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**Value Chain Investment for Sustainable Rural Development and Poverty Alleviation: A Case Study of the Indonesian Boiled Fish Market<sup>1</sup>**

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**Abstract**

Poverty is serious and widespread in the rural coastal areas of Indonesia. Government data suggests that more than 7.8 million people in more than 10,500 villages live below the poverty line. A rapid poverty reduction program has been conducted since 2011 through the provision of infrastructure that supports more productive industries. However, even if the infrastructure is available, can small-scale food producers in coastal areas achieve self-propelled development if they are still poor? The value chain approach to development is suggested as a complement to the existing infrastructure development program by opening up market channels for high value products through vertical linkages. Pindang or boiled fish is used as a case study, since the industry is quite large and it involves many low-income people. Its current value chain is analysed to define the bottlenecks. This leads to a conclusion that to achieve greater economic development, small-scale pindang producers could consider (a) improving their product quality and diversifying their product range, (b) increasing economies of scale by upgrading horizontal linkages, and (c) introducing new leading firms within vertical linkages.

Keywords: Value chain; Poverty reduction; Indonesia; Boiled fish; Horizontal and vertical integration.

**1 Introduction**

Indonesia has achieved tremendous economic growth during the last two decades, reaching around 6 per cent growth in GDP annually. However, the number of poor remains very high. The World Bank (2014) estimates that some 68 million people of a total population of 260 million are living under US\$1.25/day. Additionally, there is considerable and growing income inequality. For example, the World Bank's GINI coefficient index was 38.1 in 2010-2014, up around three points from the level in 2005-2009 (The World Bank 2015). Thus the benefits of development are not reaching low-income people.

This inequality is especially the case in rural areas, and in the rural coastal zones in particular. In 2011, it was reported that the number of poor people in coastal zones totalled 7.87 million, with those people scattered in 10,640 villages (Ministry of Marine Affairs and Fisheries 2012). The government at that time began to focus on this issue by investing to cause rapid change in coastal community poverty. Under Presidential Decree Number 10/2011, a pro-poor development program (*Peningkatan Kehidupan Nelayan*, or PKN) commenced with the aim of enhancing the standard of living of coastal fishing communities. This program invited all stakeholders, especially public institutions, to allocate more investment into those coastal villages. Some infrastructure has been developed to help fishers and other value chain participants in coastal areas increase their productivity, such as giving them larger fishing vessels, providing cold storage and ice plant facilities, and so on. However, even with new machinery and

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new buildings, these disadvantaged villages still have to rely on their existing value chains, selling low-value products, being gouged by wholesalers, having only limited market channels, and basically still living a subsistence life. The underlying issue remains: how can these disadvantaged villages be supported to achieve sustainable development for their communities under these conditions?

It is argued that improving value chain structures of enterprises arising from poor communities can reduce inequality (de Boer and Tarimo 2012). The concept involves small-scale enterprises in rural areas improving linkages between vertical and horizontal actors. Vertical improvement means the value chain actor approaching a new leading firm who has knowledge of the market to which the small-scale producers supply their product. Horizontal improvement means the small-scale producers improve their coordination with other small-scale producers to increase social capital in gaining economies of scale (M4P 2008; Waldron 2010; van Dijk and Trienekens 2012). In this way, small-scale producers can increase their production and their income flow that will benefit their local communities (M4P 2008). If this happened in the poor coastal communities of Indonesia, it is expected that their standard of living would increase.

In this paper we examine how value chain improvements could be applied for fisheries communities in the coastal areas of Indonesia. The approach is to improve the capacity of enterprises that are common in low-income rural coastal society in Indonesia. Pindang, or Indonesian boiled fish, is used as a case study. We analyse the existing value chain for small-scale pindang producers in rural coastal areas and then provide some possible solutions for self-propelled rural area development. It is expected that this approach can be used more generally by governments in developing countries to assist a strategy of reducing poverty.

## **2 Fishermen and poverty in Indonesia**

Despite living in a place where fish and other marine resources are in abundance, most Indonesian fishers and their communities are poor. Indonesia occupies 2.7 million km<sup>2</sup> of exclusive water territories with some 81,000 km of coastline (FAO 2006). Indonesia is advantaged by warm currents that host some high value species such as tuna, skipjack, red snapper, grouper and mackerel. Indonesia is rich in its marine biodiversity.

Fisheries are important for local economies as well as for the national economy. Low-income people in regions that have substantial water territory have no barriers to access the seas as their primary source of income and specialized skills are not required. For some high-value species, medium- to large-scale processing activities for both domestic and export markets are important contributors to national economic growth. In 2012, total fish production reached 8.8 million tonnes, and Indonesia has been acknowledged as one of the largest fish producers in the world (Globefish 2012). The fisheries sector is estimated to contribute some US\$140 billion to Indonesian GDP annually, mainly through exports. Yet, while the industrialization of the fisheries sector continues to grow, there remain some residues of poverty, especially in the rural areas. Based on the 2011 Indonesian household survey, some 7.9 million people in coastal zones are reported to be living below the national poverty line. That number was 25 per cent of Indonesian poor at that time (TNP2K 2011).

Many researchers have sought to define the root cause of poverty. Kusnadi (2003) asserts that the main factor contributing to chronic poverty in rural coastal areas is a problem with the common, which is the absence of clearly defined property rights to exploit oceans. As everyone can access the sea, with rapid population growth more people have engaged in fishing, resulting in depletion of the natural resource. An environmental levy has been proposed (Ministry of Marine Affairs and Fisheries 2013), but is not yet imposed. Fishers then use more destructive gear in their escalating effort to earn an income from the more difficult fishing environment. This leads to an increasingly depleted environment, and continuing poverty.

The Java, Sunda and Sumatra seas have been affected the most by the impact of increasing population and weak property rights in accessing the sea. For example, it was reported that fishers in Indramayu, West Java, were bringing in only 15 kg per fishing trip in the early 2000s, whereas a decade earlier fishing output reached 60-90 kg per fishing trip (Kusnadi 2003). This has pushed the fishers within these regions to widen their fishing grounds (Muawanah *et al.* 2012).

About 90 per cent of Indonesian fishers are small-scale fishers, using tiny fishing vessels of less than 10 gross ton (Fauzi 2005; Satria 2009). The small capacity of the fishing fleets and the use of manual fishing gear results in small outputs and higher per unit costs, and some fishers require more frequent fishing trips at higher cost to achieve acceptable fishing output levels. The fishing ground is limited to within 12 nautical miles. At the same time, the small-scale fishers have to compete with other fishers of the same scale as well as much larger commercial fishing fleets. Further, illegal, unreported and unregulated (IUU) fishing is prominent and this has further worsened the prosperity of the small-scale fishers. Losses due to IUU fishing are calculated to be approximately \$US 40 billion a year (Kusuma 2014).

The prevalence of poverty is particularly high in East Java as shown in Figure 1. East Java is used as the case study region in this analysis. It is estimated that in this region some 4.9 million people (both rural and urban) fall below the national poverty line, or 12.7 per cent of the national poverty count (Statistics Indonesia 2015). About 60 per cent of the poor live in rural areas, and some of the regencies in East Java with a high prevalence of poor people are those that are close to seawater (Statistics Indonesia 2015). Most of those regencies are long distances from urban centres and sufficient capital has not been available to provide the required infrastructure.

### 3 The concept of value chains as an avenue for poverty alleviation

Inequality of opportunity has been considered to be one of the main reasons why poverty is prominent in developing countries, despite many of these economies growing strongly in recent times (Ray 1998). This situation occurs in many Indonesia provinces. The expanding industrial sector typically does not inclusively engage small-scale producers in rural areas. As well as the issue of unskilled labour, the disparity of infrastructure development in rural areas has excluded those producers.



**Figure 1. Distribution of low income earners in Indonesia (darker color indicates more severe poverty) (Ministry of Social Welfare 2012)**

Restructuring the value chain strategy of small-scale food processors in rural areas to become more attractive partners for larger firms would invite more engagement of low-income earners, since these industries are typically located in rural coastal societies and involve many of poor. It is believed that such a strategy would integrate small-scale producers in rural areas as active participants in more modern value chains and this would open high value market for products originated from low income society (Bolwig *et al.* 2011), such as pindang. Greater market access and stable demand would become possible, higher returns would flow back into these communities and the standard of living would improve (van Dijk and Trienekens 2012). In addition, the larger firms would achieve benefits through lower transaction costs, as products are supplied where sources and labor are less costly (Reardon *et al.* 2012), but with upgrades in processes quality standards can be improved. Ultimately, over time such vertical integration would lead to greater income flows to help alleviate poverty since many low income earners depend largely on small scale food producers (FAO 2005; M4P 2008).

## 4 Pindang – an overview

In this analysis, pindang has been selected as the case study to examine how the principles of value chain analysis can be applied for promoting particular industries and promoting rural areas. *Pindang* or *pemindangan* is a traditional seafood product, made by boiling fish in brine water. It has been used for centuries to preserve fish, prior to the advent of refrigeration<sup>2</sup>.

There are several reasons for selecting this industry. First, it would encourage participation by low-income earners, as the industry itself is located primarily in poor villages in coastal areas across Indonesia. It is reported that there are approximately 65,000 pindang producers that are associated with about 350,000 labour units on a daily basis (Bisnis.com 2012). Many of them are women, who are take responsibility for on-the-ground business under the fishers' family norm (Kusnadi 2006), and they look for ways to earn additional income for the family.

East Java, in particular, is one of the boiled fish centers of production, with a large number of producers in Lamongan, Trenggalek, Jember, Situbondo and Banyuwangi regencies. Infrastructure such as roads, cold stores, and ice plants is now more generally available; however, in some places cold stores and ice plants are scarce. There are 2,151 boiled fish processors and 291,543 fishers in East Java (Ministry of Marine Affairs and Fisheries 2014a).

Second, Indonesia's economic improvement has given rise to a growing middle-income population that requires more processed and convenience food. For Indonesians, protein sourced from seafood is preferred over other protein sources. As shown in Figure 2, on average, consumption of fish is the main source of protein for most Indonesians, ranging between 7 and 9 grams per capita per day. It is higher than that from beef, eggs and dairy, and legumes (Statistics Indonesia 2014), and is higher in urban areas than rural areas. Annual fish consumption per capita increased from 29.08 kg in 2009 to 35.21 kg in 2013 and, in East Java, fish consumption increased from 19.2 kg per capita in 2010 to 25 kg per capita in 2012 (Kominfo Jatim 2012). This suggests that more fish is needed to meet the growing demand (MMAF 2014).

Middle-income people prefer fish to red meat as their source of protein as shown in Figure 2 (Indonesian Bureau of Statistics 2014). The numbers of the Indonesian middle-income class are predicted to double from 74 million to 141 million people by 2020 (BCG Perspective 2013), providing a good opportunity to specifically target this product at those consumers. Pindang could easily be supplied with a different value proposition to suit those buyers' needs. This would require better quality control, better packaging and shelf life and higher standards of food safety

Lastly, pindang, is a very good protein source. It has a protein composition ranging from 15 to 30 per cent, depending on the species (Afrianto and Liviawaty 1989). Further, the polyunsaturated fatty acid content is good for cardiovascular health (Heart Foundation 2008). It would contribute to Indonesia's food security needs for both macro and micronutrients.

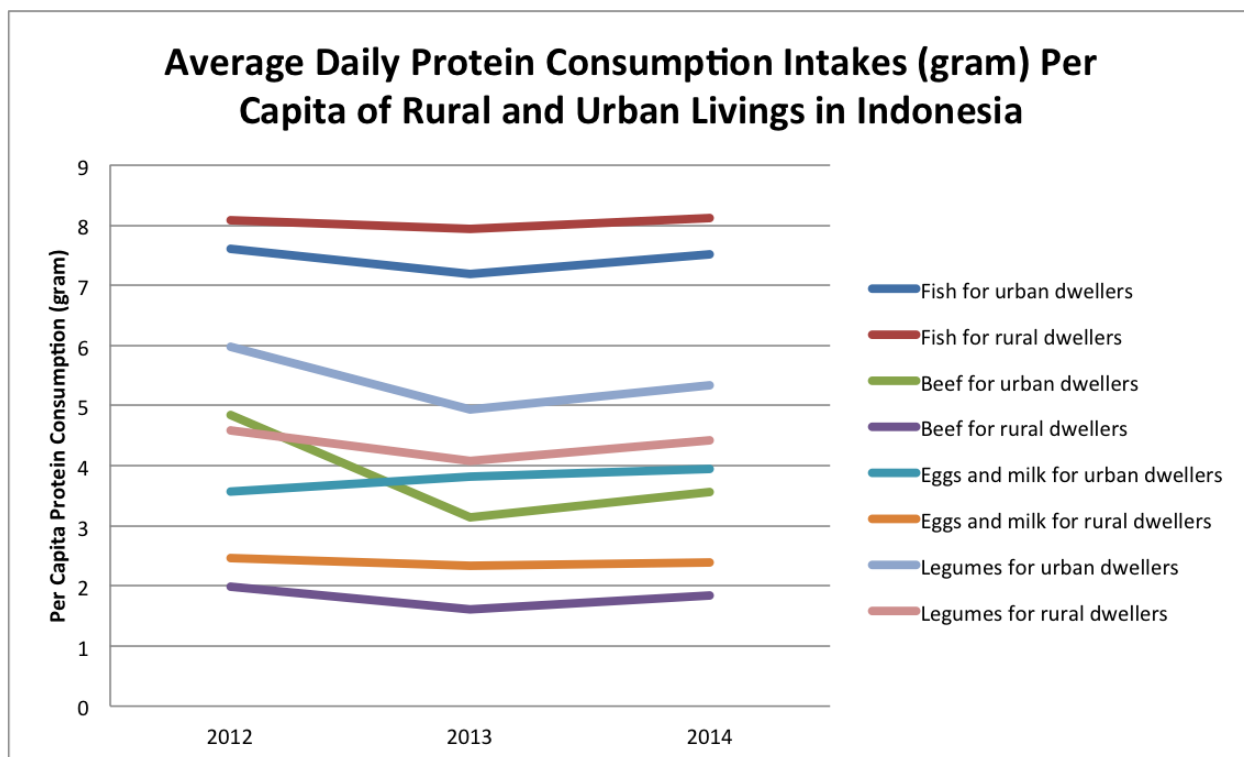
There are four main processing steps: preparation, boiling, packaging, and distribution. These processes can be done by home-scale industries, as it requires little capital to set up a processing unit at home and labour requirements can be met by the family. The industry is therefore common in low-income coastal societies, where low-income earners, mostly women, are employed as the labour. Consumers say that the product has a delicious taste, not as salty as dried salty fish. It can be consumed in its original form or consumers can do further cooking at home using their own recipes (Afrianto and Liviawaty 1989).

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<sup>2</sup> A description of how pindang is produced is provided in the following video link:

<https://www.youtube.com/watch?v=tSA7DUup0zc>

This video was published by ANTV in 2012



**Figure 2. Consumption trends on different protein sources of middle-income people in East Java (Indonesian Bureau of Statistics, 2014)**

Pindang can be a highly profitable business. Some analysts (Ciputra Entrepreneurship 2013) estimate that for one 10kg bamboo bucket (*bakul*) of raw material worth IDR.150,000, and sold at IDR.2,000 per piece, the gross profit would be IDR.50,000. On average, a producer could produce 8 to 10 *bakul* a per day, giving a possible gross profit per day of IDR.400,000 to 500,000. The challenge for the small-scale processors is to do this every day.

There is also a potential export market, although this is far from a realisation at present. In Thailand, a similar product is called *pla-thu-nung*; in the Philippines, people consume *sinaingnatulingan* mostly in Lent to substitute for red meat; while in Malaysia and Singapore, the product is simply called boiled fish (Nitibaskara and Dollar 1967; Afrianto and Liviawaty 1989; Dimaculangan 2013).

The Indonesian government has recognized the potential of this industry in recent years. In 2012, through regulation number PER.27/MEN/2012 about fisheries industrialization, pindang was prioritised as a commodity that provides a promising avenue for development (Ministry of Marine Affairs and Fisheries, 2010). In 2011, a national pindang association (APPIKANDO) was established to help the government address the industry's problems (Detik Finance 2011).

## 5 Pindang value chain analysis

The analysis of the pindang value chain was done in two stages. First, value chain mapping was conducted to form a general understanding about the product, information and income flows in the pindang markets. This is followed by a qualitative evaluation of the current problems in this value chain and some suggestions to promote a better-performing value chain. As the framework is the value chain, the essential objective is to offer a higher value proposition for consumers, where the chain has to choose a strategic fit which provides the best compromise between the market they are targeting and the resources available within the chain (Chopra and Meindl 2013).



## 5.1 Mapping pindang value chain

Mapping the value chain is an important step in value chain analysis. It identifies the “upstream” and the “downstream” actors who collaboratively move products, information and funds from producers to consumers and vice versa (Bolwig, Ponte et al. 2011; Chopra and Meindl 2013).

The first step is that fishers catch fish in the ocean, or fish farmers raise fish and harvest in a pond, to be used as the raw material for the production steps. Marine fish is preferred to fresh water fish in making pindang. Species such as tuna, skipjack, tongkol (*Euthynnus*, Sp), mackerel, and sardines are used frequently in some processing places. However, different villages use different fish. For example, in Juawana, Central Java, the processors use mackerel, whereas in Banyuwangi, East Java, they process tongkol as the raw material.

According to the Ministry of Marine Affairs and Fisheries (2011), there are three classifications of marine fishers : 1) full-time fishers who fully work in fishing; 2) major part-time fishers who spend a major part of their time fishing; and 3) Minor part-time fishers who spend a minor part of their time fishing. In relation to aquaculture fisheries, there are various techniques used to raise fish, such as: marine culture, brackish water pond culture, fresh water pond culture, cage, floating nets, and raising fish in paddy field, coexisting with paddy farming. These farmers can also be divided into three kinds, namely: full-time, part-time, and artisanal fish farmers. The classification is based on the time spent on aquaculture in a day (Ministry of Marine Affairs and Fisheries 2011).

It is claimed that about 95 per cent of Indonesian fishers are small, equipped with small and traditional fishing fleets and limited fishing gear and skills (Satria 2009). Dealing with small fishers in large numbers is quite challenging. Small fishers are predominately poor, and mostly do not own their own boats. They rent the boats from boat owners who are also the fish buyers. Before fishing, fishers have been supplied some inputs such as fishing gear, ice, salt, rations, and other equipment from the boat owners. As payment, they have to give half of their catch to the boat owners, and they may also sell the rest to the boat owners (Anisah & Susilowati, 2007). The boat owners purchase the fish for a price that favors them. This kind of system has been argued to be the cause of poverty in rural coastal areas of much of Indonesia (Kusnadi 2003).

Instead of selling their fish to the boat owners, fishers can also sell their fish through a service which is provided by fishing ports. The fish is sold by auction so that the price is determined by bidding from potential buyers. Fishers can get fair prices because the government employees who run the auction use a standard market price to set up the starting price of auction. Sometimes price can increase at times when the quantity of fish is low during bad weather or in the low season. Price can increase by 10 to 20 per cent (Ministry of Marine Affairs and Fisheries, 2014b). Information about price, from different port locations, is published by the government.

Pindang processors have to face problems associated with raw material supplies. Irresponsible and unsustainable fishing practices have led to depleting stocks. When fish stocks are scarce, pindang processors can source fish from cold store owners or by importing. However, it is expensive to purchase fish from the owners since there are only a few sellers who have stocks of the raw material (Jatim Update 2014). Alternatively, processors can order imports. The pindang association holds the import license from the government (Bisnis.com 2012). An import quota is applied because fish importation is very sensitive politically. Imports are only applicable for fish species that cannot be caught in Indonesian waters.

The fish are then partially cooked at high temperature for several minutes in brine water. The output is pindang, which is packaged in wooden bamboo. The packaging is not well sealed and microorganism contamination is common. Moreover, using a wooden material has serious implications for health if the wood component is not cleaned properly, and consumers can be affected. In fact, the finished product's shelf life is very short, only two to three days, due to deterioration problems (Detik Finance 2011).

The next step in production is distribution from pindang processors to wholesalers (*pengumpul*). Processors can directly deliver the products to wholesalers or have them picked up. Wholesalers exert power against their suppliers. They hold the key market information regarding market access, such as prices, buyers, and quantity demanded. This has put downward pressure on pindang processors' income (Kusnadi 2003).

From the wholesalers, products are distributed to retailers. The main destination is the local wet markets, targeting middle- to low-income people in rural areas as well as in some urban areas. This limited distribution is due to the shelf-life of the product being relatively short. Ice is not used along the supply chains, except during fishing. Refrigerated trucks are costly and are not commonly used to transfer the product, therefore the processors are prone to incur losses due to deterioration during non-refrigerated transportation. Some product also goes to restaurants, and only a little goes to supermarkets. The latter is only for that output which can comply with agreed standards.

Finally, families purchase and consume pindang in their own ways to meet their hunger and nutrient needs.

Figure 3 shows the current configuration of the pindang value chain map. Related information is shown in the top part of Table 1.

The process above is repeated if retailers decide to replenish their stocks in anticipation of future demand. However, these calculations are frequently inaccurate as many of the retailers have low levels of marketing knowledge and poor numerical skills. The wholesalers or *pengumpul* are the informal leaders in the pindang value chains. They purchase and collect pindang from many processors, as an individual small-scale pindang processor is able to produce only a small amount of output, about 70 to 80 kg a day of finished product (Kusnadi 2006).

Services that serve the value chain may improve its governance (M4P 2008). Extension services are provided by government to share skills and technology information. Government also provides fish quality spot checking. The processor units are required to have a certificate of processing in order to be able to process. In conjunction with the certification, the government provides preliminary processing guidance to new certified producers (Ministry of Marine Affairs and Fisheries 2013). The Cooperation unit provides finance for fishers; however, the amount is very low and sometimes cannot cover the production costs. Fishing ports provide information about the current fish price and fishing ground area. They also provide fishers with the weather condition and give alerts for bad weather. Fuel station service is provided by government. In some fishing ports, cold stores and ice plants are available, but are limited in capacity.

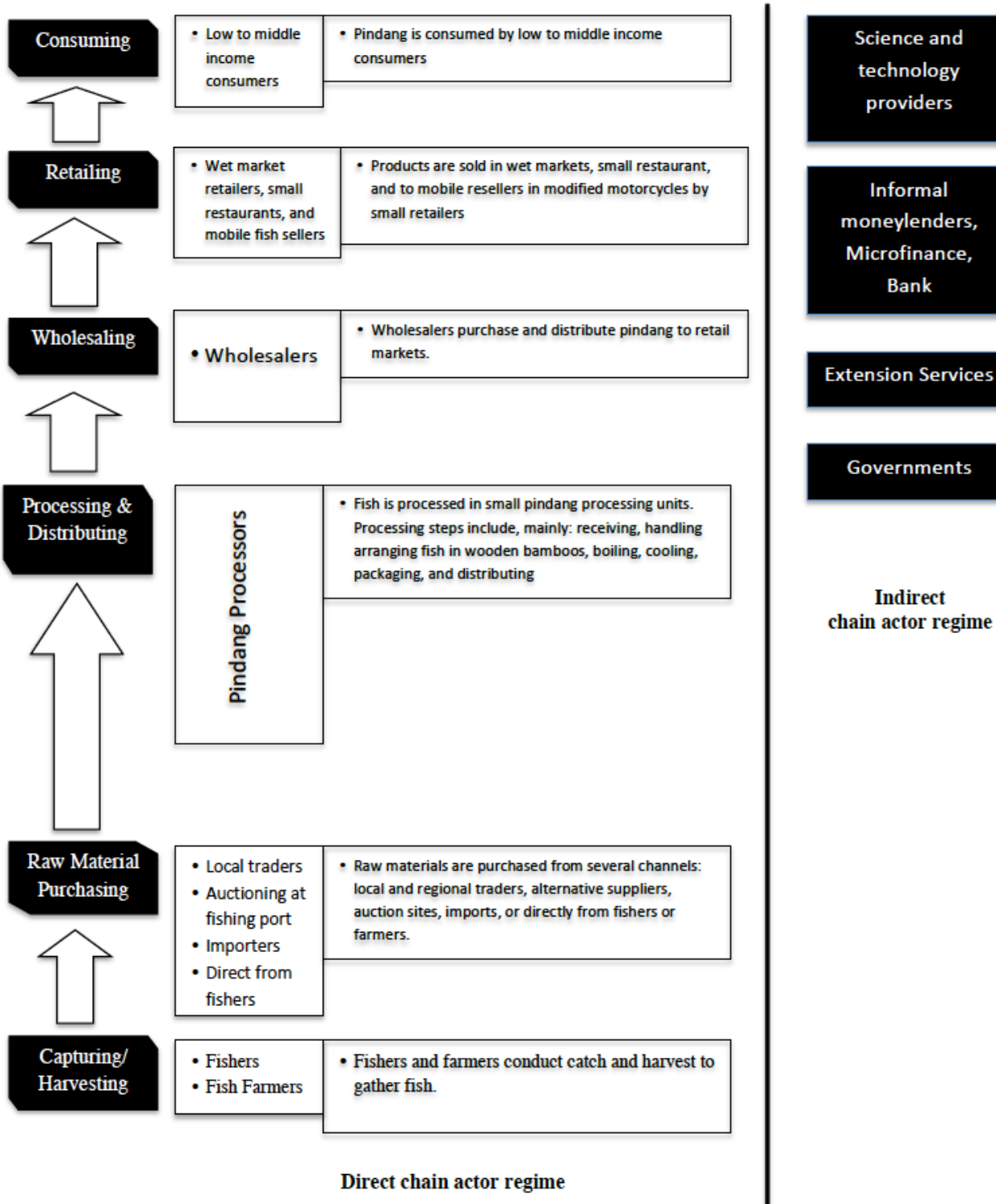
To ensure that pindang is produced to high quality and is safe for consumption, government provides regulation related to quality standards. Moreover, to protect against the use of hazardous chemicals, the government conducts a campaign to warn against such usage. Laboratories do random checking to inspect product quality. However, there is only one laboratory operated in East Java which is in Surabaya, and this is not sufficient to cover the different places in the province.

There are three standards that regulate the quality of pindang. They are: SNI 2717.1:2009 that regulates specification, SNI 2717.2:2009 that regulates raw material quality, and SNI 2717.3:2009 that regulates handling and processing (Badan Karantina Ikan Pengendalian Mutu Dan Keamanan Hasil Perikanan 2009). However, the implementation of these standards is low as they are not mandatory and the lack of punishment makes enforcement of the standards poor. Nevertheless, this regulation should be applied when the fish is going to be distributed to modern markets and become feasible for export markets.

## **5.2 Assessing the value chain and defining the bottlenecks**

A summary of the value chain constraints appears in the middle part of Table 1.





**Figure 3. Pindang's value chain map**

**Table 1. Summarizing the value chain mapping (Adopted from (M4P 2008))**

	<b>Fishing/ Harvesting</b>	<b>Processing</b>	<b>Distributing</b>	<b>Wholesaling</b>	<b>Retailing</b>
Inputs	Fuels Ice Fishing gears Rations Money	Fish Salt Ice Packaging	Pindang	Pindang	Pindang
Activities	Fishing	Purchasing raw materials  Processing, include handling, preparation, boiling in brine water, and packaging	Distributing pindang from processors to wholesalers	Pick up finished products from processors  Sell products to retailers  The wholesalers mostly have limited storage facilities, yet they promote selling.	Selling to end consumers
Outputs	Fish (raw materials)	Pindang	Pindang	Pindang	Income
Actors	Fishers	Pindang processors	Processors or Wholesalers	Wholesalers	Fish traders, mostly traditional
Participation of poor	High	High, especially women	Low	Low	Low to medium
Problems	Depletion of fish stocks, include assumed risks of climate change  Unsustainable fishing practices (e.g. using destructive fishing gear)  Small-scale fishing fleets with obsolete fishing technology, thus inefficient  Poor fish handling practices, including utilisation of ice during voyage, generates losses  Strong role of informal moneylenders that traps fishers in poverty, due to their unfair payback scheme  Social problems, fishers' consumptive culture	Uncertainty of raw material supplies, and as the impact, fluctuating raw material prices  Low food quality and food safety compliance  Lack of entrepreneurships and managerial knowledge  Labour has limited skills to operate modern technology devices. And obsolete processing technology  Financial scarcity  Difficult to enter modern market channels, like supermarkets	Trucking facilities without refrigerated systems  In some places road is not feasible, thus increase cost of transaction  Mostly, transportation vehicles are small, which is inefficient in scale	Most wholesalers lack storage facilities, thus may frequently purchase products  Unequal market power, hence exerting unfair trade  Cannot coordinate the whole value chains to agree with quality and quantity supplied	Products are sold in low value  Unhygienic trading places, less attractive for affluent consumers  Short product shelf life, may impose great losses if products unsold  Traders have low business and management skills
Possible Solutions	Enforce fishing right system to regulate fishing license, while recovering fish stocks. Can be extended to tradable fishing license  Rigorous assessment for fish	Establish sufficient buffer stock facilities for raw materials to ensure continual supply  Enforce stringent food quality and food safety standards and provide assistance to develop capability for compliance	Develop good roads that connect rural and urban areas  Upgrade trucking facilities with larger size embedded with refrigerated system	Enforce fair trade regulation to remove the market failure  Encourage economies of scale to develop storage	Approach modern market channels as the place for affluent consumers looking for product  Build a system to inform lower-

	<b>Fishing/ Harvesting</b>	<b>Processing</b>	<b>Distributing</b>	<b>Wholesaling</b>	<b>Retailing</b>
	<p>stocks and apply quota</p> <p>Innovate fishing gear and fleet technology towards ecologically sustainable devices. The fleets should run by renewable energy, such as using solar</p> <p>Exclude use of dangerous gear and closely monitor the implementation</p> <p>Ensure adequate supply of ice and monitor it on board</p> <p>Monitor stock assessment surveillance</p> <p>Provide alternative formal financial institution, such as microfinance, to remove financial barriers</p> <p>Develop maritime and fisheries school, especially for marine engineering near coastal areas. This may also eventually address skills and culture shortages</p> <p>Collective action to increase scale economies together among horizontal linkages</p> <p>Corporate and social responsibility scheme may help release government's burden</p> <p>Introduce internet and communication technology system to advance navigation and to communicate with other nodes</p>	<p>Provide training and workshops in regards of business and managerial skills</p> <p>Disseminate relevant research and development outcomes to assist technological upgrades as well as willingness to adopt that new technology</p> <p>Provide alternative formal financial institution, such as microfinance, to remove financial barriers</p> <p>Government steps in to encourage compliance with standards and develop the brand image of locally-produced fish products</p> <p>Develop centralised production to promote economies of scale</p> <p>Develop maritime and fisheries school, especially for fish processing technology</p> <p>Introduce internet and communication technology system to manage production system and to communicate with other nodes</p>	<p>Introduce internet and communication technology system to manage the distribution and to communicate with other nodes</p>		<p>value chains about the shifting needs and wants of consumers</p> <p>Establish integrated marketing channels to promote the products</p> <p>Ensure product quality to enhance brand image</p>

### Variability in the Supply of Raw Materials

Variability in the availability of raw materials is a major issue hampering pindang processors, particularly increasing scarcity during the off-season. The pindang processing center in Pati, Central Java is an example. Due to low supplies of fish, the price of fish has recently doubled from IDR 1.3 million to 2.6 million per 180 kg fish (Antara News Jateng 2015). Some of this increasing price can be passed to consumers but not all, so the processors are worrying they will incur heavy losses, as the cost of inputs rise and as many consumers move out of the market (Antara News Jateng 2015).

It is argued that the scarcity of raw materials is mainly due to overfishing by Indonesian fishers and the pervasive impact of illegal, unreported, and unregulated fishing in much of Indonesian water territory, as mentioned earlier (Kusuma 2014). Also, in terms of productivity, the majority of fishers are not competitive due to their small scale and inefficient gear.

Different fishing seasons have different challenges for fishers in finding a catch. The “affluent” fishing season, during the east monsoon, allows higher productivity because the weather is friendlier. Conversely, during the west monsoon, or “hard” season, the weather does not allow fishermen to sail because it is too dangerous for most small fishing fleets (Niehof *et al.* 2005).

Despite good catches during the affluent season, storage facilities are poor. Commercial firms own some cold stores, but they charge prices that the pindang processors cannot afford. There is sometimes no choice but for fishers to dump fish back into the seas in order to avoid decomposition (Antara News 2013).

Imports may be the best way that some pindang producers could provide good quality fish, with consistent supply and stable prices. However, local fishers voice their discontent with this policy, as their market outlets will be less secure and at an inadequate market price. This action may impose significant losses on fishing families, leading to unemployment (Bisnis.com 2014). This may cause civil unrest in a village where affected labour cannot find alternative jobs.

Looking for a longer-term solution, the Indonesian government has been seeking infrastructure development to establish SLIN, a national fish logistic system, as the buffer stock for national fish demand. This would change the centre of the fishing grounds from the Java, Sunda, and Sumatra seas that have been over-exploited to new fishing grounds in eastern Indonesia, which are only moderately exploited (Muawanah, Pomeroy *et al.* 2012).

### Loose Coordination of the Value Chain

A more coordinated value chain governance structure leads to a more organised supply chain to better serve the market in achieving customer satisfaction (M4P 2008). It responds in more efficient ways as all actors work for their best result to target more profit by eliminating unnecessary costs and improving productivity (M4P 2008).

The pindang value chain is a type of very loosely-coordinated value chain, indicated by weak governance where all actors are not integrated, working only for their own goal. A typical pindang value chain has one informal leader, the wholesaler (as shown in Figure 4). Despite having a leading actor, the power of the leader is too weak to control the value chain as a whole. Coordination is only achieved at immediate nodes. The supply of raw materials from the fishers to processors is beyond the control of the leading actor, hence they cannot control raw material supply. This system has haunted Indonesian fish production policy makers for a long time. The asymmetric power is argued to provide disproportionate returns to the wholesalers, hence those who contribute in supplying goods to wholesalers get less margin than they should (Kusnadi 2003), and this contributes to poverty in the coastal fishing villages.

The structure of the coordination system in the cotton value chain in Zambia can be used as a model of governance for boiled fish value chains (M4P 2008). That system is relevant for pindang value chains because the chain needs a strong coordination system. It requires operational managers. In Zambia, operational managers manage production, the financial system (loans), and recover credit. They also manage coordination with suppliers. There are also field operators that monitor the production activities and report the activities back to the operational manager (M4P 2008).



**Figure 4. The structure of loosely coordinated pindang value chain (Adopted from (M4P 2008))**

#### Poor Quality and Low Food Safety Compliance

In terms of quality and food safety, pindang processors are struggling to provide standardized products that comply with quality and food safety standards (either public or private) that are applied to the domestic market. In Indonesia, the Drug and Food Surveillance Body (BPOM) regulates compliance on food safety for small-scale food producers, under decree number HK.00.05.5.1639. The decree provides guidelines for good manufacturing practices (GMP) and sanitation and standard operational procedures (SSOP) in the processing food sector. Pursito (2014) argues that small-scale producers face great barriers to implementing quality and food safety systems, due to insufficient knowledge and capital.

Further, it is difficult to trace the product back to the beginning of the chain to confirm the source of any problem such as a food safety incident. This is because products are sourced from different producers and mixed at the wholesale level before being distributed to retailers. However, having a credible traceability system is very important to be able to market high value products into modern market chains, thus existing non-compliant value chains require substantial upgrading if they want to achieve this (European Commission 2007).

#### Lack of Transformation of Research and Development Outcomes

There have been numerous Research and Development (R&D) projects on pindang in the past; however, the results of the research have not been taken up by most pindang processors. In fact, technological innovation by processors is not often seen. Most of the processors still believe in the adequacy of their inherited cooking techniques, making it difficult to convince them to take up new R&D discoveries.

Some R&D has been performed in order to create a more competitive pindang industry. In 1967, there was research undertaken which aimed at quality improvement (Nitibaskara and Dollar 1967). They discovered that a good composition of salt, in brine water, could improve the product's shelf life at room temperature while being sold. This would allow more efficiency as retailers could order more pindang to reduce transaction costs. However, different regions have different ways of handling and processing pindang. They keep their inherited recipes to provide their unique pindang tastes. Moreover, quite recent research by (Ariyani *et al.* 2010) found that an extract of guava leaves can be used to prevent the decomposition of pindang. This can be used to replace salt, especially for those who suffer high blood pressure. Again, adoption of this finding is poor. This could be due to weak extension services to deliver the research results and the absence of particular institutions such as a marketing board, which could give advice in terms of market acceptance. Fundamentally, willingness to adopt a technology depends on some prominent factors. (Feder *et al.* 1985) explain that small-scale agribusiness producers avoid technology adoption because of a perception of high upfront costs, lack of skills and not being sure how



to apply it, perception of risks that may lead to greater failure by adopting, and inconsistent input supply that may not suit the pace of new production technology.

### Financial Needs and the Absence of Formal Financial Institution

All fishers require funds prior to fishing to pay for such items as diesel, ice, salt, and food during the voyage. Formal moneylenders are reluctant to provide loans due to insufficient collateral. Thus, informal moneylenders are the only source of finance for poor fishers, and this system disadvantages the fishers. The lenders arbitrarily set interest rates as high as possible, and it is not possible for fishers to pay the loan back immediately. According to Kusnadi (2003), some of the lenders are boat owners, so in order to make the repayment feasible, fishers have to loyally work with the boat owner until all the debt is paid. Such a mechanism is embedded in rural coastal living in Indonesia and it forms a strong barrier for the poor to step out from poverty.

However, recently the government has made some interventions. For example they implemented a credit scheme called the KUR program, which provides a small amount of money with little payback interest. Yet, it is argued that the dissemination of credit had been impeded because the banks still do a thorough analysis to grant the credit, thus even with the program it is (still) difficult to acquire a loan (VIVA 2009). Moreover, since collateral is the major issue to gain sufficient capital, the government provided land for fishers, where land certificates could be used for collateral. Nevertheless, such intervention is too costly to justify implementing on a wide scale (Ministry of Marine Affairs and Fisheries 2013).

## **6 Intervening in the pindang value chain**

Given the obstacles to value chain performance identified above, it is suggested that the East Java pindang value chain could be modified in order to foster more sustainable local development. For example, it is argued that value chain upgrades for small-scale producers in developing countries can be achieved through four mechanisms (Trienekens and van Dijk 2012): 1) improving the value added, such as flow process upgrade to be more efficient, increasing product quality, provide quality packaging, doing product diversification and segmentation, enhancing distribution strategy, and applying a well-designed marketing strategy; 2) enhancing market access (through horizontal and vertical cooperation); 3) enhancing the value chain governance structure (restructuring and reorganizing supply chains for more effective and efficient performance); and 4) establishing good partnerships, either private-public, private-private or public-public. Some suggested interventions along these lines are shown in the bottom section of Table 1 and are discussed in the flowing sections.

### **6.1 Targeting new markets and deciding to scale up**

The decision to upgrade should be based on a market-based orientation where products are to satisfy consumers' needs and wants. Existing and emerging middle-class consumers could be targeted as the target market. The domestic market for middle-class consumers is underdeveloped in Indonesia (Sunoko and Huang 2014). Economic growth and rising income is changing the pattern of diet. As income increases, people tend to reduce their intake of inferior food, such as rice, and begin to consume more protein (Gale and Henneberry 2009; Reardon, Timmer et al. 2012). Thus, per capita fish consumption increased from 25.03 kg in 2006 to 35.14 kg in 2013 (Ministry of Marine Affairs and Fisheries 2013) and it is predicted to increase to 54.49 kg in 2019 (Ministry of Health 2015). Moreover, since many people now have a higher opportunity cost of their time, especially women, time to spend in preparing food has become less, and consumers now look for processed food for instant consumption (The Innovator 2007). Indonesian spending on processed food has shown a growing trend. For example, monthly household spending on processed food increased from 9.48 per cent of disposable income in 1999 to 12.79 per cent in 2010 (Statistics Indonesia 2015).

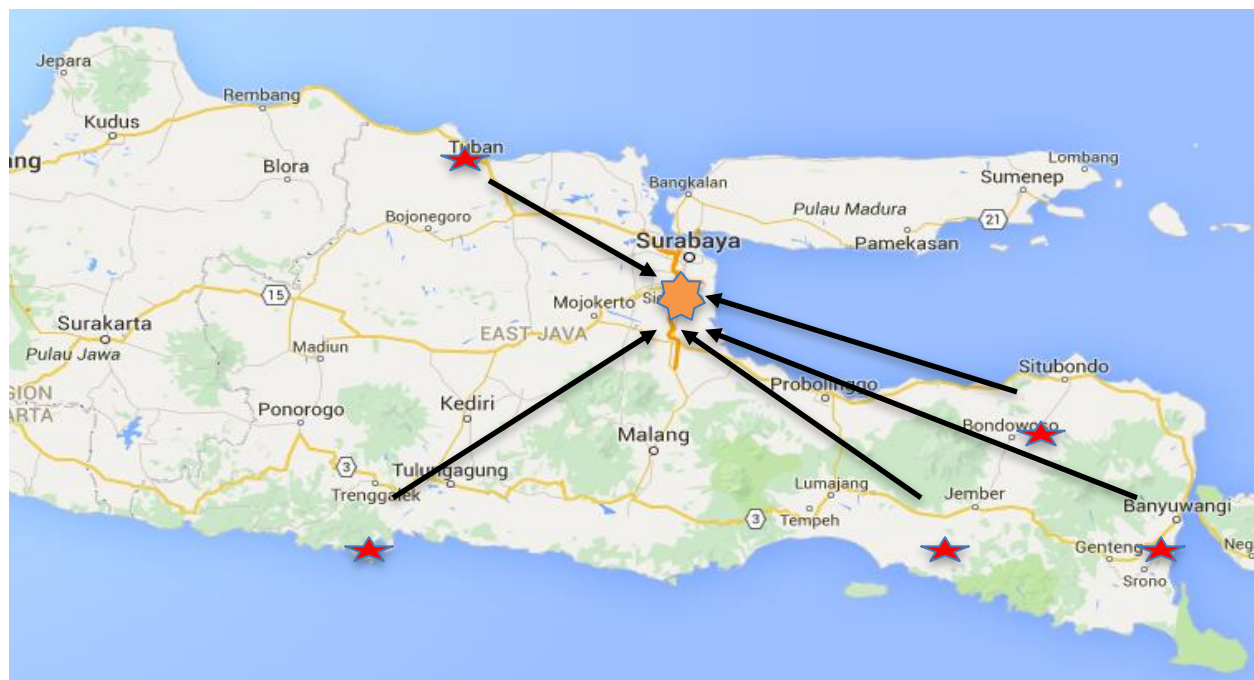
Pindang offers a processed food with a high protein density that would be a good blend for this middle-income market.

Supermarkets, as an agent of modern market channels that target middle to high income people, could be approached to create a linkage with the small-scale producers to market this product. Supermarkets are perceived as a one-stop-shop. Consumers can enjoy a more convenient place to search for their needs without worrying about quality and food safety. Supermarkets also often offer lower prices (Shepherd 2005).

The presence of supermarket firms in the pindang value chain would change a very loosely-coordinated type of value chain into a more integrated value chain. Large firms tend to shorten value chains, cutting out some unnecessary actors in order to lower transaction costs and exert full control (Trienekens and van Dijk 2012). This would pave the way for a more modernised pindang industry. This would follow the development of food value chains in China, where the path to a modernised Chinese agroindustry was marked by linking primary producers in rural areas (the body of the dragon) with leading firms (the head of dragon), such as supermarkets, food processors and restaurants (Waldron 2010).

However, supermarkets require contractual agreements of participants in their value chain and many believe that supermarkets use these agreements to exert control over small-scale producers. Some of these requirements need to be completed and certified before products can be sent to supermarket receiving points, otherwise those products will not be accepted and payment may not be made. Supermarkets maintain that they invest in their suppliers to ensure they produce superior goods - by providing capital to invest in product and process, transferring technology, food quality and safety assistance by sending extension to the processing area, and market information (Coles 2012).

Expanding the distribution areas for pindang is perceived as a good strategy for East Java producers. Surabaya would be a lucrative market because it is an urban area with good incomes where demand can be driven by the life style of urban people that require convenience in preparing food. However, the main pindang production nodes are a long way from Surabaya: Tuban is only about 80 km to the north west of Surabaya; but Trenggalek is approximately 200 km away from the south west of Surabaya; Situbondo and Jember are around 190 km from Surabaya to the south east; and Banyuwangi is also to the south east but about 290 km away (Figure 5). This implies that transportation facilities need to be upgraded to trucks with refrigerated systems to prevent deterioration of the products during transit.



Map is sourced from Google Maps (<https://www.google.com.au/maps/@-7.7902416,112.4947044,10z>)

**Figure 5. Geographical map of “pindang” distribution to urban market in Surabaya**

However, focusing only on Surabaya may create fierce competition between the pindang producers and the market may easily be saturated. Therefore, alternative markets could be investigated. Products can be marketed to other provinces such as to Central Java, Bali, Madura, and Jakarta. However, such a

strategy would require greatly increased production capacity, regular and sustainable raw material supplies, and even better logistics services.

## **6.2 Centralised processing units: grouping pindang processors together to increase economies of scale**

Supermarket chains prefer to contract with medium to large producers. They want consistent supplies at low prices while at the same time encouraging suppliers to modify the products to match changing consumers' preferences (Reardon, Timmer et al. 2012). Therefore, it is important to improve the horizontal linkages in the production nodes to have pindang processors working together to share their private finance, knowledge, infrastructure, and market information in order to increase the scale of their combined processing unit.

Currently, there are 43 clustered pindang processing units in Indonesia that had been assisted by the government. In East Java, there is one pindang clustered processing unit in Trenggalek (Ministry of Marine Affairs and Fisheries 2014). A clustered processing unit is preferred by the supermarket chains, because it lowers the transaction costs and increases the efficiency of procurement compared to transacting in scattered spot markets (Reardon, Timmer et al. 2012).

With increased volume comes the need for increased cold storage facilities to manage the supplies of both raw materials and finished products. With adequate storage, larger quantities of raw materials accumulated during the affluent season of fishing could then be used later during the west monsoon when fish are scarce. It is predicted that the annual raw material demand by pindang producers is likely to increase by almost 40 per cent, with monthly raw material needs at 4.4 million kg (Ministry of Marine Affairs and Fisheries 2014). When imports cannot be afforded, such a storage system would help processors to deal with uncertainty of raw materials. This facility must be placed at the clustered processing unit site, allowing ease of access to store and release both raw materials and finished products. Quantity uncertainty would be considerably reduced.

The current development of the National Fish Logistic System (SLIN) in eastern Indonesian water territory is being provided as a hub for fish producers and fishers. This system is designed to support the supply of raw materials when stocks from local fishers are low. At present, most of the raw material supply is intended for processors in Java and Sumatra (Ministry of Marine Affairs and Fisheries 2014), as these seas are already overfished (Muawanah, Pomeroy et al. 2012).

New facilities construction has to meet standard designs for good manufacturing practice (GMP) and sanitation standard operating procedures (SSOP) to ensure production of good quality and safe food. It is voluntary to have a certificate of good manufacturing practices (GMP); however, it becomes compulsory when products are intended for the export market (Ministry of Marine Affairs and Fisheries 2013). See also (FAO 1997) guidelines.

## **6.3 Improving product quality and food safety assurance**

The implementation of food safety systems and attention to food quality are weak in the pindang processing industry. All small scale food producers have to comply with regulation number HK.00.05.5.1639 about guidelines of good manufacturing practices for home scale food producers (Pursito 2014). In addition, pindang product processing is regulated by SNI 2717.1:2009 (national standard of pindang specification), SNI 2717.2:2009 (national standard of raw material quality), and SNI 2717.3:2009 (national standard of handling and processing) (Badan Karantina Ikan Pengendalian Mutu Dan Keamanan Hasil Perikanan 2009).

However, these public standards may be less stringent than private standards that are applied by supermarkets. It means that compliance may be challenging for small-scale producers who are looking to move into vertical linkages with supermarkets. The small-scale processors face problems associated with insufficient capital to modify processing facilities and to ensure labour has sufficient knowledge to meet regulatory requirements (OECD 2008; Pursito 2014).

Overall, though, improvements in horizontal and vertical linkages may help small-scale producers. Collective action where equal actors are getting together to share what they have, including capital shares, competency shares, technologies, and inputs may find it easier to organize themselves to comply with those quality requirements (Trienekens and van Dijk 2012). Moreover, indirect participants such as

extension services provided by the public, and product quality advisors from private firms can assist small-scale producers produce quality food. NGOs with specialized knowledge about food quality and processing techniques could provide guidance on quality and food safety in these pindang value chains.

#### **6.4 Implementing ICT in the value chains**

The role of information and communication technology is very important. This ensures that information can be disseminated in real time throughout the nodes of the value chains. Participants could respond promptly to opportunities or threats and productivity could be improved.

ICT is particularly important to manage cold storage capacity and inventory. A synchronized system between SLIN and local cold storages would allow an online purchasing system, which would save time and costs.

#### **6.5 Who are going to pay for an enhanced pindang value chain**

Business-community partnerships are argued to be one of the drivers of sustainable local development (de Boer and Tarimo 2012). The concept underpins an idea as to how public-private partnerships can be applied in rural areas whereby public agencies, private firms and local communities can work together.

Private firms are willing to invest in making business possible for rural areas to generate future profits, as well as promote their interest in the development process as part of their corporate social responsibility obligations (de Boer and Tarimo 2012). This includes improving infrastructure, such as roads, delivering ICT technology, providing health and education services, delivering transportation services, empowering activities and so on (Spacey as cited by (de Boer and Tarimo 2012)).

Local government carries the responsibility to initiate regulations that smooth the way for cooperation. They can also assist in enhancing demand, by promoting pindang as a convenience food for middle-class people. Moreover, taking the model of business-community partnerships program in the Tanzania tourism industry, the government monitors the tourism industry and collect shared revenue as compensation for occupied land (de Boer and Tarimo 2012).

#### **6.6 The role of pindang association (Appikando)**

The emergence of Appikando as the association of pindang processors in 2011 should provide a strong impetus to improve the pindang value chains. The organization was established to help facilitate technological transfers, develop marketing strategies, provide financial needs, and to disseminate government regulations (Appikando 2011).

The organization needs to be a central player to help pindang processors in terms of contract establishment and improving marketing strategies. Supermarkets have little certainty when dealing with many small-scale food producers, so Appikando could be the party who signs and enforces the contract. Thus Appikando would have to monitor and maintain production activities within the pindang value chains, and ensure that products are made to meet required standards and are delivered at sufficient quantity at the right time.

Marketing strategy is related to market access. The role of Appikando is to create new market channels to reduce vulnerability in terms of achieving return from only one market channel. Hence, it is important to diversify markets. Appikando could usefully organize product development in order to meet different requirements from different market channels. Such marketing advice could be available in every clustered pindang processing unit.

The net effect of these suggested interventions is hypothesized in Figure 6.

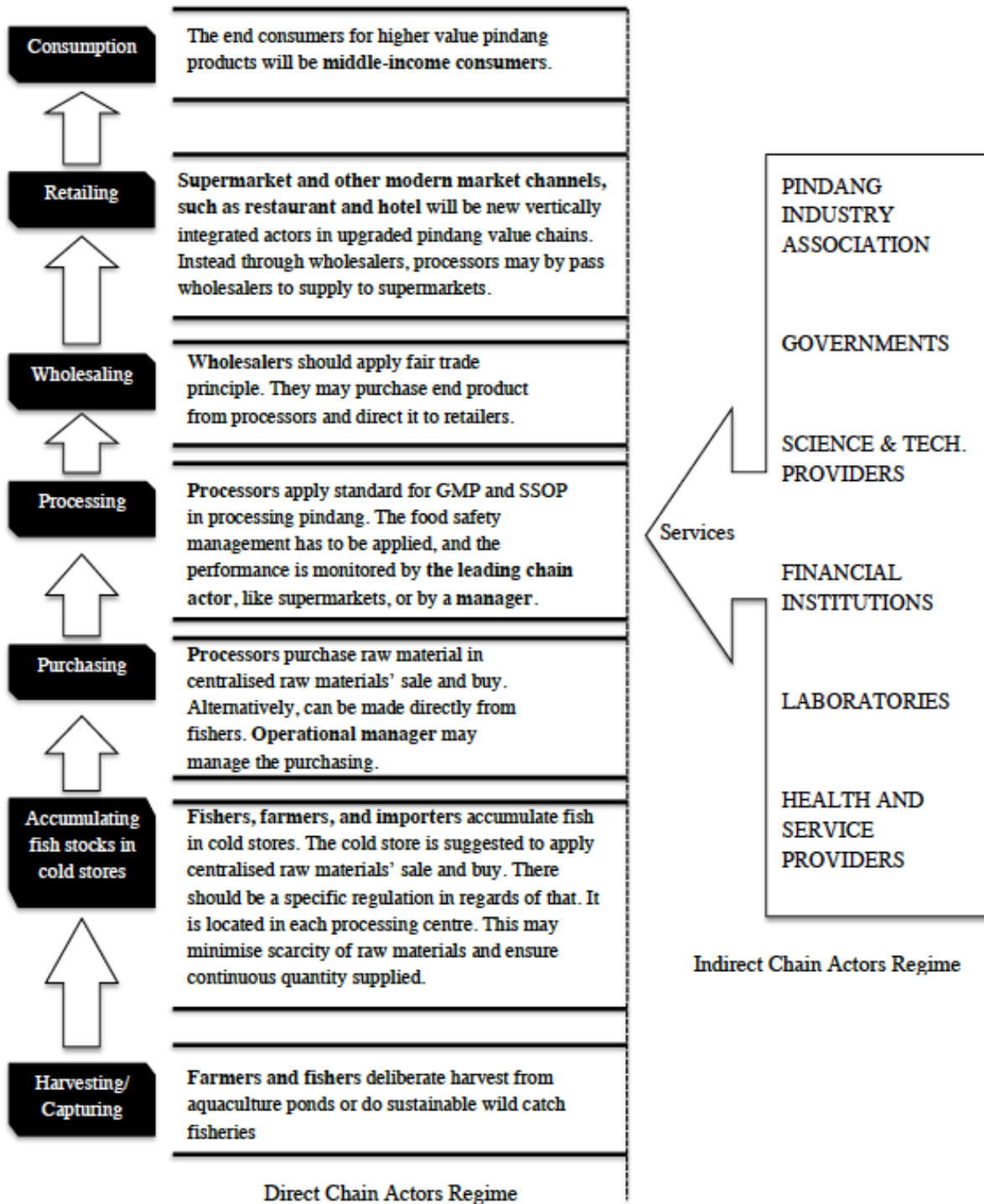


Figure 6. Change in pindang value chain map after suggested interventions



## 7 Conclusion

In order to increase the income of poor people who live in rural coastal areas of Indonesia, it is necessary to develop the local fisheries industry. One of the local fish processing industries that employs many low-income people is pindang, or boiled fish. An analysis of the pindang value chain in East Java suggests that the value chain needs to be upgraded. Quality has to be improved by applying cold chain principles along the whole chain, from catch to consumption. Production has to comply with food quality and food safety standards which are regulated by the Indonesia National Standard (SNI). A more effective information and product flow coordination system needs to be introduced. Taking an example from an upgraded chain in another country, local operational managers and operators could be employed who have responsibility for different tasks include information sharing, skills and knowledge upgrade, maintain suppliers, and as financial lenders. Large cold storages at key ports are needed so that the purchasing system for raw materials can be changed. Finally, new more valuable markets for pindang need to be investigated. It is expected that if the value proposition for pindang can be increased, then the low income people involved in this industry, and the villages and communities they are part of, can have a greater opportunity to move out of poverty.

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