Investment Guideline for Sustainable Aquaculture in Indonesia

2018

yayasan inisiatif dagang hijau

WALTON FAMILY FOUNDATION

Foreword

Yayasan Inisiatif Dagang Hijau (YIDH) believes sustainable production and trade can transform markets for the benefit of people and the planet. We convene companies, CSOs, governments and others in public-private partnerships. Together we drive the joint design, co-funding and prototyping of new economically viable approaches to realize green, blue and inclusive growth at scale in commodity sectors and sourcing areas. To enable scalable and sustainable production of commodities in a supply chain or sourcing area, such as for aquaculture, sufficient and appropriate investment is required.

The global aquaculture sector significantly contributes to fish production (around 46% in 2016, projected to reach 54% in 2030, or 21 times growth since 1970s). Indonesia is currently the third largest producer of aquaculture-related products. With such a crucial contribution, this investment guideline for sustainable aquaculture is important, especially in ensuring that present and future investment in, or financing of, aquaculture development will not only lead to accelerated growth but also sustainable growth.

Access to finance in the aquaculture sector has traditionally been a hotly debated topic. On one side, there is recognition that aquaculture is needed to satisfy the growing demand for quality animal proteins. On the other, the risks associated with aquaculture production and the fragmentation of the sector – especially in tropical aquaculture – have limited the appetite for investors to finance the sector, other than services and processing.

This document is designed for investors operating in Indonesia. It aims to provide a summary of the aquaculture sector and its potential, a description of the risks and mitigation strategies, and a presentation of possible financial models.

Acknowledgements

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We are also grateful to the Ministry of Maritime Affairs and Fisheries (KKP) and its departments for sharing data and knowledge of the Indonesian aquaculture sector, its potential and challenges.

We would also like to thank all the people and organizations who participated in bilateral and group discussions, without whom it would have been impossible to generate guidelines that are truly applicable to the current reality of Indonesian aquaculture.

The document is unique in that it can be used by private-sector players along related aquaculture supply chains as well as financial institutions and donors. YIDH intends the document to make a starting point for various stakeholders and regulators to support better investment in sustainable aquaculture, and to open the discussion on new ideas and opportunities in the future.

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Salam,

Fitrian Ardiansyah

Chairman of Executive Board

Yayasan Inisiatif Dagang Hijau

Chapter 1:
A SHORT GUIDE TO AQUACULTURE

To feed the ever-expanding global population, we need to roughly double global food production in the coming 25 years. But our planet has limits, and we cannot continue to produce food in the same way we do now to feed future generations.

Fish (here defined as fish, crustaceans, molluscs and other aquatic animals) is a food source consisting of proteins, as well as healthy omega-3 fatty acids and essential nutrients, including iodine, vitamin D and calcium. Fish can be caught or farmed. The volumes of fish from capture fisheries were increasing until the 1980s, when fish populations started to become depleted due to overfishing (see Figure 1). The share of fish stocks within biologically sustainable levels were 90% in 1974, declining to 66.9% in 2015, meaning that more than 33.1% of fish in 2015 were overfished. It seems unlikely that fish stocks will be able to recover the 30% quickly, as the recovery effort requires time (two-three times the species' lifespan) (FAO 2018).

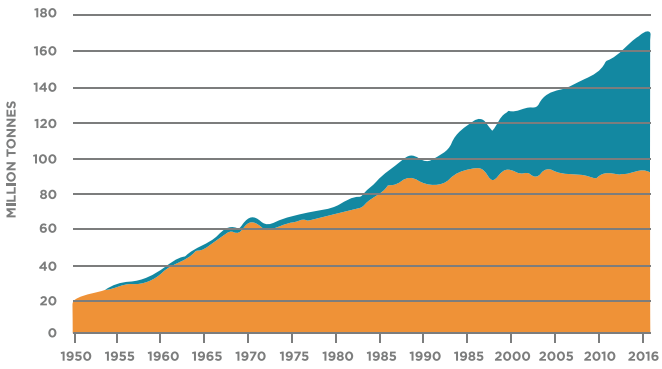


Figure 1: World capture fisheries and aquaculture production, excluding aquatic mammals, crocodiles, alligators and caimans, seaweed and other aquatic plants (FAO 2018)

The definition of aquaculture

The term aquaculture broadly refers to the cultivation of aquatic organisms including finfish, molluscs, crustaceans and seaweed.

Aquaculture is one of the solutions to food security, as it is an efficient way of producing protein compared to other livestock. Farming fish is seven times more efficient when it comes to feed than producing beef. The aquaculture sector also has a lower carbon footprint compared to other livestock sectors (Nidjam et al. 2012), requiring less water, energy, feed and fuel per cycle. But fish need to be farmed responsibly for the sector to be a sustainable solution to feed a growing world population.

Nowadays, 53% of all fish consumed comes from aquaculture, making farmed fish an important source of protein for people worldwide. As the fastest growing food industry globally, aquaculture grew by more than 21 times since the 1970s.

Aquaculture includes several culture methods including ponds, tanks, nets, bags or cages. An important difference between the various systems is the level of intensification; this is based on the use of productive technologies and inputs such as feed, seed, labor, capital and management. The culture systems can be categorized as follows:

Extensive

- No additional feed
- Minimum stocking density
- Basic infrastructure, usually in ponds
- High dependency on naturally available food

Semi-intensive

- No additional feed
- Minimum stocking density
- Basic infrastructure, usually in ponds
- High dependency on naturally available food

Intensive

- Artificial feed
- High stocking density
- Sophisticated technology
- Commercial operations

Aquaculture can be conducted in freshwater, seawater or brackish water.

Global aquaculture production

Asia has contributed more than 89% of total global aquaculture production for over two decades. China is the greatest producer by both value and volume (see Figure 2).

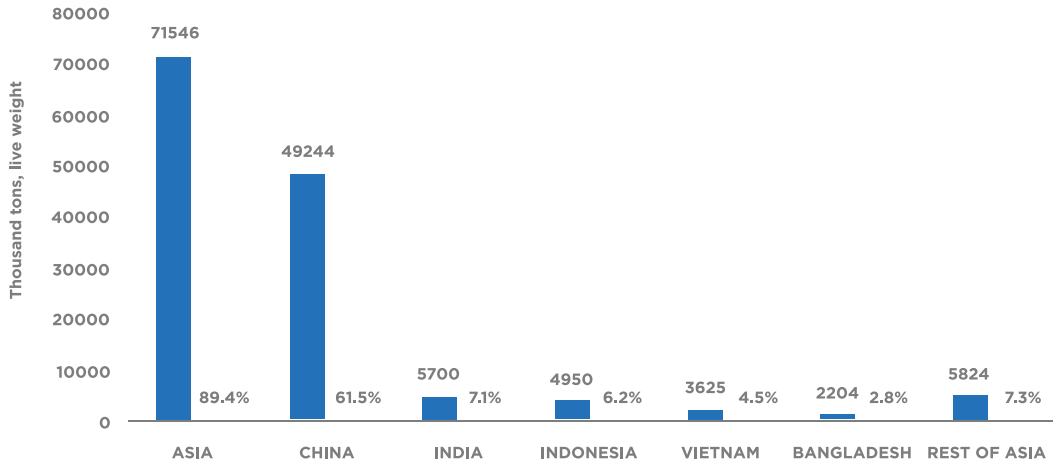


Figure 2: Aquaculture Asia production by major producers in thousands of tons; percentage of the world total in 2016 (FAO 2018)

Some aquaculture species such as salmon and shrimp are classified as high value due to strong international trade and relatively high prices. Salmon is mainly produced in countries with low water temperature such as Norway, Canada, Scotland, the United States, and Chile. Shrimp are mainly produced in tropical countries such as China, Thailand, Vietnam, India, Indonesia and Ecuador. Farmed white fish species such as pangasius and tilapia are also farmed in the tropics and supply a different market because they are relatively cheaper than other species.

Aquaculture in Indonesia

Indonesia is the third largest country in terms of total aquaculture production (FAO 2018). The government recognizes the importance and benefits of aquaculture, and has consequently set ambitious targets for 2030: the government estimated that aquaculture can expand by up to 12 million hectares, while the targeted annual growth rate of most species is around 8.5%. This expansion is considered necessary to meet the future demand for fish.

Indonesia shows strong potential for aquaculture as the country comprises 16,056 islands and has a coastline of around 81,000 kilometers. From the total potential area of 17.9 million hectares, only 1.3 million is used for aquaculture, which accounts for 7.4%.

Farmed species

Indonesia has a high aquaculture species diversity ranging from fresh to marine culture, from inland to offshore culture. Indonesia cultures more than ten species in freshwater, including tilapia, pangasius, common carp, catfish, gurami, silver barb, nilem carp, snakehead, giant prawn and others. Vannamei and monodon shrimp have the highest value in brackish water culture. In marine culture, Indonesia produces some high-value products such as grouper, seabass, pompano, molluscs and seaweed.

Aquaculture business in Indonesia

Of all fish producers in Indonesia, 80% are smallholders, and 20% are large-scale companies. While for shrimp production, 70% of the farms are owned by smallholders and 30% are managed by big companies. Based on the government definition, a smallholder:

- uses simple technology in aquaculture;
- farms on a total area of maximum 2 hectares in freshwater and seawater, and less than 5 hectares in brackish water.

Chapter 2: **RISKS**

Introduction

Aquaculture is often perceived as a high-risk sector. When crops fail, losses can be considerable and the actual risk of failure at any given moment is often unknown because of a lack of information. In addition, when considering aquaculture, financial institutions often think about shrimp farming, which is arguably the sub-sector with the highest history of failure.

This chapter indicates the main risks associated with aquaculture, prioritized according to the outcome of stakeholder consultations. A true assessment of the risk profile of different producers can only be conducted when accurate data on production, risk factors and the associations between these can be conducted at different points in time.

From the financial institution perspective, there are three risk categories (that may overlap):

1. Production risks: risks affecting the ability of an investee to generate a profit because of production failures.

2. Market risks: risks associated with the inability of an investee to generate a profit because of market factors. Market risks include also environmental and social impacts that may affect the reputation of the investee and consequently the reputation of the institution involved.

3. Political and social risks: risks that are associated with changes in the political or legal system, or in the social acceptance of an investee's production activities

1. Production risks

Disease occurrence/poor performance

Disease is arguably the biggest risk associated with most forms of aquaculture, especially in shrimp farming. The underlying cause of diseases is often limited investment and aquatic animal health management, associated with the traditional, smallholder nature of farming.

Farming system

The farming system has a profound effect on performance and success rates: the ability of farms to provide a suitable environment, and remove waste and unwanted organisms. For example, a pond which takes in and discharges water from opposite, disconnected

channels is at lower risk of self-pollution; ponds that use a plastic lining are easier to clean; ponds using a central drainage system allow for easier removal of waste and weak (potentially infected) animals.

Land and pond preparation

The preparation of a farm before stocking is arguably as important as the farming practices themselves. Poor pond preparation affects the water in the pond and, in the case of shrimp farming, affects the animals' health and ability to cope with diseases. Pond preparation requires effort to remove waste from the previous crop, and time to ensure that the water to be stocked is free from pathogens and provides the right environment to welcome the fish to be stocked.

Seed quality and stocking density

The most common way pathogens are introduced to a farm is through the infected seed (e.g. shrimp Post Larvae, PL). In this case, it is virtually impossible to remove, meaning the risk of an outbreak and crop failure is generally high. Seed that has been generated from poor-quality broodstock or managed poorly will also perform badly, and will either grow slowly or be more susceptible to health problems and failure.

The number of seeds stocked per unit area, called stocking density, can also affect productivity and disease risk. The higher the stocking density, the higher the yield in successful crops. However, the lower the stocking density, the faster the growth and the lower the risk of disease outbreaks.

Feed quality and management

Most aquaculture production systems use external feed, with only very low-density systems (approximately 1-2 shrimp per square meter) not requiring external feed as they generate enough natural feed in the pond. Feed is most often the largest cost item in aquaculture; it therefore offers opportunities for cost saving that can be associated with reduced quality and performance.

The feed must contain enough of the right nutrients in the correct proportions (e.g. the ratio between protein and energy/fat), including micro-nutrients such as minerals and vitamins. In addition to the feed formulation, the practices used to feed the animals are equally, if not more, important. Feeding too little will limit growth, while feeding too much will pollute the water.

Water quality management

Fish are very efficient at producing animal proteins. This is partially due to the fact that fish float in water, requiring less energy to sustain themselves than animals that stand on land. Water quality is therefore extremely important in aquaculture. Fish not only take oxygen from water, they excrete toxic products like ammonia into the water – these would be toxic to the fish stock if at too high a concentration. The water (and its salinity) is also essential to the osmoregulation (salt balance control) of the fish. In addition, animals like shrimp get the salts necessary to build their shell from water. Changes in the concentration of oxygen, toxic substances, salt and so on can all dramatically affect the health and performance of a fish. Furthermore, fish are cold blooded and grow faster at higher temperatures (up to a limit – if too high, their health is negatively affected).

Most farming systems need to extract water from the surrounding environment, sometimes to manage water quality within the farm (e.g. to dilute excess nutrients, provide oxygenated water, etc.) and sometimes to compensate for the water lost through evaporation. The quality of the water to be extracted is therefore very important.

Biosecurity

Maintaining a suitably biosecure system is essential, as the introduction of pathogens into the system opens the farm to risk of outbreaks. It is important that farmers adopt hygienic practices that limit pathogen entry, including the disinfection of personnel before entering the farm, and the disinfection of any tools used in other ponds or farms (including water testing equipment).

Power supply

With few exceptions (e.g. very extensive, low density systems) farms require power, especially to activate equipment that increases the water oxygen (e.g. paddlewheels). When power failures occur, oxygen levels can reach dangerous levels, and in extreme cases, the crop can be lost completely.

Neighboring farms

Diseases can spread between farms. Although farmers try to mitigate the risk of infection from neighboring farms by adopting biosecurity strategies (see above), it is almost impossible to completely eliminate this risk. Sharing information and collaboration is key to profitable investment (see Chapter 3).

Services

Farmers often rely on advisory services to guide them throughout the crop cycle. Such services include extension workers, input suppliers (feed, chemicals, etc.) and diagnostic laboratories, and are consulted when problems (e.g. diseases) occur in particular. If such services fail to provide suitable recommendations, farmers will adopt less suitable management practices that can negatively affect the crop.

Seasonal factors

As a tropical country, Indonesia goes through wet and dry seasons. Different seasons are associated with changes in rainfall (which can affect the salinity of the water), temperature fluctuations (which affect growth) and so on. Different species have different seasonal preferences, although in general aquatic animals do not like sudden changes, which means the dry season is generally better for aquaculture farming.

Natural disasters

Natural disasters, especially flooding, can cause the complete loss of a crop. Such events are likely to occur more often because of climate change; proper precautions must be put in place to reduce the risk of losses.

2. Market risks

The declining, or at best stagnating, status of capture fisheries and the increasing need to supply seafood to a growing population creates positive demand for aquaculture products. Nevertheless, there are a number of market risks that can affect the ability of a farm to be profitable. It is worth noting that several of the **reputational risks include practices that should be avoided by responsible investors**, even if in some cases they may not have profitability consequences.

Price volatility

Seafood price volatility is largely caused by supply-demand dynamics. The impact of shrimp diseases on some countries' ability to produce can create heavy shortages and price volatility. Although the occurrence of disease outbreaks in other countries may benefit the profitability of Indonesian producers, this also means that in periods when no major disease outbreak occurs prices may be lower. Understanding this price dynamic is essential to calculating break-even points and ROI.

Reputational risk

Legality of production

Producers are expected by buyers and financial institutions to comply with the existing legal framework, including requirements for:

- Siting of the farm;
- Farm construction;
- Compliance with environmental requirements;
- Compliance with social standards;
- Reporting to the government.

Removal of high conservation value areas

Although the protection of high value ecosystems is one of the legal requirements for the establishment of new farms (Fisheries Act No. 45/2009), aquaculture has historically been associated with the conversion of mangrove forests and wetlands into farms. For this reason, sourcing from producers that "recently" destroyed mangrove forests either during establishment or operation of the farms affects buyers' reputation.

Poor farming practices

In addition to affecting the ability of a farm to be profitable, poor farming practices can also affect the farm's reputation and deter buyers, hence affecting profits. These practices may include:

- Unhygienic practices, e.g. people bathing in the farm, pets roaming around farms, etc.;
- Practices that negatively affect the environment, e.g. the discharge of polluted water and the potential eutrophication (too many nutrients) of the ecosystem;
- Occurrence of diseases, as the public is often responsive to images of dead fish;
- Use of antibiotics, as antibiotics in animal production have been associated with an increase in the resistance of human pathogens to antibiotics.

Social conflicts

Social conflicts as a consequence of farming can lead to NGO action and discouraging the purchase of aquaculture products. The salination of agricultural land as a consequence of discharge or leaking of brackish water from shrimp farms, and the consequent loss in livelihoods and social conflicts, led to several NGOs campaigning to discourage the consumption of cultured shrimp. Land expropriation for shrimp farming, e.g. in Bangladesh, had a similar effect and also led to

the boycotting of shrimp aquaculture. Such attacks are generally industry wide, although they may also target individual producers. In Indonesia, social conflicts occurred in the implementation of the nucleus plasma farming model.

Illegal, unreported and unregulated (IUU) fisheries

Trading with producers that engage with illegal, unreported or unregulated (IUU) fisheries can prove very detrimental. The accountability for producers and seafood buyers does not stop at the farm or processing plant, but includes every step of the production process, including practices occurring in boats harvesting fish products that are then included in the feed used for farming. IUU practices may have either a social component (e.g. the adoption of poor labor conditions) or an environmental one (e.g. the catch of protected or overexploited stocks) although it's generally recognized that the two components often happen simultaneously.

Rejections

Indonesian aquaculture products are often exported, and as such must be in compliance with the bilateral agreements between Indonesia and the importing country. Such agreements often require compliance with hygiene, public health and animal health standards. If products are not in compliance, depending on the seriousness of the infraction, notifications will be issued and products may be sent back to Indonesia or destroyed at the border. Notifications and rejections not only have an impact on the reputation of a producer, but also affect their profitability directly if compliance with those bilateral agreements was included in the contractual arrangement between producer and importer.

3. Political and social risks

The political and social risks that could affect aquaculture production in Indonesia include:

- Different policies at national/provincial level: Since the issuance of the autonomy law in 1999, the government of Indonesia has given the provincial governments the authority and responsibility for the provincial aquaculture and fishery sector. Although the national and provincial long-term policies are often harmonized, some mismatches or double regulations do exist.
- Sudden policy changes: Due to the changing government following the five-year election cycle, targets and policies are often changed at both national and provincial levels.
- Bureaucracy: The level of bureaucracy varies between different provincial governments; it is not always in compliance with the procedures set at national level.
- Limited inter-ministerial collaboration: Technically, the Ministry of Marine Affairs and Fisheries is in charge of fisheries. However, there are other ministries that are relevant to the sustainable development of the aquaculture sector.
- Social friction and conflict: These often occur when the legal arrangements (e.g. ownership or responsibility) are unclear.

Chapter 3: RISK MITIGATION

Introduction

Over the past decade or so, several risk mitigation approaches have been developed to address the risks identified in Chapter 2. Although ideally all the risk mitigations strategies listed in this chapter would be followed, the choice of strategy will depend on the risks to which the investee is exposed.

Siting

- Investors should invest only in farms that comply with aquaculture zones and plans.
- Investors should prioritize investments located in water bodies where:
    - A carrying capacity assessment (to calculate how many farms can "carry" a specific water body) has been conducted;
    - The investee operates within carrying capacity;
    - Other farms in the same area are also expected to comply with carry capacity recommendations.
- Investors should aquire information on the date of conversion of natural environment and on the type of land that was converted. Investors should prioritise investments on farms that did not convert high conservation value areas such as mangroves.
- Investors should prioritize investees that operate in proximity to extension services, diagnostic/ laboratory services, quality seed, quality feed, and buyers.
- Investors should collect information on the dependency of the investee on power supply and, if the dependency is high, on how to ensure stable access to power.
- Investors should prioritize investees who make use of renewable sources of energy.
- Investors should request investees to establish a dialogue with the local communities and preferably conduct a Participatory Social Impact Assessment (PSIA).

Waste drainage system

- Investors should collect information on the water waste collection system adopted by the investee. A central drainage system is preferable in shrimp ponds.

Quality of seed

- Investors should prioritize farms that use seed from certified hatcheries such as CPIB (Indonesian equivalent of Good Hatchery Practices), or hatcheries that have a track record in high performance.

Quality of feed

- Investors should prioritize farms that use certified feed, such as CPPIB (Indonesian equivalent of Good Feed Manufacturing Processes).
- Investors should prioritize farms that use feed from manufacturers that are proven to be associated with better farm outcomes.
- Investors should invest in companies that use feed from manufacturers that have data on the source of the fish products they use, do not use IUU products and participate in pre-competitive initiatives aimed at strengthening the oversight of the supply chain.

Farm management

- Investors should collect evidence of investee adoption of Better Management Practices (BMP) or Good Aquaculture Practices (GAP) programs relevant to their farming system, species and location, and prioritize farms that participate in such schemes.
- Investors should invest in farms that are certified as compliant with a standard benchmarked by the Global Sustainable Seafood Initiative (GSSI) or to CBIB (Indonesian equivalent of Good Aquaculture Practices) .

Technology and data tools

- Investors should prioritize investees who adopt farm data management tools to reduce risk and, if records exists, for investors to assess the risk level of an investee more accurately.
- Investors should prioritize investees who adopt automatic (preferably IT-based) feeding units as a way to reduce overfeeding, and to calculate the break-even point (see Chapter 4).
- Investors should prioritize investees who adopt water quality sensors to increase their control over water quality.
- Investors should prioritize investees who conduct imaging-based assessments on the size and characteristic of the stock, whether during stocking and/or grow-out.
- Investors should prioritize investees who use epidemiological analysis of their data to guide their management strategy.

Access to diagnostic services

- Investors should prioritize investees who have access (at a reasonable distance) to an ISO 17025 accredited laboratory capable of providing diagnostic services on the most important diseases (see Quarterly Aquatic Animal Disease reports on http://enaca.org) known to occur in the species and location relevant to the investee.
- If the locations are very isolated, investors should prioritize investees who can use diagnostic and water quality kits at a minimum.

Good labor conditions

- Investors should only invest on operations that comply with Indonesian labor laws.
- Investors should prioritize farms that are certified to a standard that includes labor conditions and, as such, are audited for compliance with labor laws.

Collaboration between farmers

- Investors should prioritize investing in farms that participate in collaborative arrangements such as cooperatives, farmer groups, etc. Such arrangements should include:
    - Real-time communication on disease at other farmers in the organization;
    - Jointly agreed guidelines for response to disease outbreaks;
    - A water management system to ensure that the discharge water from one farm is not used untreated by another farm;
    - Joint assets, as these imply a stronger collaboration and can be used as collateral.

Value-chain collaboration and efficiency

- Investors should prioritize investees who have long-term (more than 2 years) relationships with their trading partners.
- Investors should prioritize investees who participate in value-chain collaboration initiatives, or have an ongoing dialogue with value chain actors not limited to their direct trading partners.

Public-private and landscape collaboration

- Investors should prioritize investees who participate in collaborative arrangements between the public sector, preferably involving multiple relevant ministries, and private-sector stakeholders. Such collaboration may be direct or indirect, e.g. through representatives.
- Investors should prioritize producers who participate in landscape collaboration, or similar arrangements that bring together private and public sectors at local level.

Sector-level collaboration

- Investors should prioritize producers who participate in aquaculture sector-level collaboration (e.g. the Seafood Taskforce). Such participation may be direct or indirect, e.g. through representatives.

Chapter 4: FINANCIAL MODELS

Introduction

Aquaculture farmers often lack access to financial services for their capital expenditures and working capital. Banks often have limited understanding of the aquaculture sector and find it hard to identify bankable opportunities. We propose four solutions: to share risks along the value chain; to provide credits after break-even point; to introduce so-called Islamic Finance; and to use crowdfunding.

Risk sharing along the value chain

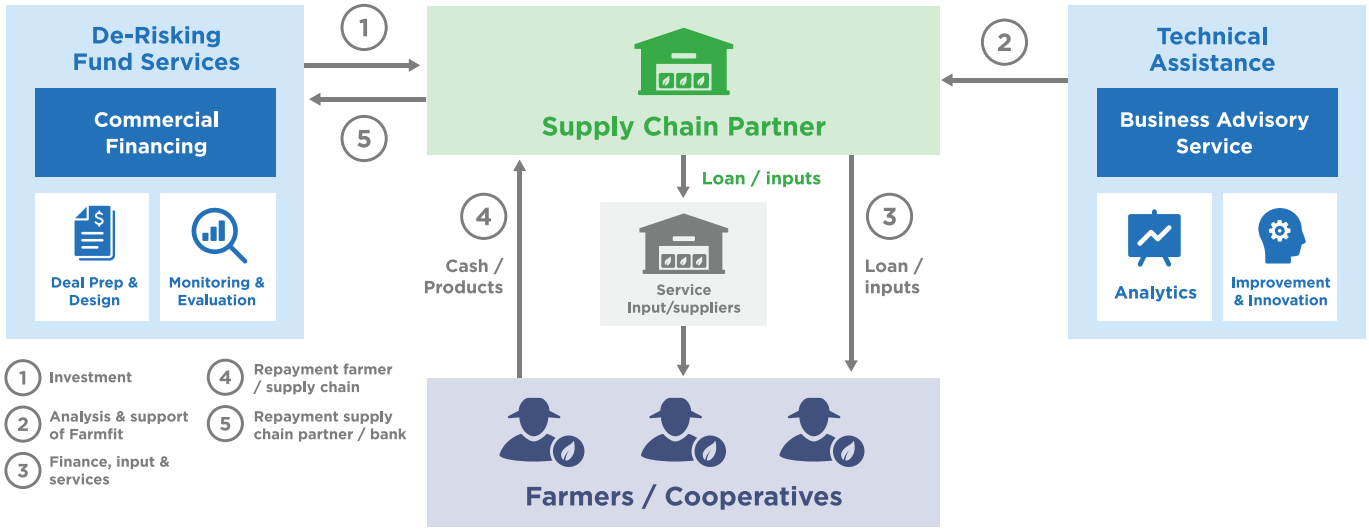
One of the main reasons banks are reluctant to finance aquaculture is their limited understanding of the risks associated with production. A risk-sharing model could solve this by addressing risks and risk mitigation from multiple players, protecting the lender, the company, or the bank. Sharing the risk along multiple actors in the value chain reduces the risks in two ways:

1. the costs are shared along the value chain;
2. if multiple parties play a role in the arrangement, the risks themselves are reduced because the value-chain players are better connected, and collaboration is increased.

A risk-sharing model aims to minimize risks for both financial institutions and the value chain actors such as cooperatives, packers, feed companies, banks and donors. It can also include public funding, e.g. in blended finance.

An example of this model is a risk-sharing agreement between an international financial institution, a local bank, a public organization, donors, a large-scale company, farmers, and/or a farmer cooperative. The company develops a supply chain structure in which the company provides services such as training, access to inputs and information for farmers to increase their productivity. Local banks finance and disburse the loan. Local banks can also share the risk on the portfolio with the large-scale company and buy the loan portfolio to keep the program running.

Another risk-sharing model is financing smallholder farmers through the input supplier. Banks interested in financing smallholders can extend their service through lending directly to the seed or feed supplier but allowing them to give a provision of credit to individual farmers. Banks thereby increase their benefit because they only lend to trusted parties by outsourcing the lending decision to the input suppliers who assess the farmer's track record, capacity and commitment. This arrangement ensures that quality inputs reach farmers, hence reducing their production risks.



Specific value chain actors that can play a role in risk reduction are:

- Cooperatives, who can provide collateral and arrangements to reduce risks;
- Public institutions, who can provide technical support or access to credit (e.g. the Kredit Usaha Rakyat or KUR program).

Insurance

The Indonesian government initiated the insurance program through a partnership with the Indonesian association of general insurance. Under this partnership, a working group was formed consisting of OJK and eight insurance companies. The program was 100% subsidized by the government in 2018 but is expected not to need government subsidy in 2019. Insurance for smallholder farmers in this model comes with high administrative costs. For the insurance to be reliable, profitable and professional, the farmers who receive insurance need to:

- Be trained on better management practices to increase productivity;
- Have guaranteed access to market;
- Be trained in financial capacity through a financial institution that also provides loans.

This can fit into a risk-sharing agreement where the value chain players are better connected, and technical capacity is built in to the agreement.

After break-even point

The break-even point (BEP) of a production cycle is the point at which the total expenses (working capital) and the revenue are equal. To compute a farm's BEP, three variables should be analyzed: variable cost, yield and selling price. In aquaculture, more than 50% of the operational costs are feed related, and the farmer's records are the only source of cost information.

The main challenge is to generate accurate information for the BEP calculation. Nowadays, the growing use of digital tools allows for objective assessments of the amount of feed being distributed. In addition to market price information, such digital tools would therefore enable an objective assessment of the BEP. This model would dramatically reduce the risk borne by the financial institution. This model is not suitable for farmers who require pre-break-even financing.

Islamic Finance

Of all commercial and government subsidized financial models, the lowest interest rate is around 4-5% with several complicated steps using collateral. Islamic Finance is different: it is a profit-sharing mechanism that aims to prevent a loss in profit, with no interest. The avoidance of riba (usury) and gharar (risk of uncertainty) are concepts from Islamic law or Sharia. This model has been authorized by OJK in Indonesia for any financial institution such as banks, which are classified as conventional and sharia banks. There are several models, all of which enable fair and equitable tools for risk sharing, as well as enabling social welfare to leverage business.

Crowdfunding

Crowdfunding works through fintech companies collecting small amounts of money from large groups of people via the internet or other platforms. It may include a joint venture in which the company provides technical assistance and acts as a business partner for the farmer under a profit-sharing agreement. Investors have online access to the aquaculture investee's progress and can monitor their investment. Funds can be collected in the form of working capital investment, loan or equity investment. Most fintech companies offer working capital as it needs relatively low investment. In the case of equity, funds could also be raised from large aquaculture companies (feed or packer), and disbursed directly to the farmer. The companies would then also have a branding advantage as they would be seen as supporting smallholder farmers. From the farmer's perspective, equity from a large company could also help develop loyalty to the company.

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