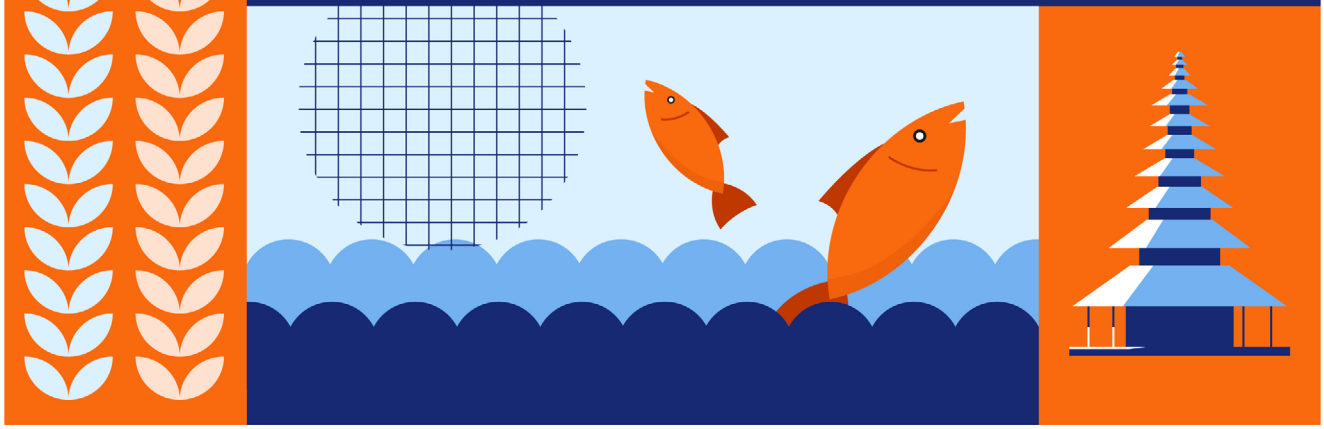
INDONESIA AGRITECH REPORT 2020

A CompassList Research Publication



FOREWORD

Farming takes up nearly a third of Indonesia's land use and labor force. More land is being used for agriculture compared with two decades ago. Yet, the contribution of the agriculture, forestry and fishery sector to the economy as a percentage is declining. Indonesia is also increasingly dependent on imports of key commodities, including rice, corn and sugar – crops that the country itself already plants.

By 2025, Indonesia's population will exceed 280 million. More than half live in Java, a densely populated island and also the epicenter of food production. Fewer Indonesians are working in agriculture and fisheries due to low and unstable wages.

Unless Indonesia takes action to help these industries, the country will one day struggle to feed its people. It will have to buy more food from other countries, which will likely face similar challenges as well. As we publish this report at the end of March 2020, the world is grappling with the threat of a food crisis resulting from the Covid-19 pandemic. Global food supply chains have come under strain as more countries close their borders and stop food exports. Most businesses are also suspended along with the rest of public life, amid lockdowns to contain the virus spread.

Against this backdrop, the importance of food security – and national agriculture – has never felt more acute. Indonesian startups have been the ones leading the charge to revolutionize the country's agriculture and fishery sectors. Many target the logistical inefficiencies and the power imbalance between small-holder farmers and their brokers. Others try to introduce high-tech equipment and automation into the work of farmers and fishermen. Most importantly, these companies are making agriculture and fishery more economically viable, securing livelihoods and preventing more people from abandoning their trade.

While it is still relatively early days for the agritech sector in Indonesia, we believe in the great potential of these startups to boost one of the world's largest agricultural producers through technology. More investors are sharing this view, too. In the sector's latest round of funding, farm-to-table social commerce startup Chilibeli raised $10m in Series A funding in March 2020, within less than a year of launching. More efficient and equitable farming practices will pave the way for sustainable agriculture in Indonesia, benefitting its farmers, resources and communities. This helps to create a stronger agriculture sector, which in turn will support Indonesia's food security and economic growth.

Bernice Tang
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Executive Summary

Global agricultural production capacity is under strain from urbanization, environmental degradation and climate change. Yet, the demand for food continues to grow as the world's population is expected to increase to 8.18 billion in 2025 from 7.79 billion in 2020.[1] Faced with such an imbalance, we need to reconsider how we grow, harvest and distribute food. Agritech, which uses technology to improve food production and distribution, will become increasingly critical to creating solutions for these existing problems.

Indonesia is a major global producer of many agricultural goods and one of the world's top three sources of wild-caught and farmed seafood. At the same time, its agricultural productivity and workforce size have fallen steadily over the past decade. If these declines are not reversed, this naturally well-endowed country will have to import more food to feed itself. By 2025, Indonesia will add 11 million people to its present-day population of 270.63 million.

Approximately 40.5 million Indonesians work in agriculture while 6 million catch seafood in the wild or farm seafood in inland or coastal waters.[2] Nine in 10 are impoverished smallholder farmers and fisherfolk who live in rural areas and lack access to education, financing and basic infrastructure, such as potable water, electricity and sanitation facilities. The livelihoods of these famers depend on small-scale farming. However, the farming inputs (seeds, feed and nutrients) they can access are often poor in quality. The traditional, low-tech farming methods employed have also led to stagnant, even declining, crop yields.

These challenges make Indonesia a promising testbed for agritech solutions. Technology helps smallholder farmers and fisherfolk produce more efficiently and earn enough to get out of poverty. Improved working conditions and earnings could attract more people to farming and fishing, which could increase Indonesia's agricultural and seafood output for domestic consumption and export.

DEFINITIONS

AGRICULTURE

The activity of farming crops and raising livestock. This report focuses on rural smallholder farming of food crops in Indonesia that do not have a regular pool of buyers.

Omitted are rice, the farming of which is highly regulated, and cash crops like palm oil, rubber, cocoa and coffee, which are sold to local and multinational corporates. Many of these companies already provide financial and technical help to their supplier farmers to improve crop quality and sustainability.

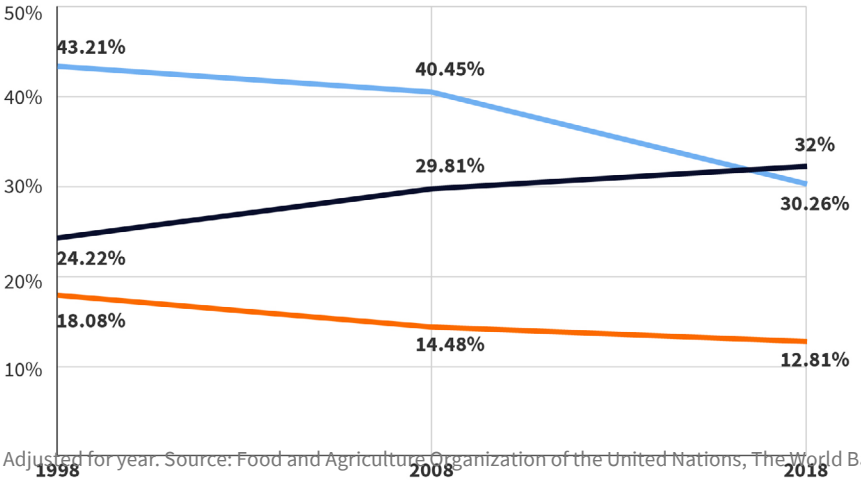
FISHERY AND AQUACULTURE

The activity of catching wild fish and rearing aquatic organisms, such as fish, crustaceans and aquatic plants, in inland and coastal waters.

AGRITECH

The use of technology in agriculture, and fishery and aquaculture to improve yields, efficiency, quality, profitability and sustainability.

Exhibit A: Indonesian agriculture and fishing data trends



Adjusted for year. Source: Food and Agriculture Organization of the United Nations, The World Bank[3]

% of GDP from agriculture, forestry and fishing

Notes: Indonesia's GDP grew from US$95.45bn in 1998 to $1.042tn in 2018.

% of land used for agriculture

Notes: More land used for key exports such as palm oil and rubber.

% of labor force in agriculture

Notes: Total labor force increased from 97.24m in 1999 to 133.95m in 2019.

In the sections that follow, we begin by looking at the **Agricultural challenges in Indonesia**. The issues span the entire agricultural supply chain, from financially excluded farmers and fishermen who can borrow only from illegal moneylenders to the dominance and multilayers of profiteering middlemen.

In the last six years, many agritech startups using digital and newer technologies to create on-the-ground solutions have sprung up across Indonesia. In **Indonesia's agritech startups**, we profile four high-potential companies that we believe are most representative of the current local agritech startup scene.

These startups require the support of investors, whether in financial terms or through their networks and expertise. In **Indonesia's agritech startup investors**, we take a look at some of the most active and prominent agritech investors in the country. They include conglomerates controlled by billionaire families, and local and foreign venture capital firms and accelerators.

Indonesian agritech startups address industry, economic and social needs: Helping smallholder farmers and fisherfolk work better more sustainably allows them to produce with improved yields and earn a higher income, thereby alleviating rural poverty. But challenges remain. In **Conclusion and outlook**, we offer recommendations to startups and stakeholders, such as investors, the government and nonprofit organizations, on how technology could be further harnessed to transform existing challenges into growth opportunities for Indonesian agriculture.

Exhibit B: Top crops grown in Indonesia

Most produced (in tons)

	1998	2008	2017
1	Rice	Oil palm fruit	Oil palm fruit
2	Oil palm fruit	Rice	Rice
3	Sugar cane	Sugar cane	Maize
4	Cassava	Cassava	Sugar cane
5	Coconut	Coconut	Cassava

Source: Food and Agriculture Organization of the United Nations[4]

Exhibit C: Top Indonesian crop exports

Most exported (in tons)

	1998	2008	2017
1	Rubber	Palm oil	Palm oil
2	Palm oil	Palm kernel cake	Palm kernel cake
3	Palm kernel cake	Rubber	Rubber
4	Fatty acids	Palm kernel oil	Fatty acids
5	Maize	Molasses	Palm kernel oil

Source: Food and Agriculture Organization of the United Nations[5]

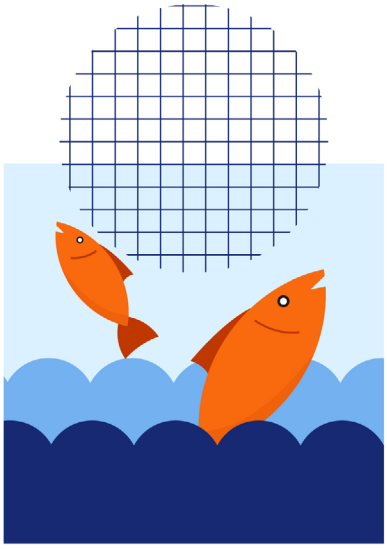
Exhibit D: Top Indonesian crop imports

Most imported (in tons)

	1998	2008	2017
1	Wheat	Wheat	Wheat
2	Rice	Soybean cake	Soybean cake
3	Refined sugar	Soybean	Raw sugar
4	Soybean cake	Cotton lint	Soybean
5	Cotton lint	Refined sugar	Cotton lint

Source: Food and Agriculture Organization of the United Nations[6]

Agricultural Challenges in Indonesia



Vulnerable farmers and an inefficient supply chain

A perennial problem in Indonesia is the influence of brokers and distributors on the price of agricultural commodities. Farmers, being often geographically located far away from commercial centers and end-buyers, turn to selling their raw produce to a middleman. These brokers, in turn, sell to other buyers, which can include industrial customers, other brokers and distributors who transport the produce farther away, or directly to nearby end-customers.

In many cases, the movement of commodities from the farmer to the end-buyer – households or businesses – can involve as many as 13 layers of middlemen. Each of these middlemen, be they brokers or distributors, typically sells at a 10–20% margin to the next buyer.[7] This puts pressure on each player in the chain, but the greatest pressure falls on the farmers themselves. The farmer, being at the bottom of the pyramid and lacking bargaining power, gets squeezed and has to accept the lowest price in the chain.[8]

In some communities, farmers have few buyers from which to choose. Dealers hold a monopsonistic power over the farmers, and they can press farmers into selling at low prices. Their plight is exacerbated when the brokers are also their moneylenders, who charge high interest rates on the capital they lend to farmers to buy seeds and fertilizers. In return, the farmers pledge their next harvest as collateral. If they are unable to repay the loan, they are usually forced to accept prices dictated by the lender-broker, or even lose the crops to the stronger party.

Many Indonesian agritech startups have built e-commerce marketplaces to replace the chain of middlemen. These startups buy directly from farmers and sell to household or industrial consumers. The logistics of transporting and storing the produce are organized by the startups themselves, often through partnerships with logistics companies.

> **"We can't say that middlemen aren't allowed to do business and take a profit. What we want to do is improve the transparency of their business process."**
>
> *— 8villages*

Jefry Pratama, Investment and Venture Partner at **UMG Idealab**, the corporate venture capital arm and startup incubator of Myanmar-based conglomerate UMG, sees selling agricultural goods as the easiest way for agritech startups to make money.

A key example of a successful Indonesian agricultural e-commerce startup is **TaniGroup**. Its TaniHub e-commerce app lets customers buy TaniHub-branded fruits, vegetables, fish and poultry. TaniHub buys from farming collectives that it supervises, ensuring a standard of quality in the production process. To extend its reach, TaniHub also sells produce through other e-commerce marketplaces, such as Tokopedia and Shopee. Another example is **8villages**, which operates an information network for farmers and a fresh produce e-commerce marketplace, RegoPantes.

Aruna is a startup that helps fishing communities in remote areas gain access to the export market. The team originally conceived their product as a B2C online marketplace called Pasarlaut but could not carry out their original vision. After handing the Pasarlaut brand over to new management, the team chose to go B2B, developing relationships between fishing villages and foreign buyers looking for quality fish.

Exhibit E: Agriculture supply chain for Indonesia

PRE-PRODUCTION

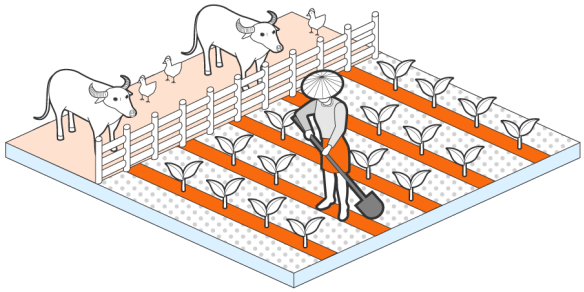
Farmer buys inputs (seeds, feed and fertilizer); prepares land for farming

Works on small land plots (averaging 0.6 ha) that generate limited income

Incurs debt to buy inputs

Can only afford low quality and quantity of inputs

Often borrows from broker-lenders or loan sharks



PRODUCTION & HARVEST

Farmer grows crops; monitors and treats crops for disease

Uses inefficient, low-tech farming methods

Faces poor yields or yield loss due to low-quality inputs, disease or poor weather

Is averse to raising production, fears unprofitability

SALES & DISTRIBUTION

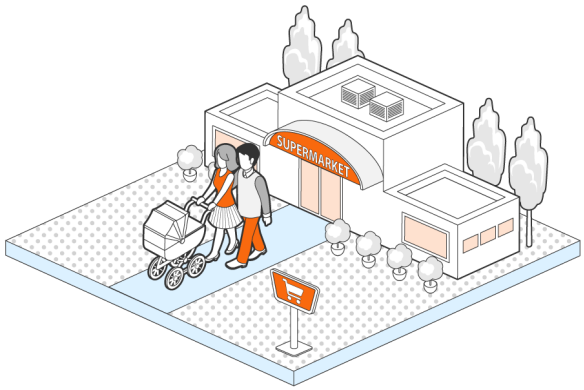
Farmer sells produce to broker, who sells to other intermediaries with wider sales and logistics networks

Prices are set by broker; farmer is usually powerless to seek fairer prices

Produce goes through long chain of brokers (as many as 13), each marking up prices by 10–20% on average

Broker is often also moneylender to the farmer, who is desperate for fast cash to buy inputs

Farmer ends up making little or no profit, sometimes even surrendering his harvest to broker to pay off debt



CONSUMPTION

Produce reaches and is sold in markets, supermarkets and groceries; to businesses, e.g., hotels and restaurants

Consumers end up paying prices inflated by many layers of middleman margins

Quality, stability and safety of fresh produce is compromised after going through multiple brokers

Limited access to fair financing

About 93% of the farms in Indonesia are small holdings, "a striking[ly] high share," says the United Nations' Food and Agriculture Organization (FAO).[9] These farms work on an average of 0.6 hectare of land, often in remote areas that have no access to formal banking services. Many farmers are also considered too risky to lend to, or lack the documentation required for opening a bank account to secure loans.

As a result, before the planting season when farmers need to buy inputs like seeds and fertilizers, many end up borrowing from local informal moneylenders, who can also be their brokers or middlemen. The lender-broker can force the farmers to sell their harvests exclusively to them, at punishingly low prices, as repayment for the loans. Or worse, during a season of poor yields or falling prices, when a farmer is unable to earn enough money to service or pay back his loan, the moneylender confiscates his harvest as repayment. This inadvertently pushes the vulnerable farmer deeper into indebtedness and distorts the power balance between farmers and lender-brokers.

TaniFund, the agriculture crowdfunding platform by **TaniGroup**, was created to help farmers gain access to fairer forms of financing. According to TaniGroup's President Pamitra Wineka, some farmers who were selling to TaniHub, TaniGroup's online fresh food store, were keen to increase their sales. But they were unable to because they had to reserve most of their produce for loan shark-brokers, to repay the loans that they had chalked up before.

TaniFund is a crowdfunding investment platform that connects farmers seeking financing with individuals or entities from the wider public. TaniFund does not directly disburse the monies raised to the farmers. Rather, it uses the pooled cash to procure resources that are needed by the farmers to increase their output and complete projects. The harvested produce is then sold on TaniHub at fair prices, and part of the sale proceeds go back to the lenders/investors who had financed the farming projects via TaniFund.

> **"Some people would rather put their money under their bed. They think it's riskier putting money in P2P lending. We can be contacted at any time and we demonstrate our work."**
>
> *— TaniGroup*

Other agritech startups that also use this crowdlending model of pulling funds from retail investors interested in the sector include **Crowde**, where lenders can start financing projects with only IDR 10,000; **iGrow**, one of the earliest agritech lenders in Indonesia; and **Growpal**, which focuses on aquaculture.

These P2P lending startups have attracted the attention of banks and other financial entities in the rural and agriculture lending segment. For instance, some have begun investing in agritech-fintech startups via corporate venture capital (CVC), as was the case with Crowde raising $1m from Mandiri Capital Indonesia, the CVC arm of Indonesia's largest bank, Bank Mandiri.[10]

Banks have also partnered with these P2P lenders to finance agricultural loans. The collaboration helps banks channel their funds to more farmers and diversify their portfolios, while the P2P lenders expand their lending capacity. The agritech crowdfunding startups also seek to manage and lower the investment risks of each investment project, by sending field agents to supervise and educate farmers to produce better yields.

Lagging education and guidance

Small-holder farming faces an inherent conundrum: the farmers that participate in this labor-intensive and time-consuming work are usually have limited or no schooling. Yet, their work requires a whole range of knowledge and skills, both new and old, for them to survive or do well.

"Farmers need to understand weather. They have to know about biology, hydrology, chemicals, and, at the end of the day, they have to be traders," Yudha Kartohadiprodjo, co-founder of farming education and social network startup **Karsa**, points out.

Farmers therefore would benefit from continuous education and close guidance, especially as population growth, increased globalization and changes in trading conditions produce greater fluctuations in market demand and prices. Climate change has also led to more extreme and unpredictable weather cycles. Traditional farming methods may no longer be efficient or effective enough, as a result. The Indonesian government has put in strong efforts to help farmers improve their practices and cope with these changes, but such public agencies are spread too thinly across the world's largest archipelago nation, with more than 17,000 islands.[11]

8villages is one of the first startups in Indonesia to focus on farmer education. It began in 2012 with an SMS-based information service, LISA, which still has over 100,000 subscribers today. Through LISA, farmers gain knowledge about farming processes and ask experts questions. LISA has since been integrated into a mobile application named PETANI (which means "farmer" in Bahasa Indonesia), which has more social media-like features.

> **"A lot of our challenges involve raising awareness among farmers, helping them be ready to adopt technologies."**
>
> *— 8villages*

A competitor, **Karsa**, operates its own farmer-focused social network website, inspired by Facebook. Farmers post questions and answers, and share information and tips about their own farming activities. Karsa also works with government agencies to maintain a list of market prices for commodities, which it updates and publishes regularly.

In its work with remote fishing villages and communities, **Aruna** helps fishing households save the money they earn so they don't have to borrow from loan sharks or brokers. Aruna also employs the families of the fishermen to work on the shoreside, preparing the catch for shipping and sales.

To manage risk and ensure that funds are used properly, agricultural financing startups often send field agents to supervise and educate farmers. Support for farming communities by **TaniFund**, for example, begins with a training program led by the company's field team. Each project funded by TaniFund is then closely supervised to ensure that the final products meet the company's quality standards, and that provided resources, such as fertilizers and pesticides, are not resold for money.

Lack of new technologies

Traditional farmers in Indonesia lack knowledge of new technologies that could help them increase their efficiency and reduce their risks. Neither can they afford them. Yet, access to technology has never been more widespread, even in the rural areas, thanks to improved power grid and broadband network coverage. As a result, startups nowadays have more opportunities to explore the use of connected hardware, or the Internet of Things (IoT), in agriculture. Such applications include automated sensors, feeding mechanisms and drones.

Another aspect of advanced technology in agriculture involves data analytics. Agriculture and fishery activities contain many data points, from weather and climate to soil nutrient content and water salinity. Businesses and farmers can use data analytics to make informed decisions. For example, data collected by sensors in the soil and air and processed in analytics help farmers better understand and decide when to plant water-hungry crops like rice, or drought-resistant crops like nuts and tubers.

> **"People did not just want raw data; they want to know what the data means and what to do with it."**
>
> *— JALA*

JALA uses a suite of sensors to detect water quality parameters in shrimp farm pools, from salinity and acidity (pH) to oxygen content. The data is sent to a cloud-based analytics engine, which then provides suggestions for improving water quality. Shrimp farmers can, for example, distribute less feed if excess feed has had an impact on water quality. This reduces waste and shrimp loss, improving yields.

Startups like **Habibi Garden and BIOPS** explore IoT-enabled precision farming for select crops. Both companies use sensors to detect humidity, temperature and soil nutrient content levels, among other relevant data. The data is then processed in a cloud-based platform, which controls automatic feeders that provide plants with water and/or dissolved fertilizer when needed. The solutions offered by these companies work best in small-plot and greenhouse-based horticulture.

Exploring the use of blockchain technology to manage agricultural data is **HARA**, a spinoff of data analytics startup Dattabot. The company's field agents collect data from farms that participate in their program. The data is then stored in the blockchain. Other parties in the blockchain can purchase the data to use as is. They can also analyze and process the data, such as cleaning junk data or creating reports. The processed data can then be sent back into the blockchain ecosystem, attracting more buyers. Farmers who contribute data get a share of the transaction value as well: they earn tokens that can be exchanged for farming supplies and daily necessities.

Where are the deep tech startups?

Overall, there are still few agritech startups in Indonesia that work with artificial intelligence (AI), data analytics, robotics or deep technology (new technologies that offer significantly advances over those currently in use), such as genetic engineering.

There are some possible explanations for this dearth of advanced tech startups. For one, talent in these fields of technology may not be working on agricultural problems. There may also be limited support, especially financial, from universities, research organizations and large corporates. These entities are normally the ones that shoulder the costs of technological development in the other sectors and countries, and are among the first to discover future innovations or acquire them.

There have been exceptions, of course. UMG Idealab, the startup incubator and corporate venture capital arm of Myanmar-based conglomerate UMG, invested in **MSMB**: an agriculture-focused technology developer that creates sensors, drones and mobile applications for farmers. According to Jefry Pratama, an investment and venture partner at UMG Idealab, MSMB was initiated by lecturers and students from Universitas Gadjah Mada, one of Indonesia's oldest and most prestigious state universities. MSMB's employees include students, recent graduates and lecturers from local universities in Yogyakarta and the surrounding provinces.

The relative lack of sophisticated technologies in Indonesian agritech startups is also a result of greater growth opportunities in logistics, supply chain and infrastructure. The state of the Indonesian ecosystem somewhat parallels that of India. While not strictly a like-for-like comparison, Indonesia and India are both large countries with lagging infrastructure development in the rural areas. Commenting on the Indian tech startup ecosystem, ID Capital, a Singapore-based agritech-focused venture capital firm writes:[12]

> ***While telecommunication network has penetrated fairly deep [sic] in rural India, more basic infrastructure such as water, electricity and roads remain insufficient. However, with the country beginning to get its act together, a renewed strategy of putting rural India as the front runner could usher in a new era for the nation. But as of now potential investors in agritech startups see large scale implementation as a challenge agripreneurs may not be able to address to reach break even point.***

ID Capital observes that in the 2018 iteration of its Future Food Asia challenge for agritech startups, 80% of the applicants from India applied to the "Streamlining Supply Chain," "Precision Agriculture" and "Sustainable Farming Practices" categories. These categories fit most of the agritech startups we have in Indonesia so far.

Indonesia's Agritech Startups

Introduction

Agritech startups in Indonesia can be grouped into four broad categories, based on their business models and the problems they solve:

Financing

Startups in this category are concerned about smallholder farmers' lack of access to capital and fair financing terms. As online crowdfunding or peer-to-peer (P2P) lending platforms, they pull in funds from retail investors, microloan financing institutions and banks, channeling the money into agricultural projects

E-commerce

Startups in this category simplify the agricultural supply chain by connecting farmers directly to end-buyers, and in the process they do away with the many layers of intermediaries and the margins they charge that inflate the final price of goods. As a result, farmers gain fairer selling prices and consumers benefit from cheaper produce. Buyers can be consumers, small businesses and even large-scale manufacturers

Education and guidance

Startups in this category teach Indonesian farmers and fisherfolk the skills and knowledge necessary to improve productivity

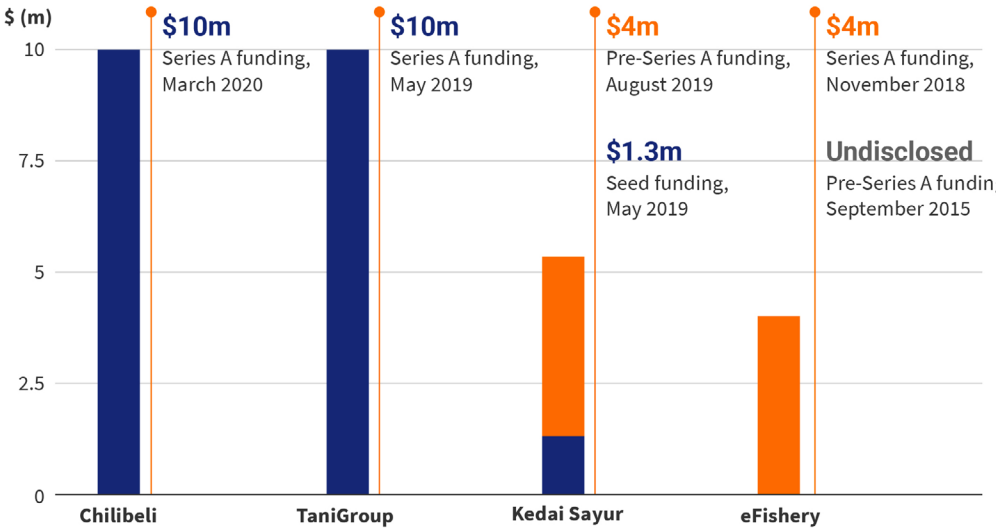
Technology development

Startups in this category create new hardware and software that improve agricultural operations. These include sensors for collecting agricultural data, automated fertilizer or animal feed dispensers, drones and VR/AR devices

Crossovers between the categories are common. According to Jefry Pratama, Investment and Venture Partner at UMG Idealab, selling agricultural commodities is the simplest and surest way for agritech startups to earn revenue. Many of the startups highlighted in this report operate online marketplaces or sell produce from the farmers they work with through offline channels.

In this section, we profile four companies in the growing Indonesian agritech startup ecosystem that occupy important niches. All have gained traction among farmers and consumers of agricultural products, as well as attracted sizable funding from investors. We believe these startups are among the best representatives of Indonesia's current agritech space, as well as of its potential for continued growth in the long term.

Exhibit F: Largest agritech startup investments in Indonesia between 2018 and March 2020



Chilibeli
Farm-to-table social commerce platform

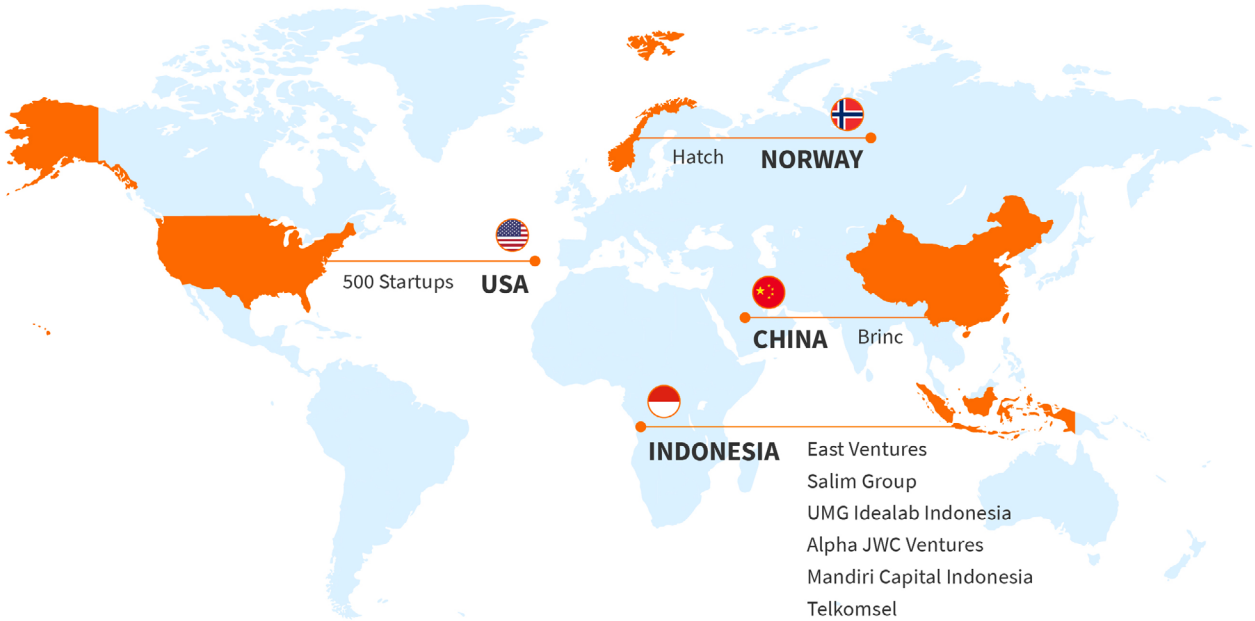
TaniGroup
Peer-to-peer lender and e-commerce platform

Kedai Sayur
E-commerce platform connecting farmers with vegetable hawkers

eFishery
Automated fish and shrimp feeding system maker

Source: East Ventures, The Jakarta Post, Nikkei Asian Review[13]

Exhibit G: Investors are local and global



8villages

Education and guidance

E-commerce

YEAR ESTABLISHED

2012

FOUNDERS

Sanny Gaddafi, Mathieu le Bras (no longer with company)

KEY ACTIVITIES

Social network for farmers for education and information exchange; e-commerce marketplace for agricultural produce; agricultural data collection.

BUSINESS MODEL

Monetizing through software as a service (SaaS) model for DataHub farming data platform, transaction fees for e-commerce platform Rego-Pantes. Profitability status unknown.

USER BASE

40,000 users in its PETANI mobile app platform; 100,000 subscribers to its SMS service. RegoPantes sells produce mostly from farmers in Java, but also from other provinces. Its B2C customers are found in the Greater Jakarta area; B2B customers are spread across Java island.

FUNDING

2012 Early grant from Mercy Foundation

2014 Pre-Series A; IMJ Fenox

2017 Funding from Salim Group (details undisclosed)

8villages is one of the earliest agritech startups in Indonesia and one of the first to gain international recognition.[14] The company was founded by Sanny Gaddafi, who developed FUPEI, one of Indonesia's first social networks, and Mathieu le Bras, a French agronomist who has since left the company.

In 2012, the company launched with a product called LISA, an SMS-based information network that provides educational information and news updates to farmer subscribers. As smartphones became more widespread and broadband connectivity in rural areas improved, 8villages decided to develop PETANI, a mobile application version of the information network.

In the past few years, 8villages has aggressively expanded its business into new verticals. The most publicized is e-commerce marketplace RegoPantes (Javanese for "fair price"), where customers can buy produce directly from farmers. 8villages has also created DataHub, a software as a service (SaaS) platform for field agents who collect agricultural data. Inspectors from municipal governments or from buyers (especially for estate crops like sugarcane) can use the app to collect data in the field and process it later through a cloud-based dashboard interface.

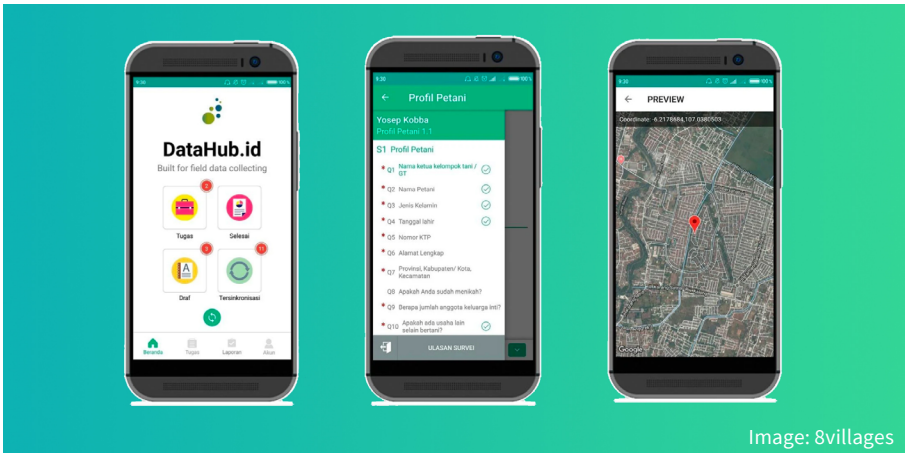


Image: 8villages

The latest venture from 8villages is VLOGS, a platform that connects logistics operators with farmers who need to transport their harvest to market. The operators are middlemen, although not those who gouge high prices from farmers. VLOGS allows these middlemen to earn money by adding value to the agricultural supply chain without treating farmers unfairly.

The primary challenge 8villages faces in expanding its user base is raising awareness among farmers, to ready them to adopt technologies. Gaddafi, the company CEO, however, remains confident that once farmers become familiar with using technology, they will be eager to learn and work to become more independent.

Gaddafi also says that consumers are still not used to the idea of buying fresh produce online, even though many companies now offer the service. Changing consumer priorities is another challenge: 8villages hopes shoppers will stop focusing on the cheapest prices and start caring more about the welfare of farmers.

“Every spoonful of food is a result of someone else's hard work,” Gaddafi said. “With us, you can be sure that our prices are fair for the farmers.”

MILESTONES

2012

First product is LISA, an SMS-based subscription service. Farmers would get information about agriculture, from tips and advice to Q&A. Worked with universities to provide expert advice to farmers.

September 2017

Began RegoPantes pilot project, a farm-to-table e-commerce marketplace. First tested to bring produce from farmers in Central Java province to customers in Jakarta and surrounding areas.

April 2018

With the success of LISA, amid the proliferation of smartphones and improving broadband connectivity in rural areas, 8villages launched PETANI (“farmers”) mobile app. A continuation of LISA, PETANI permits social media-style sharing of information. Specialized apps for livestock farmers and fisherfolk launched later on, although not prioritized.

September 2018

Launched DataHub, an online platform for agricultural surveyors to record and store agricultural data.

Aruna

Education and guidance

E-commerce

YEAR ESTABLISHED

2016

FOUNDERS

Utari Octavianty, Farid Naufal Aslam and Indraka Fadhilillah

KEY ACTIVITIES

Modernize fishing practices, mainly with digital technologies, e.g., data collection of daily catch. Facilitate sales to B2B export markets, with food authentication to support fair trade prices. Community support and education for fishing villages, e.g., encouraging fiscal responsibility and transparency, creating employment for fishermen's wives.

BUSINESS MODEL

Revenue from fish trading business (focus on high-value products, e.g., live lobsters, crabs, groupers, snappers) and data subscription services (especially for international buyers).

USER BASE

Over 20,000 registered fishermen based outside of Java.

FUNDING

2016 Funding from angel investor

2017 Seed funding from UMG Idealab

2019 Pre-Series A in progress

Community empowerment startup **Aruna** was established in 2016 by university classmates Utari Octavianty, Farid Naufal Aslam and Indraka Fadhlillah. "The idea was to help coastal people [fisherfolk] gain better access to markets," Octavianty, General Director of Aruna, told CompassList.

"From each fisherman in each community we collect data on the method they use to catch the fish, what they catch, how much they catch. Using that data, we can connect them to prospective buyers," she said, explaining how Aruna works.

The startup takes a small commission on each transaction. Some buyers subscribe to Aruna's paid data collection service to ensure the quality and sustainability of their fish supplies, which provides the company with another revenue stream.

Prices on Aruna are not always cheaper for buyers or higher for fishermen because local markets can sometimes offer better prices. What Aruna can provide that local markets can't is quality assurance for buyers and a stable demand for fishermen.

According to Octavianty, most of the fishing households in Aruna's communities have experienced a threefold increase in their income since joining Aruna, "with some extreme cases seeing a 12-fold increase in income."

Aruna also seeks to foster more independent fishing communities by employing fishermen's families to work shoreside, cleaning and packing the catch before shipping.

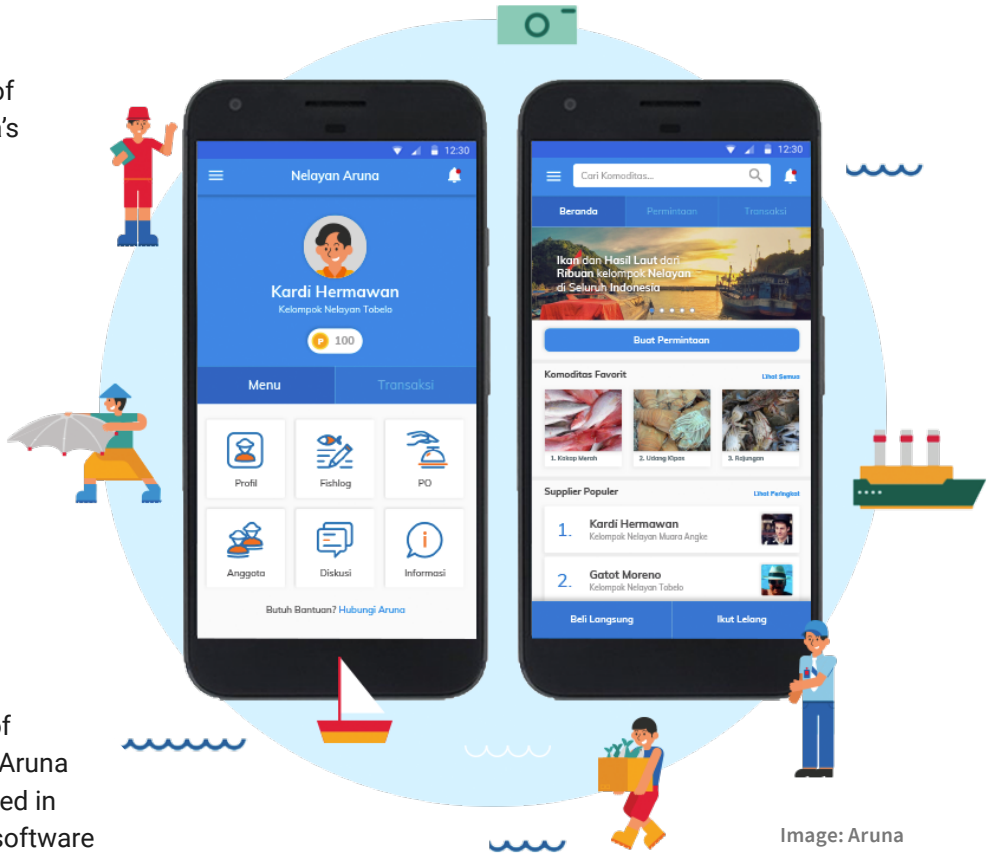


Image: Aruna

A business at the intersection of fishery and online connectivity, Aruna requires personnel that are skilled in modern technologies, such as software engineering and web development, as well as community relations. Finding talent outside of Java can be difficult because of unequal access to education and other infrastructures. Since Aruna is committed to building fishing communities that can sustain themselves in the long run, it works to employ local talent whenever possible.

MILESTONES

2016

Joined various competitions, and placed first or runner-up – led to publicity and networking opportunities. Met with government officials. Selected for accelerator and incubator programs such as Telkom Indonesia's Indigo Incubator.

2017

Selected for the Indonesian government's "Fishermen go online" program.

2018

June 2019

Won the $60,000 Alipay-NUS Enterprise Social Innovation Challenge prize; joined Alipay's workshop in Hangzhou, China. Company has broken even.

JALA

Technology development

YEAR ESTABLISHED

2015

FOUNDERS

Ayro Wiryawan, Syauqy Nurul Aziz, Raynalfie Raharjo and Liris Maduningtyas

KEY ACTIVITIES

Technology development (hardware and cloud-based analytics platform) for monitoring and improving water quality in shrimp farms based on salinity, dissolved oxygen, temperature and pH levels. Processing the data collected, it gives farmers suggestions on how to improve or maintain their ponds' water quality to improve productivity, and reduce shrimp deaths caused by disease or poor water quality.

BUSINESS MODEL

Monetization from software as a service (SaaS) charging IDR 300,000 in monthly subscription, B2B hardware+SaaS bundle for bigger farms. New multi-parameter shrimp pool probe costs IDR 26m (cash).

USER BASE

Over 2,000 farmers with 5,000 pools in 2019, from 20 shrimp farmers with 200 pools in 2018.

FUNDING

2015 Awards and grants from the American Society of Mechanical Engineers (worth $45,000) and INOTEK (incubation)

2019 $550,000 seed funding from 500 Startups, Hatch and Conservation International Ventures, the social-impact investment arm of Conservation International

JALA began in 2015 as a joint project by Indonesian agriculture and aquaculture hardware startup Atnic and a group of engineering graduates, with the support of shrimp farmer Aryo Wiryawan and his company, Indmira. The project, which developed water quality monitoring sensors for shrimp farms, won multiple grants in 2015, but the team struggled to sell the system to shrimp farmers.

After conducting market research, the team realized they were approaching their target market wrong. "We found that we needed to adjust our product market fit by changing our features," CEO Liris Maduningtyas said. "People don't just want raw data; they want to know what the data means and what to do with it."

The team decided to build a cloud-based online platform that could process the raw data collected by their sensors and marketed the combination as a software as a service (SaaS), instead of a hardware product.

The company has since rebranded itself as JALA. It has also shifted its focus to analytics, but hardware development remains a core element of its business. “Our production is technically still at a ‘rapid prototyping’ phase, assembling components from China and the US. Assembling in Indonesia is still not producing satisfactory product quality,” explained Maduningtyas. JALA also offers free exchange of broken equipment to customers and performs regular device maintenance.

JALA currently partners with manufacturers in Shenzhen and Hong Kong for mass manufacturing. The company said it expected to finalize its mass production process by the end of 2019, with focus on quality assurance and waterproofing certification. It upgraded its water quality monitoring sensors and named the line “Baruno” at the start of 2020.

Image: JALA

MILESTONES

2015
Started project to develop a real-time monitoring system for shrimp farms called Blumbangreksa. Won awards and grants for R&D to develop the system for commercialization.

2016

2017
Added SaaS element to business model: Leased pond data collection devices to farmers, switched later to selling them (unsuccessfully).

2018
Selected for Brinc and Hatch Blue accelerator programs. Improved product and business strategies, started earning revenue.

2019
Expanded its shrimp farmer user network and launched pilot projects in Southeast Asia, China, India and Ecuador. Partnerships with overseas entities such as US-based Conservation International. Company currently has net positive monthly cash flow, though still loss-making. Targets profitability by 2021–22.

TaniGroup (TaniHub, TaniFund and TaniSupply)

P2P lending | Education and guidance | E-commerce

YEAR ESTABLISHED

2016

FOUNDERS

Pamitra Wineka, Ivan Arie, Michael Jovan, WIlliam Setiawan, Edwin Setiawan and Oki Setiawan

KEY ACTIVITIES

Fresh food e-retailer TaniHub sells produce directly sourced from trusted farmers to consumers and businesses. Crowd-lending platform TaniFund lets individuals and entities invest in farming projects; funds raised go toward farmers in the form of practical resources needed for their projects, not cash. Business units are complementary: TaniFund enables farming projects to be realized; TaniHub provides a direct market for selling harvested produce at fair prices; TaniSupply handles the Group's fresh food supply chain and logistics needs.

BUSINESS MODEL

Share of revenue from produce sales in e-commerce TaniHub. For farming projects crowdfunded through TaniFund, typically farmers and investors each get 40% of returns, while TaniFund gets 20%.

USER BASE

More than 25,0000 farmers across Java and over 8,000 lenders.

FUNDING

2018 Pre-Series A from Alpha JWC Ventures

2019 Series A of $10m from Openspace, Golden Gate Ventures, Intudo Ventures and DFS Lab

"We originally didn't intend to establish a startup," Pamitra Wineka, President and co-founder of TaniGroup, told CompassList. Inspired by their own experiences, the co-founders of TaniGroup initially started the business as a side project to help farmers sell their harvest. After discovering there was high demand for their services, they started TaniHub, an online platform where select farmers could sell their harvest directly to end-consumers.

As Wineka and his partners ran TaniHub, they learned that many farmers were struggling to expand their business and increase yields. Many farmers borrowed money from local middlemen, which bound them to agreements to sell their harvest at very low prices, and exclusively to the middlemen. TaniHub hence expanded into a new line of business: TaniFund, a crowdlending platform that channels funds from retail investors to agricultural projects.

Funds collected from TaniFund are not disbursed as cash. Instead, TaniFund buys the tools, supplies and other resources needed to run the projects, which range from planting and harvesting to trading. Farmers are supervised and guided by TaniFund's field team. When it's time to harvest, the products are sold on TaniHub and other e-commerce marketplaces.

In November 2019, TaniGroup launched its third business unit, TaniSupply. The new operations focus on purchasing from TaniFund farmers and other small-holder farmers and storing the produce.

Staffing is TaniGroup's largest and possibly most critical expense. The company sends out teams to meet with prospective partners – individual farmers and farming collectives – as part of their KYC (Know Your Customer) process. TaniGroup intends to expand its presence outside of Java and connect with more potential partners.

Wineka said the company was interested in supporting farmers of crops with longer turnaround time – cocoa, coffee, coconut, etc. – but consumer demand for these investments remains low. Due to lack of capital, many plantations struggle to replant their crops. The farmers end up relying on old trees that no longer have good yields, and production suffers as a result.

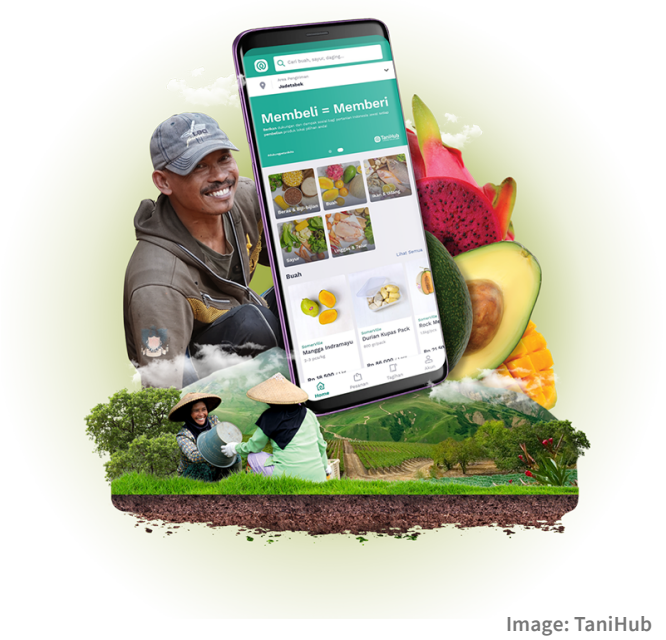


Image: TaniHub

MILESTONES

2016

TaniHub (e-commerce) and TaniFund (P2P crowdlending) launched.

2018

Launched in-house food product labels (Sommerville, Goldspring and Fowler), invoice financing programs (Restopreneur, Juspreneur and Fruitstorepreneur) and TaniXpress logistics services. Collaboration with International Finance Corporation to improve own operations and support farmers under their care to do the same.[15]

2019

Series A funding of $10m, the largest round to date raised by an Indonesian agritech startup. Joined ride-hailing unicorn Grab's accelerator program. Launched TaniSupply, replacing TaniXpress. TaniFund has disbursed IDR 105bn for farming projects.

Indonesia's Agritech Startup Investors

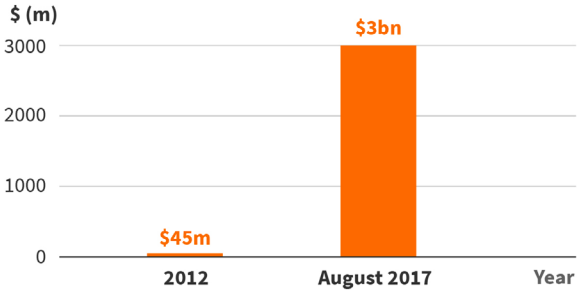
Introduction

Indonesia is the most populous country in South-east Asia, and so not surprisingly, it has also been a magnet for startup investors. Whether they are in e-commerce or ride-hailing, local consumer startups like Gojek, Tokopedia and Traveloka have been the biggest winners of investor funding. They ascended to unicorn status with over $5bn in combined funding raised – and counting – from local and foreign investors (mainly from China, Japan and the US).

Indonesian agritech startups have attracted far less investment – about $33.15m in total via seed to Series B funding rounds since 2013, based on publicly available data. The actual figure is likely to be higher, as in many funding rounds the amount of money raised is undisclosed.

Globally, agritech startup investment is also still in relatively early stages of development. According to Agfunder, a US-based agri- and foodtech venture capital firm, the US was the top market for agritech investments in 2019, raising $8.7bn, or 35% of global deal flows.[16] Ranking second and third were Asia's two largest countries and agriculture powerhouses, China ($3.2bn) and India ($1.3bn).

Exhibit H: Growth in Indonesian startup investments



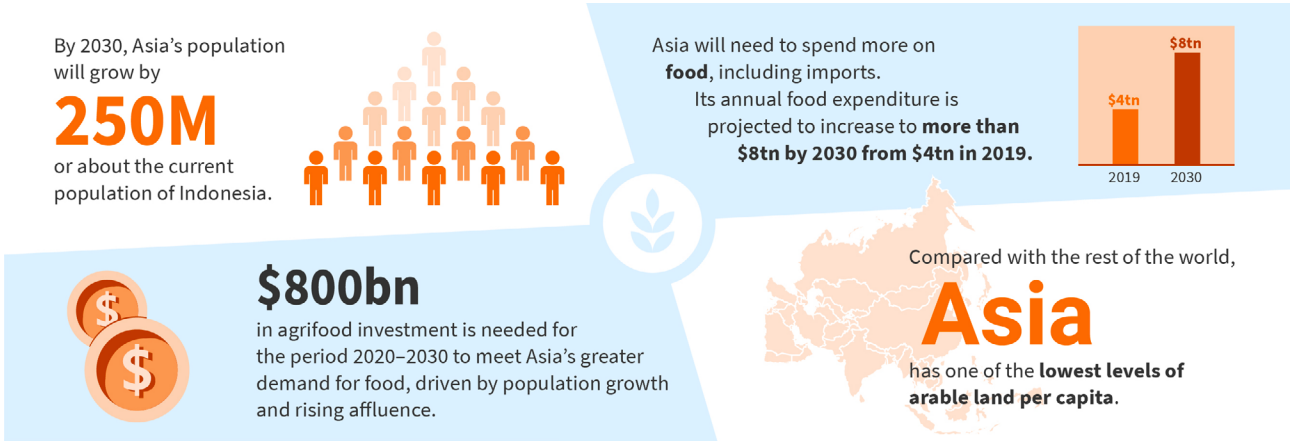
Source: Google-AT Kearney[17]

Exhibit I: Top three investment sectors

In 2017, **95%** of the funding – from Chinese investors Tencent, Alibaba and JD.com – went to **Go-Jek, Tokopedia and Traveloka.**

Source: Google-AT Kearney[17]

Exhibit J: Growing demand for agritech and foodtech investment



Source: Temasek, PwC and Rabobank[18]

Who are Indonesia's agritech investors?

Agriculture, fishery and aquaculture are complex businesses that depend on many factors. For example, extreme weather conditions due to climate change and the unpredictability of crop and marine diseases increase production risks and costs. In Indonesia, small-holder farmers face the additional challenge of lacking access to a range of supportive infrastructure, namely financial services, quality inputs (seeds and feeds), sanitation, electricity and internet connection.

"Indonesia is often a target for investors with an impact focus because there is a larger population with problems like pollution to solve," said Georg Baunach, Managing Partner and co-founder of Hatch, an accelerator and venture capital investor for aquaculture startups. Hatch is an investor in JALA, an Indonesia startup developing intelligent shrimp farming systems.

Several problems exist, but so do many opportunities for change. So, who are Indonesia's agritech investors?

Local investors fall into three main groups: venture capital firms, conglomerates and state-linked businesses. Venture capital investor East Ventures has been particularly active. Its agritech startup interests have won co-investment from the country's largest conglomerates Salim Group, Sinar Mas Group, Lippo Group and Triputra Group. East Ventures' track record in spotting unicorns is likely a big pull for these billionaire family-controlled conglomerates.

Foreign investors comprise venture and corporate venture capital companies, as well as accelerators. They either have an investment focus on Indonesia the country, or specialize in the agriculture, fishery and aquaculture sectors.

The investors of JALA, 500 Startups, Hatch and Brinc, are a case in point. Early-stage investor 500 Startups, which has had many successes in various industries globally, has been active in Indonesia since 2011. JALA, meanwhile, can also leverage Hatch's aquaculture expertise and Brinc's strengths in the development and manufacturing of specialized hardware.

A notable first-timer to Indonesia is DFS Lab, an emerging market fintech accelerator and investor backed by The Bill and Melinda Gates Foundation. In May 2019, DFS Lab and other foreign investors participated in a $10m funding round for Indonesian agritech startup TaniGroup, joining Alpha JWC Ventures, a major player in the Indonesian venture capital circles.[19]

The Indonesian agritech investment sector also has unicorns for company. The venture capital arm of Singapore-based Southeast Asian ride-hailing giant Grab admitted three Indonesian agritech startups into its second accelerator program, which was launched in July 2019.[20] One of them is TaniGroup, whose e-commerce business, TaniHub, has gone on to distribute crops grown by small-holder farmers for sale at Grab's GrabKios network of street vendors in four major cities in Indonesia.

E-commerce marketplace Tokopedia is in talks to invest in an agritech startup that will enable its customers to buy directly from small-holder farmers and fishermen.[21] Tokopedia CEO and co-founder William Tanuwijaya told the press that e-commerce reduces the role of middlemen in the supply chain and increases profits for farmers and fishermen. "We want to bring [farmers and fishermen] that efficiency because if they get more profits, they can re-invest in their businesses to buy more land, new boats or new technology," he said.

This report features four key investors of the Indonesian agritech startup scene. Other notable agritech investors are listed in the **Annex**.

East Ventures

P2P lending | Education and guidance | E-commerce | Logistics

YEAR FOUNDED
2009

HEADQUARTERS
Jakarta, Indonesia

FOCUS
Seed and early-stage in Southeast Asia and Japan

AGRITECH INVESTMENTS
Eragano, iGrow, Kedai Sayur, Limakilo (since acquired by micro-retail startup Warung Pintar, an East Ventures spinoff)

LAST MAJOR INDONESIAN AGRITECH FUNDING
Led $4m funding round for Kedai Sayur in August 2019 after a $1.3m seed round in May 2019

ALSO WORTH NOTING
East Ventures was one of the first VCs to invest in Tokopedia (in 2010) and Traveloka (2012). Both startups are unicorns today. East Ventures' investors include local conglomerates Emtek and Sinar Mas, and Singapore state-owned investment firm Temasek.

East Ventures is one of Indonesia's best known and most active venture capital firms. It has four unicorns in its portfolio – including Tokopedia and Traveloka – and invests across multiple industries. The VC's primary focus is Indonesia, but it also invests in Southeast Asia and Japan.

The firm was formed in 2009 by Managing Partners Willson Cuaca, Batara Eto and Taiga Matsuyama. Cuaca and Eto were high school friends in Medan, the capital of North Sumatra province. Matsuyama got to know Eto because he was a director at Bit Valley Association, in Tokyo, which invested in a social media firm that Eto had co-founded in 2004. Cuaca previously ran Singapore-based startup Apps Foundry, known for developing the digital reading app, Scoop.

Tokopedia, in fact, was East Ventures' first investment, in 2010. The VC then built its reputation through various highly profitable divestments, such as daily deals website Disdus to Groupon in 2011. In 2017 and 2018, significant funding from foreign investors made Tokopedia and Traveloka unicorns. A key challenge for East Ventures is to sustain its track record. Its funds are often oversubscribed, including by prominent investors such as Facebook co-founder Eduardo Saverin, Indonesia's biggest conglomerates and Singapore state investment firm Temasek.[22]

Hatch

Education and guidance

Technology development

YEAR FOUNDED

2018

HEADQUARTERS

Bergen, Norway

FOCUS

Pre-seed or seed-stage startups in aquaculture worldwide

AGRITECH STARTUP INVESTMENTS

JALA

LAST MAJOR INDONESIAN AGRITECH FUNDING

Seed funding (amount undisclosed) for JALA, alongside other investors, in September 2019

ALSO WORTH NOTING

Hatch rotates its accelerator program between its offices in Hawaii, Norway and Singapore. Each initial investment carries value of €100,000 (comprising cash, training and resources) for 8% equity. Follow-on investments range from €100,000 to €1m.

There are plenty of opportunities to innovate and disrupt in aquaculture and Georg Baunach, who is a co-founder and managing partner of Hatch, believes Asia will be a key source of such changes. “Ninety percent of aquaculture production is in Asia, so there is a clear advantage for Asian companies to understand the farmer and the industry they are trying to target,” he said.

Launched in 2018, Hatch is the world’s first accelerator and venture capital investor for aquaculture startups globally. It wants to make aquaculture businesses more productive and sustainable as global appetite for seafood grows. Hatch’s team comprises self-described “aquaculture enthusiasts and entrepreneurs.” Baunach is a molecular biotechnologist by training. His co-founders, Carsten Krome and Wayne Murphy, have prior experience in private equity, venture capital and early-stage business consultancy in aquaculture and other industries.

Each startup admitted to Hatch’s 15-week accelerator program gets €100,000 in initial funding – of which half is cash – as well as mentoring and access to Hatch’s research and development resources. In turn, Hatch takes an 8% stake in the investee startup. Hatch has a network of research institutes, non-government organisations and seafood producers that mentor or partner startups to trial their ideas for commercial viability.

Salim Group (via Innovation Factory and pre-seed accelerator Skala)

Education and guidance | E-commerce | Sustainable food waste management and animal feed production

YEAR FOUNDED
2017 (Innovation Factory) and 2018 (Skala)

HEADQUARTERS
Jakarta, Indonesia

FOCUS
High-growth technology-based startups in various industries

AGRITECH STARTUP INVESTMENTS
8villages, Magalarva

LAST MAJOR INDONESIAN AGRITECH FUNDING
Magalarva via Skala, which invested $30,000 for a 5% equity, in 2018

ALSO WORTH NOTING
Billionaire Anthoni Salim and his family own and control the Salim Group, whose diversified interests include oil palm and food manufacturing. One of Salim Group's subsidiaries, Indofood, is one of the world's largest producers of instant noodles.

Agriculture is critical to the Salim Group, one of Indonesia's biggest conglomerates controlled by billionaire Anthoni Salim and his family. It grows and processes oil palm, rubber and sugar. The conglomerate also produces instant noodles, snacks and food products that are staples in Indonesian homes, and its agricultural and food businesses operate well-developed supply chains.

The Salim Group is keen on investing in tech disruption to stay ahead. In 2017, it put money in 8villages, an education app for small-holder farmers and rural communities that seeks to reduce their reliance on profiteering middlemen. With 93% of Indonesia's farms concentrated in small holdings, 8villages' goal to improve produce quantity and quality will help stabilize supply for the Salim Group.

In 2018, Skala, a startup accelerator backed by the Salim Group, invested $30,000 for a 5% stake in Magalarva.[23] The Jakarta-based startup cultivates black soldier fly larvae to process organic waste and harvests the larvae too, which it uses as protein to manufacture animal feed. The larvae's droppings are used to manufacture fertilizer. There is plenty of trash at KFC outlets – the Salim Group is a major shareholder of the fried chicken franchise in Indonesia – to feed Magalarva's larvae, which can double as raw material for the Salim Group's poultry feed business.

While JALA is Hatch's sole Indonesian investment to date, Indonesian aquaculture is teeming with talent based on the applications that Hatch receives. Baunach said: "I'm impressed by the Indonesian aquaculture ecosystem. You would not find such a high number of startups compared with other countries in Southeast Asia. Some startups in Indonesia are very familiar with the problems."

The key to tackling these problems, Baunach says, is to manage the pond properly. JALA's proprietary devices monitor water quality in shrimp ponds and, based on the data the devices collect, JALA tells farmers how to increase yield and reduce loss due to disease and water-related pond conditions.

"What Jala does is to make that data easier to understand and actionable for farmers. We have seen improvements in many performance metrics, such as feed conversion ratio and overall productivity," Baunach said.

JALA has launched pilot projects in China, Vietnam and India, which are also major aquaculture producers. "I don't think the problems are specific enough that you say one solution is only for one country. If an entrepreneur develops a solution for aquaculture in Indonesia, it is quite likely that you can take this to other markets," he said.

He cited feed nutrition, disease diagnostics and financing as areas that can be improved and noted the growing interest in aquaculture startups from existing industry players, corporate venture capital and generalist investors globally.

UMG Idealab Indonesia

P2P lending | Education and guidance | E-commerce | Technology developement

YEAR FOUNDED
2018

HEADQUARTERS
Jakarta, Indonesia

FOCUS
Seed funding for Indonesian startups working in Internet of Things (IoT), big data, voice recognition and artificial intelligence

AGRITECH STARTUP INVESTMENTS
Aruna, Biotech, Crowde, Inagi, MSMB

LAST MAJOR INDONESIAN AGRITECH FUNDING
N.A.

ALSO WORTH NOTING
Its parent company, UMG Myanmar, is a Myanmar conglomerate with core interest in agricultural heavy equipment. Co-founder of UMG Myanmar, Kiwi Aliwarga, is Indonesian. Its current portfolio covers 50 startups in Asia.

Selling heavy equipment has been a key business for Myanmar's UMG Group, but it now wants to mine the talent of young Indonesians for its future growth. Since 2015, UMG's corporate venture capital arm, UMG Idealab, has invested in about 50 tech-focused startups in Myanmar, Indonesia, Thailand and China, across various industries.

"As one of our core businesses is heavy equipment, we are interested to invest in Indonesia's agriculture industry. We empower youth who have good product ideas, but aren't yet confident in developing their business," said Jefry Pratama, Investment and Venture Partner at UMG Idealab Indonesia.

UMG Group has a special link to Indonesia. Its co-founder, Kiwi Aliwarga, is Indonesian and worked for local conglomerate Astra Group, whose diversified operations inspired him to do the same in Myanmar.

UMG Idealab mentors its startups by way of progress monitoring, collaboration and technological support. Pratama foresees cross-selling opportunities with UMG Group when the startups' offerings are ready for commercialisation.

"We can offer the products of these startups to our customers abroad. We can also offer UMG's equipment to the startups or their clients, but this is not done yet," he said.

In Indonesia, UMG Idealab has invested in agritech startups Aruna, Biotech, Crowde, Inagi and MSMB. The industries of these startups span across bio-technology, peer-lending, e-commerce, precision farming and new technology-based solutions for farming that can be applied to different crop types, fishery and aquaculture.

UMG Idelab's agritech investments have had varying degrees of success to date. One of them, peer-lender Crowde, clinched $1m in pre-Series A funding in September 2019 from Mandiri Capital Indonesia, the corporate venture arm of Indonesia's biggest bank, the state-owned Bank Mandiri. Another UMG investee, e-commerce platform Aruna exports high-value seafood caught in Indonesian waters, such as filleted tuna and lobsters, to buyers in Japan, China and the US.

But for high-technology agritech solutions like drones for precision farming, demand in Indonesia is very low. "Right now, the more high-tech it is, the less likely there are immediate buyers," Pratama said. "There is great potential, but it might not be easily accepted by the market yet."

"In agritech, the best way to get revenue so far is to sell the harvest," he said. That is why MSMB, a precision farming startup UMG has invested in, is also selling produce, to "at least cover our expenses before we can innovate further."

UMG Idealab is keen to further explore the field of data collection, given the huge dearth of data about farmers and their activities. Pratama said: "This data is of interest to investors. If there is a big database for agriculture data, we can integrate with other industries, like insurance, farming supplies and heavy equipment. We would know the needs and capabilities of each farmer and then can provide for their needs."

Conclusion and Outlook

We are confident about the future of Indonesian agritech startups. Their role should increase in importance over time as Indonesia's food production capacity comes under pressure from population growth, urbanization and climate change. Applying new technologies to farming can help Indonesia achieve its goal of growing non-oil and gas exports (including food) by up to 12.23% by 2024 and keep its trade balance in check.[24]

Economic drivers aside, our optimism also is influenced by the generation of educated, energetic and socially conscious young Indonesians who created and run these agritech startups. Their work can play a pivotal role in slowing the decline of Indonesia's agriculture workforce, while also boosting the incomes of farming and fishing households.

Having said that, there are still a number of challenges in Indonesian farming and fishing that need addressing, so that the local agritech startups can become sustainable and profitable over time. These startups can work hand in hand with investors, government bodies and international organizations. Doing so will set off a virtuous circle of growth: Cooperation among the various stakeholders will lead to a pooling of resources that will increase the likelihood and pace of developing effective solutions. Success stories will in turn encourage more partnerships among agritech players and attract funding from investors.

"I'd like to invite Indonesia's youth to dive into this field. Don't abandon agriculture, because our country is an agrarian country with ideal weather, fertile yet unused land. It would be a shame if we cannot develop this potential."

— Jefry Pratama
Investment & Venture Partner, UMG

"Indonesia is one of the top exporters of fish and many countries depend on our fish production. Our best quality local seafood isn't actually sold locally."

— Utari Octavianty
General Director and co-founder, Aruna

Better links, less loss

The FAO estimates that 120 kg to 170 kg of food per capita is lost or wasted annually in South and Southeast Asia. Indonesia needs to improve its logistics and supply chain infrastructure to prevent vegetable, fruit and grain loss caused by poor storage and transportation. Statistics from the Asian Development Bank attributed 25–45% of produce spoilage to poor packing, inadequate cooling and long transportation time.[25]

Government and private players can help reduce post-harvest loss. Building warehouses, packing houses and cold storage facilities close to farmland and fishing villages can increase the shelf life of produce while reducing loss due to improper handling or rotting. Food transport infrastructure should also be improved through better road linkages and temperature-controlled vehicles.

Some agritech startups are taking the lead in coming up with solutions to these logistical challenges. In September 2019, TaniGroup started TaniSupply to plug supply chain gaps. Farmers supported financially by its crowdlending platform TaniFund sell their fruit and vegetables to TaniSupply, which runs quality control tests and stores the graded fresh produce in cold storage warehouses. When an online order is made on TaniHub, the Group's e-commerce unit, TaniSupply packs and delivers the order to the customer.

Another startup 8villages is working with farming intermediaries to create VLOGS, which aggregates data about logistics providers on a single digital platform to help farmers and buyers make informed hiring decisions. If small-holder farmers from neighboring villages can agree on the same logistics provider, for example, they can increase their bargaining power by collectively asking for lower shipping rates.

The overall standards and operating environment could also improve if big e-commerce players like Tokopedia get into agriculture. Tokopedia is developing smart warehouses across Indonesia that can predict which items sell best in the closest cities by physical distance.[26] Its network of over 4m micro, small and medium-sized merchants can place their stock in a warehouse based on predicted buying trends. This model can be adopted for agricultural produce, as rural small-holder farmers and fisherfolk face similar financial and logistical challenges as Tokopedia's merchants.

Simplifying the transport and processing chain will also reduce post-harvest loss by reducing the number of steps involved in between. Startups and governmental organizations can work toward strengthening local food markets, which will allow fresh produce to reach the market and consumers through as few brokers as possible. Farm-to-table initiatives work in a similar manner, reducing the amount of time and steps required for food to reach consumers.

But these solutions will be moot without potable water, electricity, internet access and better transport links in rural farming areas. Infrastructure development has always been challenging in Indonesia, the world's largest archipelagic country. Foreign governments and international organizations like The World Bank and Asian Development Bank have been active investors in rural infrastructure projects. The Indonesian government should also seek input on infrastructure development from agritech startups, as they work closely with small-holder farmers and fishermen in their day-to-day operations.

For food security, go local

Indonesia has a fast-growing middle class. From 45m in 2010, Indonesia's middle-class population expanded to 60m in 2019 and is projected to hit 85m in 2020.[27] Assuming this demographic group will follow the same consumer behavior and purchasing patterns as middle-class populations in other parts of the world, this segment of the populace will increasingly want and have the purchasing power for healthier food, including fresh, safe and sustainable produce. Many Indonesians already consume locally grown food, but there is still room to improve the demand for vegetables, fruit, meat and seafood.

"We hope that people are more willing to learn about where their food comes from, as a food security topic. We hope that they don't just eat, but care about the people who grow their food."

— Sanny Gaddafi
CEO and founder, 8villages

With the Covid-19 pandemic threatening to affect global food supply chains, there has been renewed interest in national food security and food sustainability. In March 2020, as Jakarta residents turned to frenzied stocking up of food supplies for self-isolation at home, many local supermarkets ran short of products. Some Indonesian farm-to-table e-commerce startups also reported surges in orders on the back of stronger demand for home delivery businesses. TaniHub, for instance, noted an unusually high increase in the number of new users in the space of a week.[28] Another agritech e-retailer Sayurbox apologized for delays in fulfilling orders and supply shortages, and asked shoppers to cut purchases to once a week.[29]

"It's either they don't know, or they don't trust local products. Maybe they think that when it comes to fish, it has to be from Japan to be of good quality."

— Utari Octavianty
General Director and co-founder, Aruna

Boosting local farming as a sustainable economy will help strengthen Indonesia's food security. The government and agritech startups can collaborate to promote "buying local" as part of supporting Indonesia's farmers. Companies in the food and beverage business, from specialty restaurants and hotels to food manufacturers, can invest in agritech startups, or at least become their customers.

For example, if a sushi restaurant chain needs high quality fish, they can source the ingredient from Indonesian waters, thanks to startups like Aruna. Local health food chains can burnish their sustainability credentials by buying fair trade products from TaniFood, RegoPantes and other farm-to-table marketplaces.

In the peer-to-peer lending market, scams and other unscrupulous practices remain a key concern, so stronger regulations and enforcement are needed. The government can build confidence in P2P agricultural investment programs by creating clearer crowd-lending rules with the principal goal of protecting consumers, both the retail investor lenders and the farmers who borrow. This will help the agricultural industry grow a broader base of retail investors, which in turn will allow small holdings to expand their business. More direct support from retail investors will also reduce farmers' dependency on government aid.

Scaling up meaningful data

On the supply side of agriculture, there are plenty of opportunities to improve productivity as well as the living standards of farmers and fisherfolk. To begin with, there needs to be a concerted effort by both the public and private sectors to improve community practices, especially financial literacy, in addition to agricultural and fishery practices.

According to Aruna co-founder Utari Octavianty, fishermen would often not go out to sea until they had borrowed money to fund the trip. They would seek out local brokers, loan sharks that bind the fishermen to unfair sales contracts. Aruna now assists fishermen in saving their earnings and budgeting household expenses so they can avoid borrowing money.

Farmers, businesses and the government all seek to collect data and make sense of it, but in Indonesia, these are often time- and labor-intensive processes. Data collection is an area where startups and collaborations can drive innovation. 8villages and HARA are both building their own database with information on farmers, crop yields and land ownership. These data points can be used to support farmers in many ways, including forecasting harvest yields, recommending seasonally in-demand crops to farmers, and creating agriculture insurance and financial products based on insights obtained from analyzing historical climate and farming output data.

Local and national governments and startups can also devise solutions in advance of price fluctuations. These solutions would allow farmers to avoid repeating what happened in Garut regency in 2015. Local tomato farmers who enjoyed a bumper harvest, however, found themselves faced with flagging demand. Out of frustration, they chose to destroy their tomatoes, which were commanding less than 20% of their regular selling price.[30]

"The government can play a more active role in developing Indonesia's agriculture to be more resilient. We need to fund R&D in Indonesia."

— Pamitra Wineka
President and co-founder, TaniGroup

"One of the biggest problems, in my opinion, is the availability of seeds and starter stock. Indonesia has few locally made quality seeds and starter stock."

— Pamitra Wineka
President and co-founder, TaniGroup

"The startups need to educate the market on agritech products' potential. Currently, the more high-tech it is, the less likely there are immediate buyers. Sometimes the government can be the buyers, especially for high-tech equipment."

— Jefry Pratama
Investment & Venture Partner, UMG

Research and development

For Indonesia's agricultural industry to continue growing, research and development (R&D) efforts need to accelerate. To help local farmers improve yields and reduce losses, more work is needed in enabling the production of high quality seeds and starter stock, and developing better disease diagnostics tools and new hardware.

Startups may not have the resources to overcome the high barriers to entry in "deep" biotechnology research required for seed development. They would benefit from the support and collaboration with local universities, such as the Bogor Agricultural Institute (IPB) and Universitas Gadjah Mada, in agritech research, especially in seed development. Universities are equipped with the expertise and facilities to pursue cross-breeding, genetic engineering and other basic science projects. Unfortunately, R&D in Indonesia is still underfunded: in 2018, Indonesia's overall R&D budget was IDR 25.8tn ($1.83bn), less than 0.2% of GDP.[31]

Currently, many multinationals are producing high-yield seed varieties in Indonesia. These companies are supported financially through collaborations with local players and the central government, as well as by their own budget. Involving these companies in research collaborations can accelerate the development of seeds that cater to local needs and conditions, such as varieties that are more drought- or pest-resistant.

Another possible avenue for improvement is livestock feed production. Corn and fishmeal are critical ingredients in animal feed, but corn supply is more volatile than rice and not considered as important as the staple crop, while fishmeal production contributes to overfishing. Developing an alternative feedstock could help boost nutrient content and variety in animal feed. Insect-based proteins, for example, can replace fishmeal.

Finally, if Indonesia wants to support further agritech research, it needs to bolster efforts to protect intellectual property (IP) in all its forms. As of April 2019, Indonesia is on a US government watchlist for its perceived inability to effectively protect intellectual property rights and enforce regulations.[32] Copyright infringement and software piracy are rife in both public and private sectors in Indonesia. If these problems persist, universities and companies at all levels may decide that there are few benefits to developing new IP in the country.

Annex

Other key local and foreign investors of Indonesian agritech

LOCAL Investors

VENTURE CAPITAL FIRMS

Alpha JWC Ventures

YEAR FOUNDED

2015

FOCUS

Early to growth-stage tech-focused startups in Indonesia

INDONESIAN AGRITECH STARTUP INVESTMENTS

Limakilo and TaniGroup

AGRITECH INVESTMENT AREAS

P2P lending, education and guidance and e-commerce.

LAST KEY INDONESIAN AGRITECH FUNDING

Limakilo in July 2018 (amount undisclosed)

ALSO WORTH NOTING

Invested over $25m in peer-to-peer lender Modalku, which has been working with TaniGroup's farming-focused peer-to-peer lending business

LOCAL Investors

STATE-LINKED COMPANIES

Mandiri Capital Indonesia

YEAR FOUNDED
2016

FOCUS
Series A fintech, but now diversifying its sectors of interest; Southeast Asian startups

INDONESIAN AGRITECH STARTUP INVESTMENTS
Crowde. Runs an incubator program that has admitted agritech startups Infishta, Iwak and Limakilo

AGRITECH INVESTMENT AREAS
P2P lending, education and guidance, e-commerce and logistics

LAST KEY INDONESIAN AGRITECH FUNDING
$1m in Crowde in September 2019. Also provided Crowde $7.1m in loans.

ALSO WORTH NOTING
Mandiri Capital is the corporate venture capital arm of state-owned Bank Mandiri.

Telkomsel

YEAR FOUNDED
1995

FOCUS
Telecommunications

INDONESIAN AGRITECH STARTUP ACTIVITIES
Runs NextDev startup competition and NextDev Academy to mentor competition finalists. Agritech participants have included Eragano, Habibi Garden, Vestifarm and Taponesia

AGRITECH INVESTMENT AREAS
P2P lending, education and guidance, e-commerce and technology development.

LAST KEY INDONESIAN AGRITECH FUNDING
N.A.

ALSO WORTH NOTING
Parent company Telkom Indonesia is majority-owned by the Indonesian government.

LOCAL Investors

CONGLOMERATES

Sinar Mas Digital Ventures

YEAR FOUNDED
2014

FOCUS
Tech-focused startups in Asia; seed, Series A and B rounds

INDONESIAN AGRITECH STARTUP INVESTMENTS
HappyFresh, Kedai Sayur

AGRITECH INVESTMENT AREAS
E-commerce and logistics.

LAST KEY INDONESIAN AGRITECH FUNDING
Kedai Sayur, as participating investor in $4m round in August 2019

ALSO WORTH NOTING
The VC firm is part of the Sinar Mas Group, which is owned by the billionaire Widjaja family. Oil palm, pulp and paper operations have generated for the conglomerate extensive wealth, as well as criticisms from global environmentalists. Sinar Mas Digital Ventures is also an investor in East Ventures.

Triputra Group

YEAR FOUNDED
Late 1990s

FOCUS
Seed and early-stage in Indonesia

INDONESIAN AGRITECH STARTUP INVESTMENTS
efishery, Kedai Sayur

AGRITECH INVESTMENT AREAS
E-commerce and logistics.

LAST KEY INDONESIAN AGRITECH FUNDING
Kedai Sayur, as participating investor in $4m round in August 2019

ALSO WORTH NOTING
Rubber and oil palm are Triputra Group's core businesses. The group is led by founder Theodore Rachmat. His son, Arif, is an early agritech investor in efishery, HARA and TaniGroup.

FOREIGN Investors

500 Startups

YEAR FOUNDED
2010

HEADQUARTERS
San Francisco, USA

CURRENT PORTFOLIO
Over 2,210 startups globally

DEAL SIZE
Initial investment of $150,000 for 6% equity. Potential follow-on investment of up to $500,000

FOCUS
Early-stage startups (for venture capital) and seed-stage (for accelerator) globally

INDONESIAN AGRITECH STARTUP INVESTMENTS
JALA, efishery, iGrow

AGRITECH INVESTMENT AREAS
P2P lending, education and guidance, e-commerce and technology development.

LAST KEY INDONESIAN AGRITECH FUNDING
Lead investor in September 2019 seed funding for JALA; amount undisclosed.

ALSO WORTH NOTING
Portfolio has produced 14 unicorns, including Grab, with total committed capital exceeding $454m as of end-2018.

FOREIGN Investors

Brinc

YEAR FOUNDED
2014

HEADQUARTERS
Hong Kong

CURRENT PORTFOLIO
81 startups globally

DEAL SIZE
Varies on location and program type. For its Hong Kong and China hardware and IoT accelerator program, an initial investment of $100,000 for 8–13% equity

FOCUS
Pre-seed to Series A in IoT, robotics, drones, other hardware and food technology

INDONESIAN AGRITECH STARTUP INVESTMENTS
Habibi Garden, JALA

AGRITECH INVESTMENT AREAS
Education and guidance and technology development.

LAST KEY INDONESIAN AGRITECH FUNDING
N.A.

ALSO WORTH NOTING
Preference for early-stage proprietary hardware and technologies. Has a strong network of manufacturers in China. In May 2019, Brinc raised $1.5m for its new China-focused training program for its incubator and accelerator activities.

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