singapore is a low-carbon hydraulic-driven urban vertical farm. It leverages a water-pulley system using trapped rainwater to rotate the plants and access direct sunlight.

Investors are becoming increasingly attracted to agritech solutions with climate action benefits. Climate tech investors incorporate ESG metrics, carbon sequestration, renewable energy, and water conservation approaches to their investment thesis.

# FOOD SERVICES

Food and hospitality serve a thriving ecosystem in SEA, supported by a vibrant year-round tourism sector. This sector attracts tourists to savor the warm and tropical weather and diverse culinary cuisines of Thailand, Malaysia, Indonesia, Vietnam, and Singapore. The vibrant, fast-paced business environment in major cities like Bangkok, Kuala Lumpur, and Manila is well positioned to develop fully integrated digitized platforms, serving customers and retailers and enhancing logistics.

The technologies deployed in the hospitality and retail industries of SEA are varied. These include B2B marketplaces for food (digital platforms for buying and selling food for the hospitality sector), restaurant and shop finder, and booking and ordering platforms. Additionally, restaurant operation management tools like point-of-sale systems are employed to ensure quality assurance measures.

**AI Palette** in Singapore uses AI to understand consumer needs and drive trends. AI Palette partnered with Brandscapes Worldwide in 2021 to advance AI and machine learning algorithms to measure the maturity of trends and predict their future trajectory for multinational companies such as **Nestlé**, **Dole**, and **Cargill**. In 2022, AI Palette partnered with **Olam Food Ingredients** (OFI), a subsidiary of Olam International, to predict consumer trends for 2023 and beyond.

*AI Palette's platform to understand consumers needs*

**Kamereo** is the first B2B food supplier SAAS platform in Vietnam, providing a simple and affordable service for HoReCa to get their daily supplies and reduce operational costs. In 2021, they were backed by **Thailand's CPF Group**, forming a partnership that combines food production and B2B FandB expertise to further enhance quality assurance across the supply chain servicing Vietnam, one of the largest food production hubs in SEA.

**Kelvin Ng**
Chief Scientific Officer @ Bloom8

*"There is an **over-allocation** of funding to companies in food delivery. This is because of the **quick return time** and **lower CAPEX** required. Food production and food manufacturing capacity are expected to increase as a result of food demand and food supply deficit."*

Bloom8

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**B2C Food delivery services** are widespread across SEA and received approximately 50% of AgriFoodTech funding in the region both for 2022 alone and since 2013 (even when excluding the two outliers Grab and Gojek). The dominance of food delivery when it comes to funding in the region could be due to several factors, from investors prioritising consumer adoption rather than investing in innovative or disruptive technologies, to the lack of specialized AgriFoodTech investors in SEA. Indeed, when sector-agnostic investment firms look for quick returns and technology solutions that can reach many users as quickly as possible, Agtech solutions are not able to increase productivity multifold over a short period of time. Moreover, supporting these technologies requires a long-term trajectory on food security and efficiency (10–20 years).

**Francois Vervial**
Co-founder @ AquaEasy

*"Platform businesses have been the most attractive so far. However, in the long term, platforms for Grab and Gojek may **not have the best profitability**. Food delivery should not be classified as agrifood because it handles logistics for food delivery. **Agtech is the actual production of food**, but if you have no food to deliver, then there is no point. Convinced investors need to manage expectations to see the long-term gains in agriculture. Food demand and consumption are driving AgriFoodTech growth, and we need more strategic investors to shape the rhetoric."*

AquaEasy
A Bosch Company

Diversification of food delivery has added value in SEA and many parts of the world as it generated new opportunities and jobs for people during the Covid-19 pandemic. With growing populations and digitalisation, hospitality, and retail tech will continue to grow. Lessons can be learned from mature companies such as Grab and Gojek for newcomers to this space.

Singapore's **Grab** is Southeast Asia's biggest startup company, offering multiple services for transportation, food delivery, and digital payments. Launched in 2013, Grab is present across SEA in Singapore, Malaysia, Cambodia, Indonesia, Myanmar, the Philippines, Thailand, and Vietnam. It services over 30 million users and 4 million merchants. In 2021, Grab acquired a majority stake in the grocery chain **Jaya Grocer** in Malaysia. Jaya Grocer is a leading mass-premium supermarket chain in Malaysia. This partnership is expected to accelerate the growth of GrabMart (supermarket purchase and delivery services) and GrabPay (digital payment service through the Grab app) rolled out as payment options in all Jaya Grocer outlets.

**Gojek** is Indonesia's first unicorn company, launching its SAAS (software-as-a-service) platform app in 2015 with three services: 1) sharing (GoRide), 2) delivery (GoSend), and 3) shopping (GoMart). Today it is a super-app with over 20 services connecting its users to 2 million drivers and 500,000 merchants. The use of motorcycle services, the fastest mode of transportation in Indonesian urban and rural regions, and their merger with another Indonesian unicorn E-commerce company **Tokopedia,** made **GoTo** the most visited e-commerce site in Indonesia. Today Gojek is operating all across SEA, including Indonesia, Vietnam, Singapore, Thailand, and the Philippines. Gojek formed a strategic partnership with **Unilever** to connect micro and small and medium enterprises to leading consumer products goods.

# KEY TAKEAWAYS, CHALLENGES AND OPPORTUNITIES

# KEY TAKEAWAYS

SEA has a thriving AgriFoodTech ecosystem:

- **In SEA, Thailand and Malaysia are embracing innovation, while Singapore is leading in incubating innovation, E2E testing, and the adoption of AgriFood technologies**. Singapore provides E2E services from lab to pilot and scale-up manufacturing to advanced sales and distribution, coupled with a robust regulatory approval process. This helps validate and de-risk the implementation of new technologies in Thailand and Malaysia.

- **Singapore is the ideal hub in SEA for regional and international companies to fundraise and seek lab-pilot scale assistance through shared infrastructure and innovation hubs developed by the corporate, government, and private sectors.** MNCs actively support AgriFoodTech innovation through strategic partnerships and co-investment opportunities to further scale and adapt technology to existing infrastructure.

- **SEA, excluding Singapore, has a favourable environment for scale-up manufacturing with lower CAPEX and OPEX and larger consumer markets**. More than 50% of people in ASEAN live in urban areas, and an additional 70 million people are estimated to live in ASEAN cities by 2025. This, combined with a growing and more influential middle class, contributes to building a growing market for food innovations for the next 10 to 20 years.

- **Technologies need to be adaptable to existing infrastructure and relevant for smallholder farmers to scale up in SEA**. Farmer education is key to ensuring the awareness of any additional costs and their impact on profit margins. This must be coupled with a customisation approach.

*Urban environment in SEA*

# SEA FOOD SYSTEM CHALLENGES

- **Singapore** is a small country with limited agricultural resources. However, with a clear strategy for AgriFoodTech innovation and being a thriving financial, commercial, and education hub, Singapore has become a leader in the adoption of novel food technologies, paving the way for more significant agricultural production hubs in SEA to follow.

- **Thailand, Malaysia, Indonesia, the Philippines, and Vietnam are rapidly adopting AgriFoodTech innovations.** Favourable conditions include available land for large-scale manufacturing hubs to be developed, coupled with high worker productivity and lower labour costs compared to Singapore, Europe, and the US. This will allow for the mass manufacturing of novel food technologies and help to reduce the overall cost and improve price parity and affordability for mainstream SEA consumers. Nonetheless, there is more that can be done with regard to labour rights, digital literacy, and expertise in novel AgriFood technologies.

- **Countries such as Laos and Myanmar need support to further digitalise AgriFoodTech and improve productivity.** Microfinance solutions may prove to be ideal solutions to improve farmer livelihoods and close the gap between labourers in SEA.

- **Climate action and sustainable agriculture solutions for SEA will be more relevant** as climate-related disasters become more prevalent, and traceability and quality assurance standards are implemented on both the regional and global scale.

*Laboratory setting in SEA*

# OPPORTUNITIES

- **Funding** - To enhance VC investment in all AgriFoodTech verticals, especially in industries with high CAPEX, substantial interest from corporate and government sectors is needed to share or develop new infrastructure for novel agrifood technologies via joint venture partnerships. AgriFoodTech investments in SEA are lower compared to in the EU and US. SEA investors may not be fully ready to invest in new technologies like alternative proteins until there is greater consumer acceptance and affordability, and patient capital of 10–20 years may be required for a return on investment.

- **Incubation** - Institutes of higher learning (IHLs) are crucial for innovative deal flow by supporting the commercialisation of academic research. Countries need a combination of academic schemes to encourage IP transfer. Smooth graduation of startups to private incubation hubs with capital assistance is necessary for continuity and to ensure investors have healthy access to deal flow.

- **Operational Flexibility** - Startups need access to shared infrastructure for manufacturing (CDMOs) and R&D. Partnerships or affordable leasing schemes are necessary to outsource these operational costs and keep CAPEX low. This flexibility allows startups to better manage their tight budgets, allocating funding to more tangible assets such as IP and addressing essential company needs like team hiring, sales, and marketing.

- **Technology Transfer** - Government and corporate entities in SEA can learn from Singapore's agrifood pilot scale traction and progress and use the data to directly develop and plan for scale-up manufacturing infrastructure. However, this information needs to be regularly revised and aligned with individual country strategies to strengthen specific food sectors.


*Fermentators*

# AGRIFOODTECH ECOSYSTEM LANDSCAPE

# AGRIFOODTECH ECOSYSTEM LANDSCAPE

## STARTUPS-ALTERNATIVE PROTEINS

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growthwell

Growthwell Foods develops plant-based brands, specifically chicken, using chickpeas.

**Activity:** Next-Gen Food and Drinks
**Domain:** Plant-based
**Founded:** 2019
**Country:** Singapore
**Total funding:** €26.0M
**Website**: growthwellfoods.com

FLOAT FOODS

Float Foods has developed "OnlyEg" a plant-based substitute for chicken eggs.

**Activity:** Next-Gen Food and Drinks
**Domain:** Plant-based
**Founded:** 2020
**Country:** Singapore
**Total funding:** €1.4M
**Website**: floatfoods.com

OATSIDE

Oatside is a food and beverage services company that offers oat milk products.

**Activity:** Next-Gen Food and Drinks
**Domain:** Plant-based
**Founded:** 2020
**Country:** Singapore
**Total funding:** €25.9M
**Website**: oatside.com

SHANDI

Shandi is developing a plant-based meats using its meat extrusion patented technology.

**Activity:** Next-Gen Food and Drinks
**Domain:** Plant-based
**Founded:** 2018
**Country:** Singapore
**Total funding:** €590K
**Website**: shandiglobal.com

nextgen

Next-Gen Foods creates tasty plant-based foods (chicken).

**Activity:** Next-Gen Food and Drinks
**Domain:** Plant-based
**Founded:** 2020
**Country:** Singapore
**Total funding:** €140.8M
**Website**: nextgen.com

GREEN REBEL

Green Rebel makes whole-cut plant-based beef, and chicken from plants.

**Activity:** Next-Gen Food and Drinks
**Domain:** Plant-based
**Founded:** 2020
**Country:** Indonesia
**Total funding:** €6.30M
**Website**: greenrebel.com

WhatIF Foods™

WhatIF Foods offers an authentic, nutritious basket of regenerative foods (noodles, milk, etc.).

**Activity:** Next-Gen Food and Drinks
**Domain:** Plant-based
**Founded:** 2020
**Country:** Singapore
**Total funding:** Undisclosed
**Website**: whatiffoods.com

KARANA™

KARANA is leading a new category of meat made from jackfruit.

**Activity:** Next-Gen Food and Drinks
**Domain:** Plant based
**Founded:** 2018
**Country:** Singapore
**Total funding:** €1.5M
**Website**: eatkarana.com

# AGRIFOODTECH ECOSYSTEM LANDSCAPE

## STARTUPS-ALTERNATIVE PROTEINS

FOODTECH DATA NAVIGATOR
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### TurtleTree

TurtleTree develops sustainable and affordable milk ingredients using precision fermentation.

**Activity:** Next-Gen Food and Drinks
**Domain:** Protein fermentation
**Founded:** 2019
**Country:** Singapore
**Total funding:** €33.9M
**Website**: turtletree.com

### Quorn

Quorn develops meat alternative/frozen food products using mycoprotein.

**Activity:** Next-Gen Food and Drinks
**Domain:** Protein Fermentation
**Founded:** 1985
**Country:** United Kingdom (Philippine-owned)
**Total funding:** Undisclosed
**Website**: quorn.com

### Muu

Muu develops animal-free dairy products using protein fermentation.

**Activity:** Next-Gen Food and Drinks
**Domain:** Protein Fermentation
**Founded:** 2015
**Country:** Thailand
**Total funding:** Undisclosed
**Website**: muu.com

### Phyx44

Phyx44 Labs creates an alternative to milk using recombinant proteins and microbes.

**Activity:** Next-Gen Food and Drinks
**Domain:** Protein fermentation
**Founded:** 2021
**Country:** India and Singapore
**Total funding:** €1.3M
**Website**: phyx44.com

### Umami Meats

Umami Meats develops cultured fish that offers the same nutritional value as traditional seafood.

**Activity:** Next-Gen Food and Drinks
**Domain:** Cellular agriculture
**Founded:** 2020
**Country:** Singapore
**Total funding:** €2.4M
**Website**: umamimeats.com

### CellMEAT

CellMEAT is a food technology that produces protein via cellular agriculture technology and with its own FBS-free cell culture medium.

**Activity:** Next-Gen Food and Drinks
**Domain:** Cellular agriculture
**Founded:** 2019
**Country:** South Korea
**Total funding:** €11.2M
**Website**: cellmeat.com

### Impacfat

Impacfat develops a cell-based fish fat that is nutrition-customisable.

**Activity:** Next-Gen Food and Drinks
**Domain:** Cellular agriculture
**Founded:** 2021
**Country:** Singapore
**Total funding:** €195.5K
**Website**: impacfat.com

### Shiok Meats

Shiok Meats produces crustaceans (like shrimp, crabs, lobsters) and meat using cellular agriculture.

**Activity:** Next-Gen Food and Drinks
**Domain:** Cellular agriculture
**Founded:** 2018
**Country:** Singapore
**Total funding:** €25.9M
**Website**: shiokmeats.com

# AGRIFOODTECH ECOSYSTEM LANDSCAPE

## STARTUPS-AGTECH

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### Tepbac

Tepbac is a platform that aims to make aquaculture farming easier and more transparent.

**Activity:** Agtech
**Domain:** Insects farming and Aquaculture
**Founded:** 2012
**Country:** Vietnam
**Total funding:** €2.2M
**Website**: tepbac.com

### aerodyne

Aerodyne Group is a DT3 drone-based enterprise solutions provider.

**Activity:** Agtech
**Domain:** Farm management and Precision farming
**Founded:** 2014
**Country:** Malaysia
**Total funding:** €57.4M
**Website**: aeordyne.com

### Entobel

Entobel converts low value organic substrate into high-quality products using insects.

**Activity:** Surplus and Waste management
**Domain:** Upcycled ingredients, Food surplus and Waste efficiency
**Founded:** 2013
**Country:** Vietnam
**Total funding:** €31.1M
**Website**: entobel.com

### Nutri-Tec

Nutrition Technologies manufactures animal feed ingredients using Black Soldier Fly Larvae (BSFL).

**Activity:** Surplus and Waste management
**Domain:** Upcycled ingredients, Food surplus and Waste efficiency
**Founded:** 2015
**Country:** Singapore
**Total funding:** €21.5M
**Website**: nutritec.com

### terraviewos

Terraview develops climate SaaS OS for the wine industry.

**Activity:** Agtech
**Domain:** Farm management and Precision farming
**Founded:** 2019
**Country:** Singapore
**Total funding:** €4.3M
**Website**: terraview.co

### VERTICAL OCEANS

Vertical Oceans is a company producing sustainable aquaculture-based protein in urban aqua towers.

**Activity:** Agtech
**Domain:** Insects farming and Aquaculture
**Founded:** 2020
**Country:** Singapore
**Total funding:** €3.0M
**Website**: verticaloceans.com

### PLANT CARTRIDGE

Plant Cartridge is a full-stack agrotech platform.

**Activity:** Agtech
**Domain:** Vertical and Indoor farming
**Founded:** 2016
**Country:** Malaysia
**Total funding:** €2.7M
**Website**: plantcartridge.com

### Flylab

Flylab harnesses the bioconversion power of the Black Soldier Fly to produce food for animals and plants, sustainably.

**Activity:** Agtech
**Domain:** Insects farming and Aquaculture
**Founded:** 2021
**Country:** Thailand
**Total funding:** Undisclosed
**Website**: flylabfeed.com

# AGRIFOODTECH ECOSYSTEM LANDSCAPE

## STARTUPS-AGTECH

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TeOra uses biological processes to produce compounds and peptides for the aquaculture industry.

**Activity:** Biotech/Synthetisation
**Domain:** Food processing
**Founded:** 2020
**Country:** Singapore
**Total funding:** Undisclosed
**Website**: teoralife.com

JALA offers a data-driven management system for the shrimp industry.

**Activity:** Insects farming and Aquaculture
**Domain:** Ag-Tech
**Founded:** 2015
**Country:** Indonesia
**Total funding:** €5.2M
**Website**: jala.com

AquaEasy is an IT service sector that helps farmers with decisions to reduce risks and increase shrimp harvests.

**Activity:** Insects farming and Aquaculture
**Domain:** Ag-Tech
**Founded:** 2021
**Country:** Singapore
**Total funding:** Undisclosed
**Website**: aquaeasy.com

Umitron enhances the productivity of fish aquaculture using data.

**Activity:** Insects farming and Aquaculture
**Domain:** Ag-Tech
**Founded:** 2016
**Country:** Singapore
**Total funding:** €12.7M
**Website**: umitron.com

eFishery offers an end-to-end platform for fish and shrimp farmers.

**Activity**: Insects farming and Aquaculture
**Domain:** Agtech
**Founded:** 2013
**Country:** Indonesia
**Total funding:** €217.2M (including Series D in May 2023)
**Website**: efishery.com

Singrow develops cultivates high-quality fruits and vegetables through precision farming.

**Activity:** Vertical and Indoor farming
**Domain**: Agtech
**Founded:** 2019
**Country:** Singapore
**Total funding:** €1.5M
**Website**: singrow.com

Invertigro offers cost-effective and flexible indoor vertical farming solutions.

**Activity:** Agtech
**Domain:** Vertical and Indoor farming
**Founded:** 2012
**Country:** Australia
**Total funding:** €553.6K
**Website**: invertigro.com

Delos equips aquaculturists with new technology and management capabilities.

**Activity:** Agtech
**Domain:** Insects farming and Aquaculture
**Founded:** 2021
**Country:** Indonesia
**Total funding:** €7.20M
**Website**: delosacqua.com

# AGRIFOODTECH ECOSYSTEM LANDSCAPE

## STARTUPS- FOOD SERVICES

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### gojek

Gojek is an app that provides a variety of services (food delivery, payments, shopping, etc.).

**Activity:** Delivery and fulfilment technology
**Domain:** Food Delivery
**Founded:** 2015
**Country:** Indonesia
**Total funding:** €3.5B
**Website**: gojek.com

### Grab

Grab operates a mobile technology platform that integrates city transportation in South East Asia.

**Activity:** Delivery and fulfilment technology
**Domain:** Food Delivery
**Founded:** 2012
**Country:** Singapore
**Total funding**: €5.5B
**Website**: grab.com

### KAMEREO

Kamereo is a B2B distributor that provides solutions to optimise the supply process.

**Activity:** B2B marketplaces
**Domain:** Food delivery
**Founded:** 2018
**Country:** Vietnam
**Total funding:** €4.3M
**Website**: kamereo.vn

### AI Palette

AI Palette is a company that identifies and predicts food trends in real time using AI and ML.

**Activity:** Retail tech
**Domain:** Consumer Apps and Services
**Founded:** 2018
**Country:** Singapore
**Total funding:** €4.7M
**Website**: aipalette.com

### Chope

Chope is a dining platform that connects diners to restaurants.

**Activity:** Consumer Apps and Services
**Domain:** Restaurant and shop finder booking and ordering
**Founded:** 2011
**Country:** Singapore
**Total funding:** €21.4M
**Website**: chope.com

### trax

Trax offers in-store execution tools, market measurement services, and data science solutions for retail.

**Activity:** Consumer Apps and Services
**Domain:** Retail tech
**Founded:** 2010
**Country:** Singapore
**Total funding:** €194.9M
**Website**: traxretail.com

### Pop MEALS

Pop Meals is a full-stack food delivery service.

**Activity:** Food Delivery
**Domain:** Dark Kitchens
**Founded:** 2015
**Country:** Malaysia
**Total funding:** €22.9M
**Website**: popmeals.com

### LINE MAN Wongnai

LINE MAN Wongnai offers an e-commerce platform that connects consumers, riders, and businesses for services.

**Activity:** Food Delivery
**Domain:** Delivery from restaurants
**Founded:** 2020
**Country:** Thailand
**Total funding:** €362.1M
**Website**: linemanwongnai.com

# AGRIFOODTECH ECOSYSTEM LANDSCAPE

## INSTITUTIONAL INVESTORS

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### Antler

**Notable investments:**
GroGro, GrowSquares, Perplant, Foodini

Singapore
antler.co

### MDI Ventures

**Notable investments:**
Delos, Aruna, Agriaku, Manus Bio

Indonesia
mdi.vc

### TEMASEK

**Notable investments:**
Pivot Bio, Gojek, The EVERY Company, Impossible Foods, Bowery Farming

Singapore
temasek.com.sg

### Good startup

**Notable investments:**
Melt and Marble, New School Foods, Avant Meats, Brevel

Singapore
goodstartup.com

### Alpha JWC Ventures

**Notable investments:**
Delos, Next Gen Foods, Sayurbox, Hangry!

Indonesia
alphajwc.com

### Seeds Capital (Enterprise Singapore)

**Notable investments:**
DiMuto, Protenga, Shiok Meats, Seppure, Alchemy Foodtech

Singapore
enterprisesg.gov.sg

### VisVires New Protein (VVNP)

**Notable investments:**
Ynsect, Aleph Farms, Nutrition Innovation, Mushlabs

Singapore
visviresnewprotein.com

### East Ventures

**Notable investments:**
PopMeals, KendaiPangan, Gokomodo, Legit Group

Indonesia
east.vc

# AGRIFOODTECH ECOSYSTEM LANDSCAPE
## INSTITUTIONAL INVESTORS

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**SMDV**

**Notable investments:**
Aruna, Happyfresh, Gokomodo, Kedaipangan

Indonesia
smdv.com

**AC Ventures**

**Notable investments:**
Swan systems, Eden farm, Aruna, Legit Group

Indonesia
acv.vc

**ADB Ventures**

**Notable investments:**
Inseact, Sufresca, Earthsense

Philippines
ventures.adb.org

**Kickstart Ventures**

**Notable investments**:
Mosais, PickUp Coffee, SariSuki

Philippines
kickstart.ph

**ID Capital**

**Notable investments:**
Ynsect, OneCrop, Innovopro, ScanTrust

Singapore
idcapital.com.sg

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Disclaimer: this list is non-exhaustive

# AGRIFOODTECH ECOSYSTEM LANDSCAPE

## ECOSYSTEM ENABLERS AND ACCELERATORS

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### Grow Agtech Accelerator

GROW is a global food and agriculture technology accelerator.

Singapore
gogrow.co

### Agency for Science, Technology and Research (ASTAR)

A*STAR supports Singapore's key economic clusters by providing intellectual, human and industrial capital to its partners in industry.

Singapore
a-star.edu.sg

### Trendlines

Trendlines invests in and incubates innovation-based medtech and agrifood technologies.

Israel
trendlines.com

### Innovate 360

Innovate 360 is Singapore's pioneering food incubator, offering not only support for startups but also access to manufacturing facilities.

Singapore
innovate360.sg

### Hatch

Hatch is a global catalyst for a climate-smart, truly sustainable and just (sea)food transition.

Ireland
hatch.blue

### Sustainable Rice Platform

The Sustainable Rice Platform (SRP) is a multi-stakeholder alliance comprising over 100 institutional members.

Thailand
sustainablerice.org

### Temasek Life Sciences Accelerator

TLA is an agri-bio-sci-tech incubator that invests in early stage life sciences startups through The Lifesciences Innovation Fund (TLIF).

Singapore
tla.com.sg

### Big Idea Ventures

BIV has contributed to the development of the growing alternative protein industry since its inception and has become a global leader in food innovation.

United States
bigideaventures.com

### RISE Thailand

RISE is a leading Corporate Innovation Powerhouse based out of Southeast Asia.

Thailand
riseaccel.com

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Disclaimer: this list is non-exhaustive

# AGRIFOODTECH ECOSYSTEM LANDSCAPE

## CORPORATES

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**Monde Nissin**

Monde Nissin Singapore, a subsidiary of Monde Nissin Corporation, announced in January 2023 the launch of the Green Protein Hub in Senoko, Singapore. This cutting-edge facility will serve as a comprehensive and certified plant-based food hub and accelerator.

**Thai Union**

Thai Union's Space-F incubator and accelerator is a collaboration with Mahidol University and Thailand's National Innovation Agency (NIA). This innovative program offers mentorship, facilitates valuable business connections, and provides a collaborative workspace (without taking equity) to foster growth.

**Nestlé**

Nestlé's R&D center in Singapore plays a pivotal role as the regional innovation hub for developing plant-based dairy alternatives in Asia. In July 2021, Nestlé Malaysia took a significant step by inaugurating the first plant-based meal production site in the ASEAN region.

**BÜHLER**

Buhler develops sustainable solutions across the entire value chain for the food industry, including cultivation, extraction, and processing technologies for sustainable alternatives. They also provide services ranging from engineering to training. Buhler was picked as the technology provider for SGProtein, Singapore's first contract manufacturing facility specialising in the production of plant-based food.

**ADM**

ADM is a pioneer in plant-based nutrition innovation with more than 3,000 employees throughout the wider Asia-Pacific region, across 50 locations. In 2021, ADM set up an innovation lab in Singapore which features a wide range of capabilities, including a food and flavor analytic lab; a beverage and dairy applications lab and pilot plant and sensory evaluation facilities.

**CPF**

CPF is one of the world's largest F&B conglomerate. In recent years, the company introduced new innovations such as plant-based meat alternatives in markets outside of Thailand and aims to become the number one plant-based brand in Asia. CPF has a collaborative venture with Umitron to establish a sustainable and forward-looking approach to shrimp aquaculture, focusing on indoor production methods.

**wilmar**

Wilmar and the National University of Singapore (NUS) established in June 2018 a joint research laboratory to conduct cutting-edge clinical nutrition and synthetic biology research to create healthier food products as well as to devise green production technologies for industrial enzymes and biochemicals.

**Givaudan**

The Plant-based Innovation Center (PIC) is a collaborative effort between Givaudan and Buhler. Leveraging Givaudan's expertise in taste, ingredient, and product development, the 400 sq m center offers a product development kitchen, storage facilities, meeting spaces, and a viewing area for live demonstrations.

**Firmenich**

Launched in May 2021, the Firmenich Culinary and SmartProtein Innovation Hub facility operates as a regional research and development hub for the Asia Pacific region, while also serving as a global centre of excellence specializing in alternative proteins for meat and dairy substitutes. This expertise is fostered through collaboration with Firmenich, a Swiss company, and its spin-off campus in Italy.

**ROQUETTE**

In October 2017 Roquette opened its Asia Pacific headquarters and an innovation center in Singapore to focus on food, nutrition, and pharma. This has allowed the company to partner with customers, universities, and research institutions, such as Singapore's Agency for Science, Technology and Research (A*STAR) or the National University of Singapore.

# SOURCES AND CREDITS

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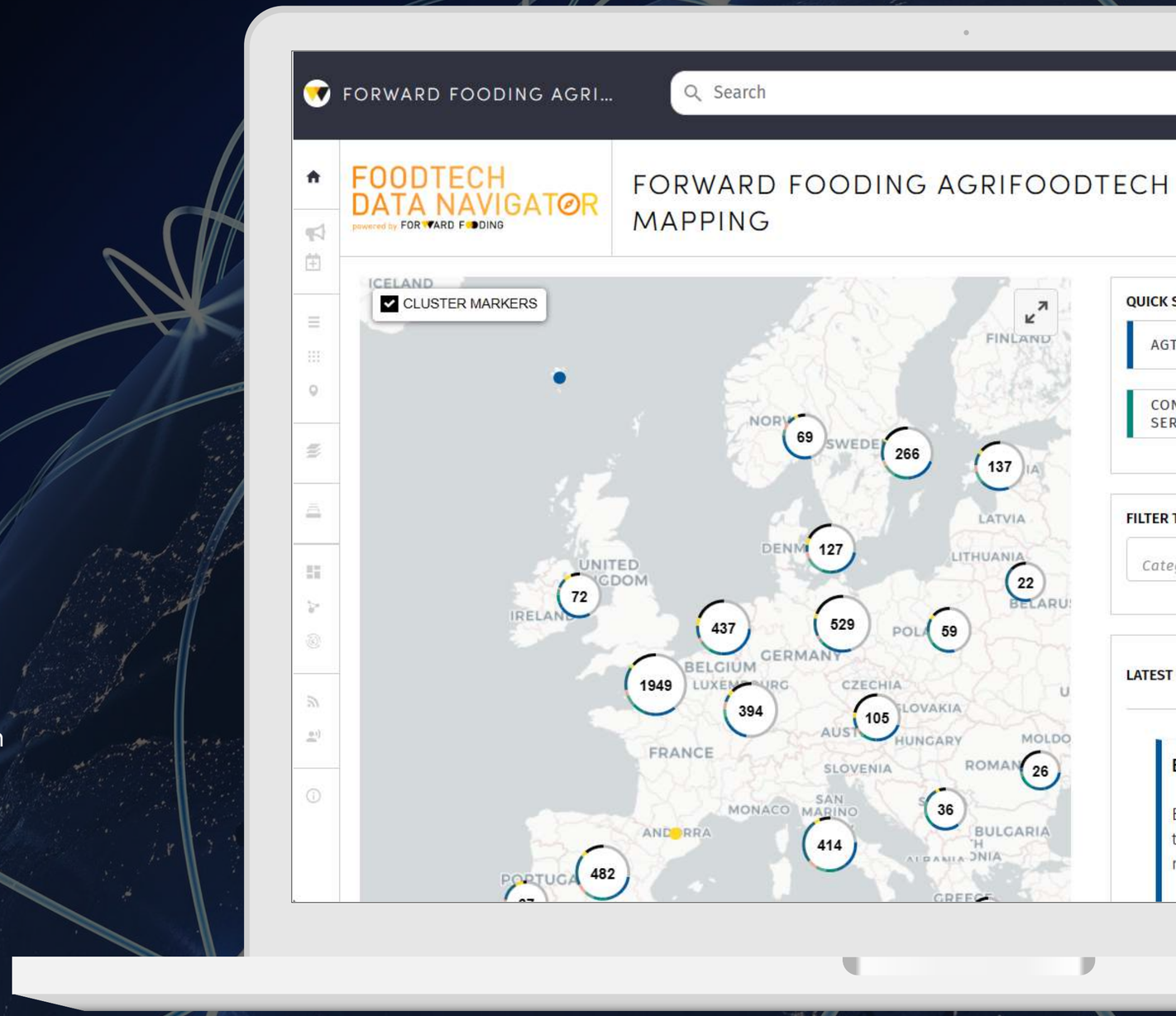
# Get access to the world's largest AgriFoodTech data intelligence platform

The FoodTech Data Navigator is the world's first and largest AgriFoodTech data intelligence platform. It allows professional investors, corporate executives, and entrepreneurs to discover and track 20,000+ ecosystem players around the world, including 8,800+ AgriFoodTech startups and scaleups.

**BROWSE THE ECOSYSTEM**



# DATA SOURCES

FORWARD FOODING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- Singapore becomes first country to approve sale of lab-grown meat
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- FIA Oxford Economics 2022
- Good Food Institute APAC report
- Insect Industry Innovation Scan: Europe and Singapore
- Enterprise Singapore Trade 2030
- Singapore's $14 billion mega-port targets supply-chain chaos
- Givaudan and Bühler open Protein Innovation Centre in Singapore
- Temasek-owned Asia Sustainable Foods Platform, CREMER invest S$6m in plant to grow alt protein sector
- Plant-based food contract manufacturer to tap new FoodPlant facility for R&D
- Firmenich Opens Culinary and SmartProteins® Innovation Hub in Singapore
- Growthwell Foods Opens New Innovation Centre to Scale Up Vegan Meat And Seafood Production
- SPACE-F launches Global FoodTech Incubator and Accelerator Batch 4, aiming to making Southeast Asia a global hub for FoodTech
- Eat Just starts construction of the largest alt-protein production facility in Singapore
- Float Foods Makes Patent Application for Nutritionally Enhanced Whole Egg Alternative
- Yeo's and Oatly announce official opening of oat milk facility
- Nestlé Opens Malaysia Plant-Based Factory, Doubles Down On Dairy-Free Foods Across Asia
- 'NRPT', a Joint Venture Company of NRF and Joins Hands with 'OR' to develop a Plant-based Business through Retail Businesses and Gas Stations. Push The Food of the Future to fulfil consumer needs
- FandB giant Monde Nissin opens new Green Protein Hub in Singapore
- Food Tech Innovation Centre
- The Launch of Bio Base Asia Pilot Plant (BBAPP)
- Shiok Meats inaugural a mini-plant with advanced R&D facility for cultivated seafood in Singapore, the first of its kind
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- Umami Meats, Cell AgriTech partner on cultivated seafood
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- GOOD Meat Breaks Ground on Largest Cultivated Meat Facility in Asia
- Aquaculture Market - Global Industry Assessment and Forecast
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- Indonesia's eFishery in talks to raise about $100m
- Adisseo Asia Pacific to Launch Aquaculture R&D Facility in St John's Island, Singapore
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- International Rice Research Institute
- Wavemaker Impact, Bill Gates's VC arm, Temasek launch startup to decarbonise rice cultivation in Asia
- Building an Ecosystem that Grows Farmers' Incomes by 25%
- Grab expands partnership with McDonald's Singapore
- Grab Holdings to Acquire Malaysian Supermarket Chain Jaya Grocer
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- Global Standards on Seafood Traceablity Launched
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# CREDITS

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Karen Tay - Classic Fine Foods
Kelvin Ng - Float Foods
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Rishita Changede - TeOra
Sandhya Sriram - Shiok Meats

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