Australian Government
Australian Centre for International Agricultural Research

Final Report

project

Contract farming options for shrimp production in eastern Indonesia

SADI-ACIAR research report

project number	SMAR/2007/226
date published	April 2009
prepared by	Rina Oktaviani, Bogor Agricultural University
contributors	Nunung Nuryartono Tanti Novianti M Iqbal Irfany Bogor Agricultural University Ali Musa Pasaribu, Assessment Institution for Agricultural Technology, South Sulawesi Asmi Citra Malina, Hasanuddin University
approved by	Mr David Shearer
final report number	FR2009-05
ISBN	978 1 921531 84 2

Australia Indonesia Partnership
Kemitraan Australia Indonesia

published by

ACIAR
GPO Box 1571
Canberra ACT 2601
Australia

ACIAR's participation in the Australia–Indonesian Partnership

The Australia–Indonesia Partnership (AIP) supports Indonesia's reconstruction and development efforts, both in and beyond tsunami-affected areas. Assistance will involve long-term sustained cooperation focused on economic and social development.

As part of the AIP, the Smallholder Agribusiness Development Initiative (SADI) aims to improve incomes and productivity for farmers and agribusiness, in response to market opportunities, in four eastern provinces—East Nusa Tenggara, West Nusa Tenggara, South East Sulawesi and South Sulawesi.

ACIAR's commitment to SADI focuses on supporting market-driven adaptive research, improving the transfer of knowledge and developing the capacity of key institutional stakeholders. This commitment will overcome constraints and barriers that prevent smallholders and agribusinesses successfully engaging with the market.

Contents

1 Acknowledgments

The authors would like to thank the contributions made by the organisations involved, particularly Hasanuddin University and the Assessment Institute for Agriculture Technology, South Sulawesi. Without the valuable contribution made by these organisations this report would not have been possible.

Importantly, the authors would like to thank the commercial shrimp industry in South Sulawesi who gave their time and provided valuable input during the compilation of the report.

2 Executive summary

Shrimp is one of the most popular export commodities in the Indonesian fisheries sector. According to the Ministry of Marine and Fishery, Indonesia exported 143,550 ton or US$1,086 billion in 2004. To encourage this valuable industry the Ministry have set a target of 540,000 tons of exported shrimp by 2009.

While South Sulawesi is a major production province (contributing 7.2 percent of Indonesia's shrimp production), in recent years it has fallen significantly because of disease, poor shrimp-pond design and effluent management problems. To reach the 2009 target, revitalisation of the provinces fishponds and improving management practices is required.

Shrimp survival rates, related to shrimp disease, is the most crucial factor concerning shrimp farmers and the industry, in terms of supply. With low farmer capacity in South Sulawesi, government policy is necessary to improve their skills in shrimp management. However to implement this policy the industry needs to be more self-sustainable.

The best strategy to develop the Indonesian shrimp industry is based on developing a more competitive supply chain, with improved relationships and communications between the farmers and intermediary sellers in order to avoid the scarcity of resource and the lack of production technology. Government intervention is needed to encourage better partnerships among agents in the supply chain in order to gain more equitable trade and risk sharing.

A formal contract farming system, could be introduced, to share the risk of failure that is currently taken by the shrimp farmer. The process could also increase the productivity, quality and resulting profit of the supply chain through:

- improved access to high paying export markets
- innovative capital investment
- access to more advanced/productive technologies
- access to farmer groups to share skills
- guaranteed and fixed pricing structures
- better management of risks, shared by all in the chain
- improved farm family employment

3 Introduction

Indonesia, as an archipelago, has vast areas of water with 5.8 million km^2 of sea water with 81,000 km of seashore. The sea condition is warm and composed, especially in cove areas, which has the potential to develop sea cultivation such as coral, shells and fish. Additionally there has been the development of fishpond cultivation in seashore areas and, according to Bappenas (2004), there are vast land areas that have potential to develop land based fisheries.

Global demand contributes to fisheries development, such as an increase of fish and fisheries product demand, transition of food pattern from red meat to white meat and changing the life style that is orientated to seafood (non-cholesterol food).

An increase of shrimp export makes shrimp one of the most popular export commodities in the fisheries sector. According to Ministry of Marine and Fishery (2006), Indonesian shrimp export volume to the world market reached 139,450 ton with the value of US$887.13 million in 2003. In 2004, export volume increased to 143,550 ton valued at US$1.086 billion. In 2009, the Ministry of Marine and Fishery has targeted that the national export of shrimp to reach 540,000 ton. Japan, USA, and European Union have become Indonesia's key destination countries for shrimp export.

Cultivated shrimp production was only 192,935 ton in 2003. That volume was increased to 238,843 ton in 2004, 281,049 ton in 2005, and 327,260 ton in 2006. It is estimated that in 2007, production of national shrimp can reach 410,000 ton. This is partly caused by the revitalisation in marine and fisheries sector for the period of 2005-2009.

One action has been revitalising intensive fishponds with *vaname* shrimp, with approximately 7,000ha of fishpond used to produce on average 30 ton/ha/year. The government has also revitalised traditional fishponds with *vaname* shrimp, with approximately 140,000ha of fishpond to produce 600 -1,500kg/ha/year. Other actions have been to: import mother of *vaname* SPF shrimp, domesticate *vaname* shrimp to be specific pathogen free, and importing specific pathogen resistance mother shrimp.

One of the unique characteristics of shrimp farming in Indonesia is the application of the 'Inti-Plasma' or NESS (Nucleus Estate Smallholders Scheme). The concept was introduced in Indonesia in the early 1990s. The Ministry of Agriculture Decree No. 509/1995 regarding the partnership program in fishery requires the NESS partnership for ponds of more than 100 ha. It has increased the economic scale and efficiency of the shrimp industry to compete in the world market.

In the NESS system, a company converts large tracts of land (often mangroves or other wetland ecosystems) into shrimp ponds. They established agreements with smallholders, who buy all the farming inputs and sell the harvest to the company. Theoretically, the smallholders are expected to pay back their debt to the company within 7-8 years and become independent owners of the pond after such time. In reality, the company sets all the conditions and prices. The company keeps the accounts and the smallholders are trapped into a vicious cycle of poverty and debt. When a shrimp harvest fails, the entire burden falls on the smallholders, who fall deeper into debt (Siregar, 2001).

One unsuccessful case of the NESS system is PT Dipasena Citra Darmaja in Lampung, which was the largest integrated shrimp farm in Southeast Asia, involving more than 9,000 shrimp farmers. In 2001 there was a conflict between the nucleus and smallholders. The problems included land acquisition from the farmers, credit to the farmers and the monopolisation of the firm to set the price (Kompas, April 26, 2000).

The shrimp industry also faces export issues. The impact of the ban on shrimp imports from Indonesia and other developing countries to the USA, EU and Japan is of critical importance to Indonesia. Non-tariff barriers from these developed countries are more serious than tariff barriers because the tariff barrier will reduce gradually in the form of

trade liberalisation. The non-tariff barrier consists of technical barriers and Sanitary and Phytosanitary Measures (SPSM), which enable member countries on WTO agreement to protect their human, animal and plant life/health (Oktaviani and Erwidodo, 2006).

To overcome this issue within the shrimp industry, the Indonesian government's Ministry of Marine and Fishery announced the Indonesian Shrimp Commission on October 8th, 2004. The commission has a mandate to overcome the shrimp industry's problem comprehensively and create better communication among shrimp stakeholders, in order to improve investment. The Commission also provides suggestions to the government to improve the national fishery industry (Pasaribu, 2004). However, the effectiveness of commission members is still unproven.

South Sulawesi is one of the key shrimp production regions in Indonesia, contributing 7.2 percent of Indonesia's shrimp production (21,150 ton out of 295,000 ton). The Ministry of Marine and Fishery have an Indonesian shrimp production target of 540,000 ton by 2009, with South Sulawesi contributing approximately 44,500 ton or 8.24 percent. Although a major production province, in recent years it has fallen significantly because of disease, poor shrimp pond design and effluent management problems.

A high priority for the shrimp industry is the analysis of contract farming options that may benefit the smallholder and increase the competitiveness of the Indonesian industry. Analysis would include a review of the current contract options, consideration as to who will benefit or be disadvantaged within the supply chain, field visits to survey options, and strategic work to consider other options that may be worthwhile pursuing.

4 Current production

Shrimp is one of the most popular export commodities in the Indonesian fisheries sector.

Since 2003, cultivated shrimp production for the nation has risen steadily from 192,935 ton to 410,000 ton in 2007. This is partly caused by the revitalisation in the marine and fisheries sector and the government's realisation of the significance of the industry to Indonesia's export market.

The rise in national production has also been mirrored by a rise in export volume. This has been well noted by the Indonesian Ministry of Marine and Fishery as they have set in place a target of 540,000 ton for national export of shrimp by 2009, to encourage this growth.

To reach this target, one action has been revitalising around 7,000 ha of intensive fishpond areas with *vaname* shrimp, to produce on average 30 ton per hectare per year. The government has also revitalised around 140,000 ha of traditional fishpond areas with *vaname* shrimp, to produce 600-1,500 kilogram per hectare per year. Other actions have been to: import mother of *vaname* SPF shrimp, domesticate *vaname* shrimp to be specific pathogen free, and importing specific pathogen resistance mother shrimp.

South Sulawesi is one of the key shrimp production regions in Indonesia, contributing 7.2 percent of Indonesia's shrimp production in 2005 (21,150 ton out of 295,000 ton). There are around 120,000 ha of fishponds in the region, 30 percent of the total number of fishponds in Indonesia. Of the 540,000 ton export target, set by the Ministry of Marine and Fishery's for 2009, South Sulawesi is expected to contribute around 44,500 ton or 8.24 percent.

While South Sulawesi is a major production province, in recent years it has fallen significantly because of disease, poor shrimp-pond design, and effluent management problems. For it to reach its 2009 target, revitalisation of the areas fishponds and farmers shrimp culture is required to produce the additional 23,350 ton.

Smallholders using traditional technology require a minimum survival rate of 42 percent to break even for a year. Farmers using intensive technologies require 45 percent. Currently the survival rate is around 40 percent in South Sulawesi, meaning many farmers are struggling to make a profit.

5 Production technology

Most shrimp farmers in Indonesia use traditional farming methods (traditional scheme). This scheme is more appealing than semi-intensive and intensive systems because it only needs a small amount of capital and has low risk of failure.

Traditional methods only use natural feed (“kelakap”), as well as cheap and easily accessible feeds such as “rucah”, fish and corn. Some farmers also use artificial feeding (“pellet”) for one to two month old shrimp.

Farmers often used very low dosages of TSP, SP2 and Urea fertilisers, however this was dependent on how much capital they had. Some farmers were also found using the “dangerous” Théoden pesticide. Very few used vitamin supplements for shrimp production.

The major problem that farmers faced was shrimp culture failure. Based on the survey, the shrimp culture’s success rate was approximately 40 percent, lower because of slow growth rates and disease, both results of unfriendly growth environments. There are three main causes for the failure of shrimp culture in South Sulawesi:

Intensification methods were developed without considering the environment. The intensification method caused feed residue and shrimp faeces to accumulate and contaminate the water and land. Furthermore, the contamination accelerated pathogen growth that harmed shrimp growth and caused diseases.

Land clearing was approved without considering the damage to the mangrove ecosystem. This method causes the accumulation of shrimp faeces and cannot be neutralised by the water due to the lack of mangroves.

Development of brackish water was not accompanied by the development of good irrigation systems, such as separated exhaust systems (outlet) and water intake systems (inlet). The current situation shows there is mis-management of the system. Outlets and inlets are in one channel, which can cause a rapid increase in disease contamination levels.

While semi-intensive and intensive methods are viable and more improved schemes, if they are well funded and properly managed, farmers low educational level, minimal capital investment and preconceptions, related to environment capacity and disease, are affecting their decision to not use these innovative schemes.

Apart from not being able to afford intensive technologies or practical farming support, a major problem that shrimp farmers in South Sulawesi face is a lack of knowledge to avoid disease.

Some diseases that are often found in shrimp are virus, bacteria, fungi and parasite. Systemic Ectodermal and Mesodermal Baculovirus (SEMBV) are two diseases that could cause a significant impact on shrimp production. This virus causes White Spot Disease (WSD) that results in mass deaths of 1-3 month old shrimp. White Spot Disease (WSD) could emerge because of some factors, such as base-soil quality, the environment quality of the shrimp-pond, and the farmer’s shrimp culture management system.

The combination between bad environment, quality, and weak shrimp condition could also cause disease. This could be worse if WWSV pathogens enter into the shrimp culture system through shrimp fry, water, air, or pathogen carriers. Government policies could be implemented to help farmers to implement the appropriate technology to cope with these diseases.

6 Current market production

The simplified supply chain of shrimp production and marketing (Figure in South Sulawesi includes: prawn fry hatchery, shrimp feed, shrimp farmer and intermediary sellers (collectors, coordinators and cold storage/ exporters).

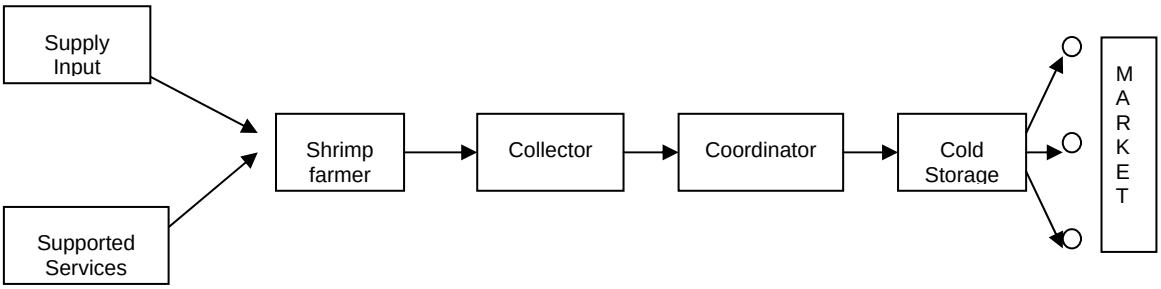

Figure 1: Shrimp supply chain in South Sulawesi

Generally, shrimp farmers in South Sulawesi have their own land however there are production schemes with rent systems, pawning systems and profit sharing systems.

Most brackish water farmers only use their own money as their starting capital therefore brackish water fields are usually very small. Additional capital is difficult to acquire, because of the high probability of crop failure. Farmers also have difficulties acquiring loans from banks because of complicated requirements and the banks unwillingness to provide high-risk loans. Moreover, there is no support from agricultural extensions, or farmer group mechanisms.

The shrimp product is often sold directly to the nearest collector. The main reasons are the price differences among collectors are usually small and the total value of the crop is not significant. Distance from brackish water fields to collectors becomes the major consideration due to the transportation cost.

In one village, there were around 5-10 collectors and farmers usually have their own collector. The reasons they choose particular collectors are mainly due to distance (transportation costs) and family or friend relationships. There is no economic reason, such as capital support and shrimp selling price. Few collectors do offer capital support incentives and production facilities, but this is mainly given to larger fishponds (100 ha) under the ‘Inti-Plasma’ or NESS (Nucleus Estate Smallholders Scheme); a concept introduced in the early 1990’s by the Ministry of Agriculture to increase the economic scale and efficiency of the shrimp industry.

Farmers do not have bargaining powers to determine price. Collectors grade and size the shrimp and determine the shrimp-selling price at the farmer level, which is ultimately based on regularly adjusted standard price lists provided by the coordinator and the cold storage.

Collectors pay cash when buying shrimp from their farmers, therefore they often receive funding support from their coordinators, who are willing to offer such support, as losing their suppliers is a significant problem in such a competitive market. Cold storage companies in turn offer this support to coordinators, as they too are always looking for suppliers to meet their export needs.

While farmers are concerned about the lack of technology, capital, institution support, and risk of disease, intermediary sellers are concerned more about the relationships they hold with one another, due to the competitiveness of the industry and market.

7 Economics of further development

An increase of shrimp export in the 21st century makes shrimp one of the most popular export commodities in the fisheries sector. Japan, USA, and European Union have become Indonesia's main destination countries for shrimp export.

According to the Ministry of Marine and Fishery, Indonesian shrimp export volume reached 139,450 ton with the value of US$887.13 million in 2003. In 2004, export volume increased to 143,550 ton valued at US$1.086 billion.

In South Sulawesi, shrimp export reached 7,675 ton in 2006, with the major destination market being Japan. As South Sulawesi is an important production base the national increase of shrimp export is directly related to an increase of shrimp production in South Sulawesi. Production increased by 12 percent, from 12,000 ton in 2005 to 13,400 ton in 2006.

As such the Minister of Marine and Fishery expects that South Sulawesi will contribute 44,500 ton or 8.24 percent of the nations shrimp production target (540,000 ton) by the end of 2009. This is not out of reach with South Sulawesi producing 21,150 ton or about 7.2 percent in 2005. However to meet this expectation in 2009, there would need to be significant revitalisation of fishponds.

For revitalisation to occur there needs to be capital invested into fishponds, by collectors, coordinators and cold storage companies. This can help farmers improve their pond quality and pay their increasing resource rates (shrimp feed and energy). In turn this should increase survival rates and the supply required by the industry to meet its target.

8 Future prospects

Even though South Sulawesi is a key national shrimp-producing centre, government policy is not enough to support the requirements to continue to meet national and export targets.

The South Sulawesi shrimp supply chain consists of five agents – hatchery, farmer, collector, coordinator and cold storage – who rely heavily on maintaining good relationships in a competitive industry. While intermediary sellers stand by this as the basis of the survival of the industry, they do not acknowledge that their primary producer's (shrimp farmers) need more than good relationships if they are to increase export productivity. Contract farming could help the supply chain become supportive and self-sustainable, by making resources more available to poorer farmers and sharing the risk of production and possible failure.

8.1 Farmers

Under contractual agreement South Sulawesi shrimp farmers would be exposed to:

- improved access to high paying export markets
- innovative capital investment
- access to more advanced/productive technologies
- access to farmer groups to share skills
- guaranteed and fixed pricing structures
- better management of risks, shared by all in the chain
- improved farm family employment

While these benefits sound helpful to farmers, they depend on a number of factors. The first is whether all farmers are able to participate in contract farming when contracts are being offered, where past experience indicates contracts are offered to larger more commercially viable landholders. This is often the case and has been the case under the government's own 'Inti-Plasma' scheme, or NESS (Nucleus Estate Smallholders Scheme), where partnerships are offered to farmers with +100 hectare ponds.

In the NESS system, a company converts large tracts of land (often mangroves or other wetland ecosystems) into shrimp ponds. They established agreements with smallholders, who buy all the farming inputs and sell the harvest to the company. Theoretically, the smallholders are expected to pay back their debt to the company within seven to eight years and become independent owners of the pond after such time. In reality, the company sets all the conditions and prices. The company keeps the accounts and the smallholders are trapped into a vicious cycle of poverty and debt. When a shrimp harvest fails, the entire burden falls on the smallholders, who fall deeper into debt.

Other hazards of contract farming are: the potential for 'capturing' smallholders within contracts, negative social effects of the 'cash economy', narrowing of local markets as contracted production squeezes out local food production, deteriorating contract terms as contracts mature, and general concerns about how multi-national corporations behave in developing countries.

Obviously these hazards will need to be assessed and policy, laws and regulation will need to be implemented and enforced by the supply chain and the government to stop them occurring. Partnerships that are reasonable and mutual for both farmers and contractors (intermediary sellers) will be observable by both parties willingness to continue

with each other annually. Also there will be even more pressure in the market for buyers to offer better incentives.

8.2 Intermediary sellers

Apart from maintaining financially rewarding relationships with suppliers and buyers, collectors, coordinators and cold storage companies share only one overarching problem – their dependence on supply.

Collectors admit they can easily get shrimp from farmers, as coordinators and cold storage companies admit to being able to get their supply from their sources. However they lack to account for the performance of farmers to supply their needs. With better technology farmers could increase production and quality, however without capital incentives, which are only offered between intermediary sellers, farmers cannot improve on their production rates at a rate that the market wants it to.

Transportation is another issue and affects buying prices, especially when transferring from the village collectors, to the coordinators and cold storage companies that are mainly located in Makassar city.

Cold storage companies also faces export problems such as government regulation, retribution and fees in South Sulawesi, and regulation in destination countries; and it is often these export issues (along with continual supply) that effect the price and industry performance.

For the intermediary seller to increase market production and profits as such profits and margins, they need to improve their relationships with farmers to avoid scarcity or resources and lack of production technology, which will fuel the growth of the market.

9 Recommendations

Shrimp survival rates, related to shrimp disease, is the most crucial factor concerning shrimp farmers and the industry. Government policy is necessary to improve their skills in the shrimp culture. Some policies that could be implemented in order to cope with shrimp pond diseases are as follow:

- Physical and biological quality standardisation of shrimp fry in all hatcheries in South Sulawesi. From the physical perspective, shrimp fry must be active, have complete intestine, be responsive to food, have no physical defect, free from infection from bio-fouling organisms, and have no MBV. The condition of muscle, intestine, hepato-pancreas, and khromatophore are to be measured in a score system. From the health perspective, shrimp fry must be free from WSSV and other pathogens and cannot be sold before their PL levels achieve 16 point. Shrimp fry that cannot satisfy these standards, should be forbidden from being sold to the next user.
- Shrimp ponds should be prepared perfectly, to provide optimal conditions for shrimp. The government should prepare a guidebook that gives clear explanations about the preparation of shrimp ponds, types of calcium or fertiliser that can be used, and also their dosages. Moreover, the guidebook should also define special treatments on shrimp pond in rainy season.
- Shrimp culture should be run with tight bio-security principles to protect the culture system from pathogens. Bio-security could be applied by doing screening on shrimp fry by using formalin and PCR. Other measures would be to set delicate filter on water entry gates and reservoirs. Reservoirs are used in large scale and high pond risk to get pathogen-free water. Crab movement also needs to be controlled and shrimp pond has to be free from crustaceans before shrimp fry introduced. Bio-security principle could also be applied on shrimp pond construction by constructing closed re-circulation systems or semi-closed re-circulation system.
- Standardise shrimp pond management, to maintain the health of shrimp and their environment. This standardisation should minimise factors that could cause diseases in shrimp pond by considering: base-soil quality, the environment quality of the shrimp pond, and the farmer's shrimp culture management system.
- Shrimp pond farmer groups are essential to maintain high support capacity of member's shrimp pond areas. Furthermore, they can work together to maintain and improve irrigation systems and share the same concerns of disease, as well as preventive and curative action for their area.
- Sustainable training and assistance for farmers is really essential to help farmers understand and apply the Shrimp Culture Health Management and bio-security principle.
- The government needs to issue policy about land planning for shrimp ponds that already exist and future ponds. This land planning can be made by imposing water controlling systems, dividing inlet systems and outlet systems, and returning the land to its natural function, for instance, prohibition of land clearing for shrimp pond in mangrove areas.

The best strategy option to develop shrimp industry is better relationships between the farmers and intermediary sellers to avoid the scarcity of resource and the lack of production technology. Government intervention is needed to encourage better partnerships among agents in the supply chain in order to gain fair trade and risk sharing. A formal contract farming system can be introduced to reduce this risk and increase the certainty of doing business, especially at the farmer level.