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The Madura Island Salt Value Chain

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Abstract

Indonesia as the largest archipelagic nation in the world has many potential growth industries in terms of maritime products, including seawater salt. In the last four years, the Indonesia salt production balance has been consistently in deficit, and a record deficit in 2016 reached 3.2 million tonnes. Indonesian seawater salt production occurs across 51 regions, by mostly small scale operators, which complicates industry value chain analyses. Madura Island is the largest salt production region in Indonesia. It is used as a case study to inform the general constraints that hamper the salt industry's growth and competitiveness. This case study also suggests some potential industry improvements. Constraints were found in production, value-adding, feedback mechanisms, governance and regulation. Strategies to address identified constraints to enable a better growth path for Madura Island's salt industry are in the final sections of the paper.

Keywords: Salt, value chain, Indonesia, deficit, small scale operators

Introduction

Indonesia is the largest archipelagic nation in the world, with a total of 13,466 Islands (Central Intelligence Agency, 2019) and it has the world's third-largest coastline of 54,720 km (World Atlas, 2019). Indonesia is currently classified as a middle-income nation with a Gross Domestic Product (PPP) of $US12,400, and with an average economic growth of 5 per cent in 2017. Its GDP composition was 45.3 per cent from service, 41 per cent from industry and 13.7 per cent from agriculture. Nevertheless, 32 per cent of Indonesia's population depends on agriculture for their income (Central Intelligence Agency, 2019). Although Indonesia is an archipelagic nation, only 2.6 per cent of its GDP was from the maritime sector (Ministry of Marine Affairs and Fishery, 2018a). Of the maritime sector, salt production, particularly that produced by traditional salt farmers, is one sector that arguably requires immediate attention due to its small scale, and its inability to adapt in an ever-changing environment has led to a decreasing amount of revenue.

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A value chain analysis is presented in this paper on the Island of Madura to understand and explain the constraints of traditional Indonesian salt production as Madura is the industry's pre-eminent salt producer. The case study identifies interventions at each stage of the value chain to increase the value gained by the actors.

The Indonesian Salt Market

Production of salt around the world comes from various sources. Generally, there are two main ways in which salt is produced (Ardiyanti, 2016):

- Seawater and salty inland lake - about 40 per cent of the world's salt is produced from seawater. Some major countries that produce salt through these methods include Australia, Brazil, Canada, the People's Republic of China, India, and Indonesia. Salty inland lake salt production accounts for about 20 per cent of the world's production. The main producing countries are Australia, the People's Republic of China, the Kingdom of Jordan and the United States. The main production method is solar evaporation.

- Salt mine - this method accounts for about 40 per cent of the world's salt production. Salt mines are mainly located in the People's Republic of China, the Netherlands, the United States, and Thailand.

Underground spring water is another method but it is not widely used as it is typically uneconomical and therefore accounts for very little of the world's supply.

Indonesia exclusively uses the first method for producing salt. There are several key components to ensure a productive salt field (Ardiyanti, 2016):

- Seawater - seawater used to produce salt must meet several criteria;

a) it has a high salinity level, well away from any freshwater outlet
b) clear, not mixed with mud, waste or any other contaminant
c) the location is accessible to seawater intrusion

- Soil - the soil that is being used as the "pan" in which the seawater is evaporated must meet several key criteria;

a) it must be watertight, to reduce seawater seepage
b) it should not be more than 3 meters above sea level
c) its scale has to be large enough to be economical

- High evapotranspiration rates which require;

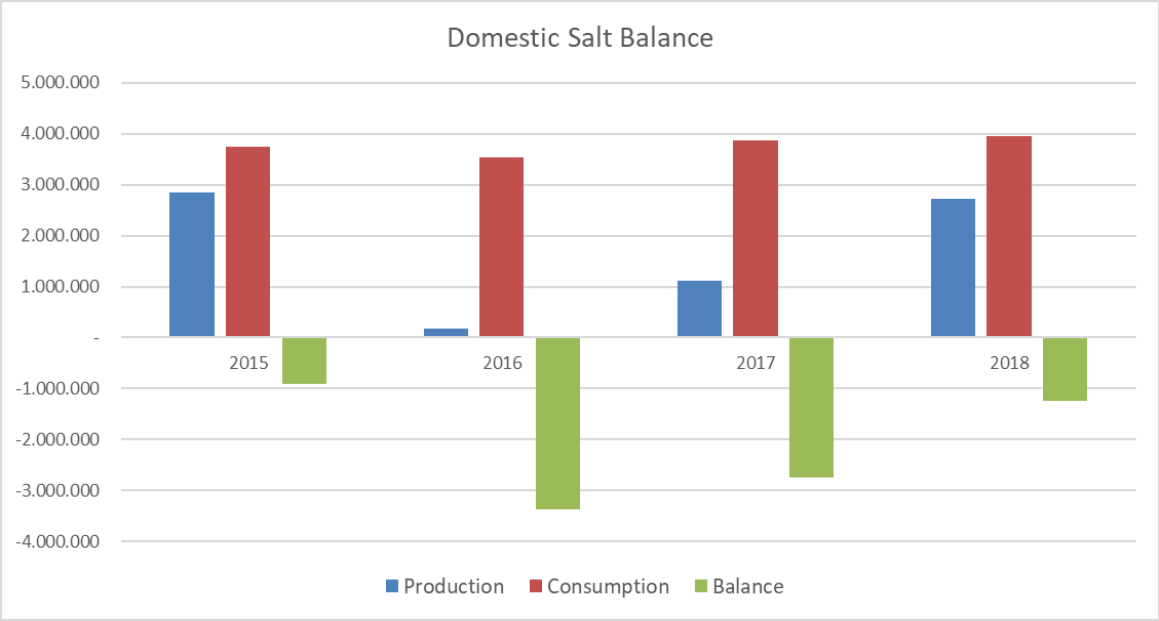
a) low annual rainfall (less than 1000 mm/annual)
b) more than 4 consecutive dry months
c) high average ambient temperature with high sun intensity and few foggy/cloudy days
d) a low average moisture level

Indonesia's expansive coastline implies a large potential area for salt field production, which is estimated to be 37,400 hectares. However, at present only about 20,000 hectares are utilized for salt production. Most of the salt fields are operated and owned by an individual person or by small scale

operators, with some as small as 0.3-0.5 hectares. The main corporation that produces salt in Indonesia is PT. Garam, a state-owned enterprise that produces about 12 per cent of total Indonesian domestic supply. It also refines and distributes salt for human consumption. It is the sole importer of salt for household consumption (salt that is not for industrial purposes). There are also some foreign enterprises such as PT. Cheetham Indonesia, a subsidiary of Australian operated Cheetham Salt, but it is not yet in full-scale production (Ardiyanti, 2016).

Due to the reliance on mostly traditional methods and uneven climatic conditions, Indonesian salt production in the last four years has been uneven and at times extremely low (Ministry of Marine Affairs and Fishery, 2018c) as shown in Figure 1.

Figure 1. Indonesia domestic salt balance



Source: Ministry of Marine Affairs and Fishery (2018c)

Indonesia typically consumes more salt than is produced. The production shortfall was greater during a period of incessant rain in 2016 in which the salt trade negative balance tripled from the year before (Ministry of Marine Affairs and Fishery, 2018c). In 2018, total domestic production was 2.7 million tons, regaining the levels of three years earlier (see Figure 1).

Table 1 indicates that Indonesian salt production was spread across 51 *Kabupaten/Kota* (regencies) in 2018. This indicates the small scale of the Indonesian salt production sectors. Nonetheless, more than a quarter of all Indonesian salt was produced from the Island of Madura in East Java province. The Island alone produced 27.6 per cent of Indonesian salt production (Ministry of Marine Affairs and Fishery, 2018b).

The main production regions are shown on the map in Figure 2.

Table 1. National salt production area

No	Location	Production (ton)	No	Location	Production (ton)
	Aceh Province	11,690		**East Java Province**	782,738
1	Aceh Besar	57	25	Bangkalan	2,750
2	Aceh Timur	554	26	Gresik	11,977
3	Aceh Utara	1,213	27	Kota Pasuruan	11,044
4	Bireun	4,108	28	Kota Surabaya	2,272
5	Pidie	5,265	29	Lamongan	20,487
6	Pidie Jaya	492	30	Pamekasan	134,596
	West Java Province	479,085	31	Pasuruan	25,300
7	Cirebon	149,803	32	Probolinggo	27,229
8	Indramayu	319,936	33	Sampang	312,061
9	Karawang	9,347	34	Sidoarjo	8,309
	Central Java Province	637,178	35	Sumenep	199,075
10	Brebes	43,197	36	Tuban	28,613
11	Demak	101,324		**Gorontalo Province**	1,263
12	Jepara	49,949	37	Pohuwato	1,263
13	Pati	257,794		**South Sulawesi Province**	111,835
14	Rembang	184,914	38	Jeneponto	65,025
	Bali Province	4,532	39	Kepulauan Selayar	197
15	Buleleng	3,171	40	Pangkajene dan Kepulauan	29,015
16	Karang Asem	1,343	41	Takalar	17,598
17	Klungkung	19		**East Nusa Tenggara Province**	11,142
	West Nusa Tenggara Prov	309,185	42	Alor	8
18	Bima	263,238	43	Ende	401
19	Kota Bima	277	44	Flores Timur	167
20	Lombok Barat	1,129	45	Kupang	291
21	Lombok Tengah	25,180	46	Lembata	961
22	Lombok Timur	13,760	47	Manggarai	1,833
23	Sumbawa	5,601	48	Nagekeo	6,383
	Central Sulawesi Prov	982	49	Rote Ndao	90
24	Palu	982	50	Sumba Timur	672
			51	Timor Tengah Utara	336
		Sub Total			**2,349,630**
		PT Garam Production			**369,626**
		Nationwide Total			**2,719,256**

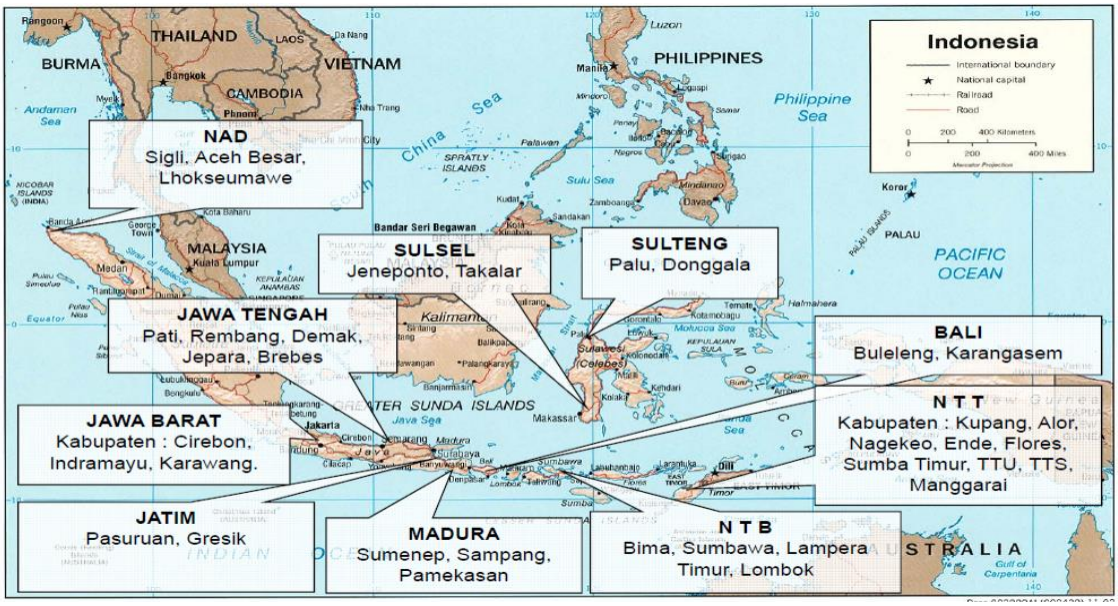
Source: Ministry of Marine Affairs and Fishery (2018b)

On average, Indonesian producers were only able to produce salt for four months, with a historical high of 4.8 months in 2011, and less than one month in 2016 due to unfavorable weather (Ardiyanti, 2016). The process is as follows, as shown in Figure 3.

First, seawater is let into the inlet by the use of a pump or waiting for the tide. It is then moved into the first reservoir field (usually about 25 per cent of total land use) where the water is allowed to evaporate for 7-10 days. Next, the water is transferred to the second reservoir for three days to evaporate more, then so on until the fifth reservoir for another 7-14 days. Finally, after it is sufficiently aged and

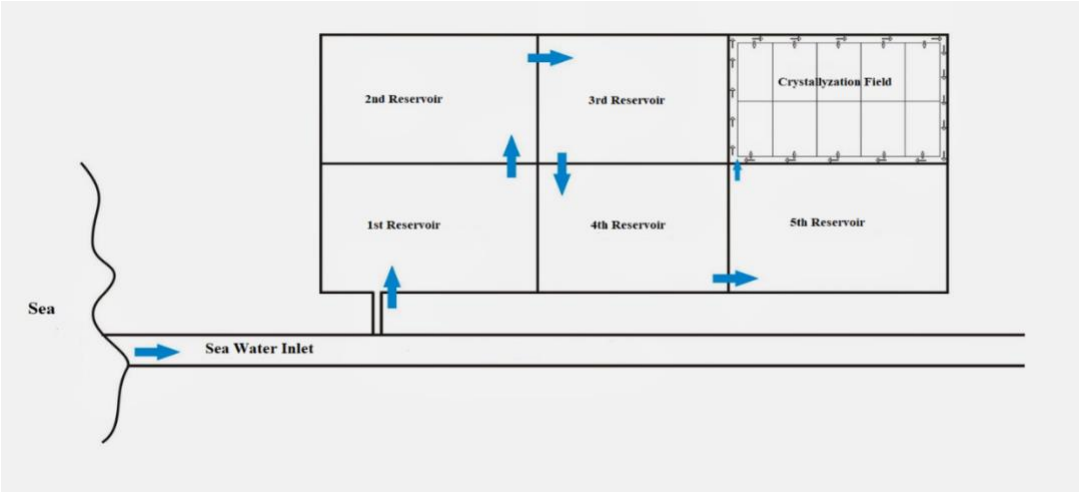
measured at 20 Be (analyzed using Baumeter), the water is let into smaller crystallization fields (with a depth of just 5 cm), and after 5-10 days of much faster evaporation, the resulting salt crystal is collected with a wooden utensil (8villages, 2018).

Figure 2. Indonesian salt production centers



Source: Ministry of Industry (2016)

Figure 3. Schematic of traditional salt production in Indonesia

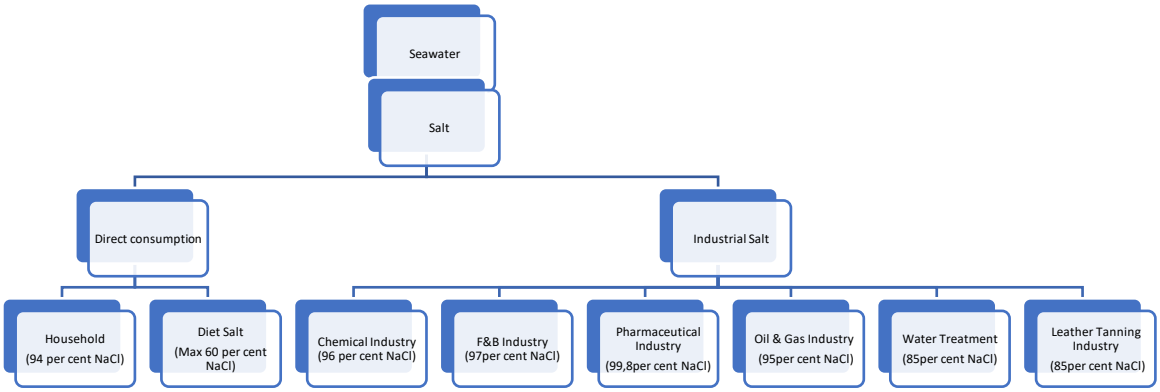


Source: 8village (2018)

In Indonesia, salt serves a variety of uses. First, it is used for direct consumption by human beings. Second, it is used for a variety of purposes in industrial capacities, such as for chemical uses, in the food and beverage industries, pharmaceutical industries and oil and gas industries, for water treatment

usage, for salting fish, and in the leather tanning Industry (Ardiyanti, 2016). In Indonesia, the salt industry is divided into two main domains of household and industrial uses (Figure 4).

Figure 4. Domestic salt usage



Source: Ministry of Industry (2014)

The Minister of Industry's regulation number 88/M-IND/PER/10/2014, stipulates that salt used for household consumption must have a minimum of 94 per cent NaCl content. Water and heavy metal limits are also stipulated: water content (7 per cent), undissolved particles (0.5 mg/kg), cadmium (0.5 mg/kg), lead (10 mg/kg), mercury (01 mg/kg) and arsenic (01 mg/kg). It must also meet a minimum kalium iodide content of 30mg/kg. Diet salt may be either liquid or solid, with maximum NaCl content of 60 per cent and a minimum kalium iodide content of 30mg/kg (Ardiyanti, 2016).

For industrial purposes, salt is divided into more specific technical specifications according to its particular uses. For example, the chemical industry's specification is a NaCl content of more than 96 per cent NaCl, with a maximum water and calcium content of 2.5 and 0.1 per cent respectively. In the food and beverage industry, for salt to be classified as food-grade salt, it must have a minimum NaCl of 97 per cent, with maximum allowable contents of calcium (0.06 per cent), magnesium (0.06 per cent), water content (0.5 per cent), cadmium (0.5 mg/kg), lead (10 mg/kg), mercury (0.1 mg/kg), arsenic (0.1 mg/kg), and undissolved matter (0.5 per cent). For pharmaceuticals, the specification is a minimum of 99.8 per cent NaCl with impurities as close as possible to 0 per cent. For oil and gas, the salt must have a minimum of 95 per cent NaCl, with maximum allowable contents of sulfide (0.5 per cent), calcium (0.2 per cent), magnesium (0.3 per cent), and water (between 3–5 per cent). For both leather tanning and water treatment uses, the minimum requirement is simply a minimum of 85 per cent NaCl. Nonetheless, for boiler uses, a minimum of NaCl 95 per cent is specified (Ardiyanti, 2016).

Unfortunately, the traditional methods used in Indonesian salt production result in outputs that are mostly unable to meet the specifications for industrial salt. Samples taken in various traditional salt production centers show varying results. For example, in 2013 from 42 samples across Indonesia, the average NaCl content was only 92.69 per cent, with average water and lead contents of 2.24 per cent and 8.9 mg/kg respectively. Further sampling in 2014 shows an even worse result of 86 per cent NaCl content on average. Nonetheless, sampling taken at a production centre using geo-isolator medium showed that its NaCl content could reach 97.73 per cent, surpassing the minimum for industrial use threshold (Ardiyanti, 2016).

The traditional methods of salt production in Indonesia also result in a high production cost as illustrated in Table 2. It is clear that the largest share of the production cost was from labor since most production used traditional methods.

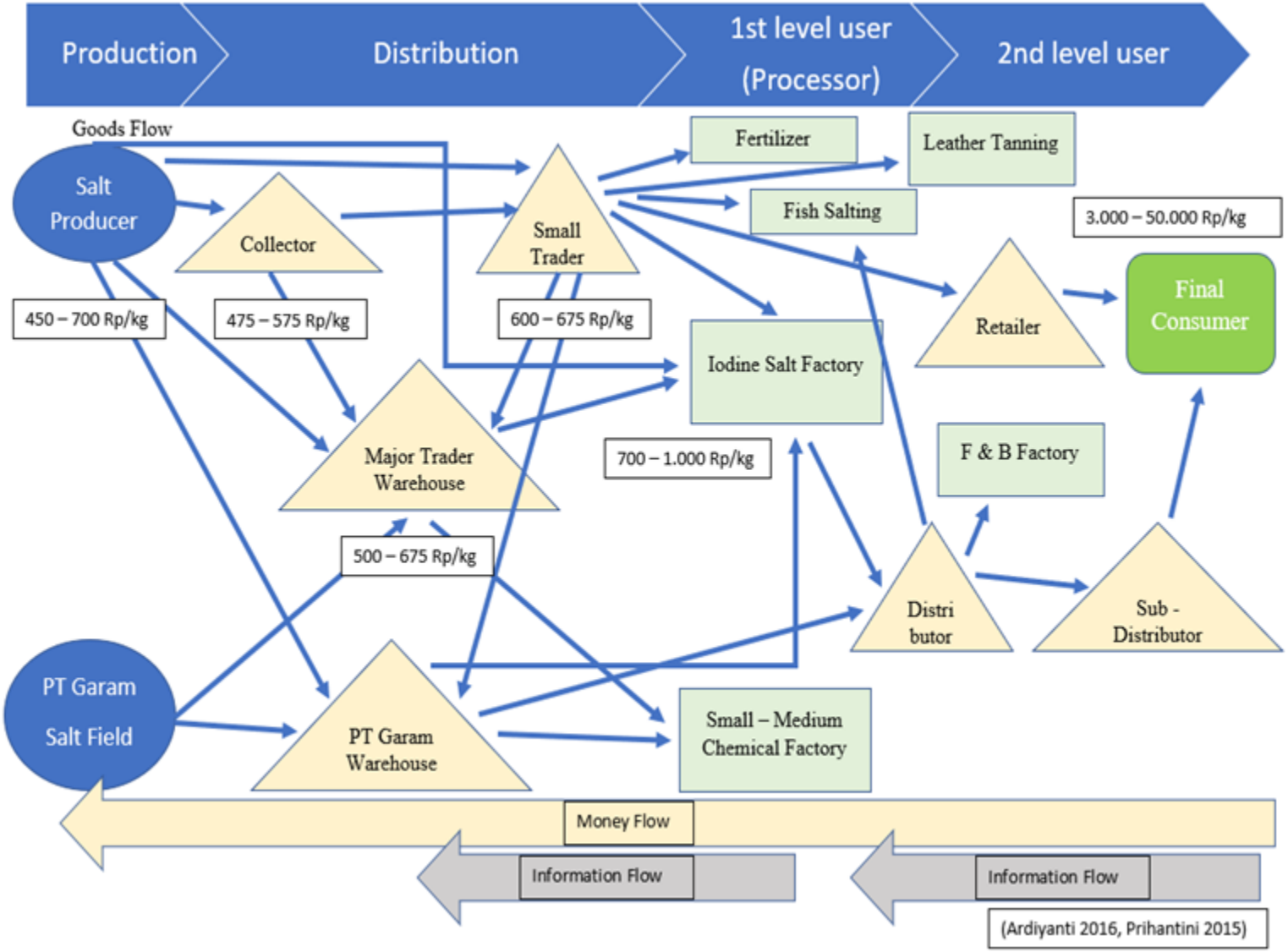
Table 2. 2018 Indonesian traditional salt production cost

Number	Component	Unit	Amount	Cost (Rp)
I	**Preparation & Production**			
1	Land Rent	Rp/Ha		13,500,000
2	Land Repair	Rp/Worker	2	2,000,000
3	Solidifying Equipment	Rp/unit	1	350,000
4	Solidifying worker	Rp/worker	1	5,000,000
5	Windmill	Rp/Unit	2	3,600,000
6	3-inch Pipe	Rp/Unit	2	2,400,000
7	3- inch Pipe elbow	Rp/Unit	2	100,000
8	3 Hp water pump	Rp/Unit	1	4,500,000
9	3-inch water hose	Rp/Unit	5	250,000
10	Bamboo basket	Rp/Unit	2	200,000
11	Baumeter	Rp/Unit	1	35,000
12	25 kg bucket	Rp/Unit	4	360,000
13	5 kg bucket	Rp/Unit	2	30,000
14	Hoe	Rp/Unit	1	200,000
15	Wooden Rake	Rp/Unit	2	500,000
16	Bamboo hut 2 x 3 meter	Rp/Unit	4	360,000
17	Plastic Tarpaulin 2 x 3 meter	Rp/Unit	1	90,000
18	Fuel for pump	Rp		2,000,000
19	Large bamboo	Rp/Unit	20	540,000
20	Small bamboo	Rp/Unit	3	360,000
21	Plastic rope	Rp/Unit	5	5,000
II	**Harvesting Time**			
22	Worker's wage for 90 days	Rp/Worker	3	33,000,000
23	50 kg of Plastic bags	Rp/Unit	1800	3,240,000
24	Plastic tie knot	Rp/Unit	10	130,000
25	Transport cost to seller Warehouse	Rp		4,500,000
	Total Production Cost	**Rp/Ha**		**77,250,000**
	Productivity assumption	80 Ton/Ha		
	Production cost/kg			**965,620**

Source: Ministry of Trade (2019)

Therefore it is concluded that Indonesian traditional salt production faces several inherent problems. These are high production costs, low-quality products, and less than satisfactory seawater quality due to proximity to large population centers.

Figure 5. Salt distribution value chain in Madura Island, Indonesia



Salt Value Chain Mapping in Madura Island, Indonesia

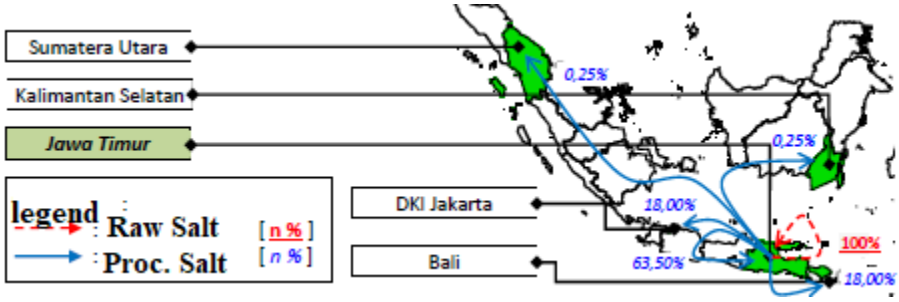
As the largest regional producer, problems found in the Madura Island salt value chain are a mirror of the wider Indonesian salt value chain. These issues could be divided into two main problem sets. The first is on the production side, as elaborated above. The other set is in product distribution. Figure 5 elaborates on these distribution problems.

There are several key features of the Madura Island salt value chain :

- The value chain is extraordinarily long; for instance, in the longest channel from traditional salt producer to the final consumer, the product changes hands eight times. This affects the total shares received by producers from the final consumer which varies from 23 per cent to a minuscule 0.9 per cent.
- The value chains are also very varied. This reflects the differences in choices that are facing the salt producers since different product qualities and destinations will result in differing value chain options.
- The flow of money is relatively assured as most salt producers operate on a cash basis instead of a clearer contract-based system. However as some collectors serve as money lenders, prompt payment from the next link up in the chain serves as an incentive as to whom they would regularly do business with.
- The flow of information is blocked from reaching the salt producers, due to the peculiarities of the salt industry itself. This means that any feedback from the final consumer is communicated only to the iodine salt factory.
- The flow of information from the iodine salt factory regarding the quality of the salt is mostly communicated to small traders, except if the factory has direct contracts with producers.

Salt from Madura Island is exclusively distributed to East Java province processors (Central Bureau of Statistic, 2014).

Figure 6. Geographical value chain of Madura salt



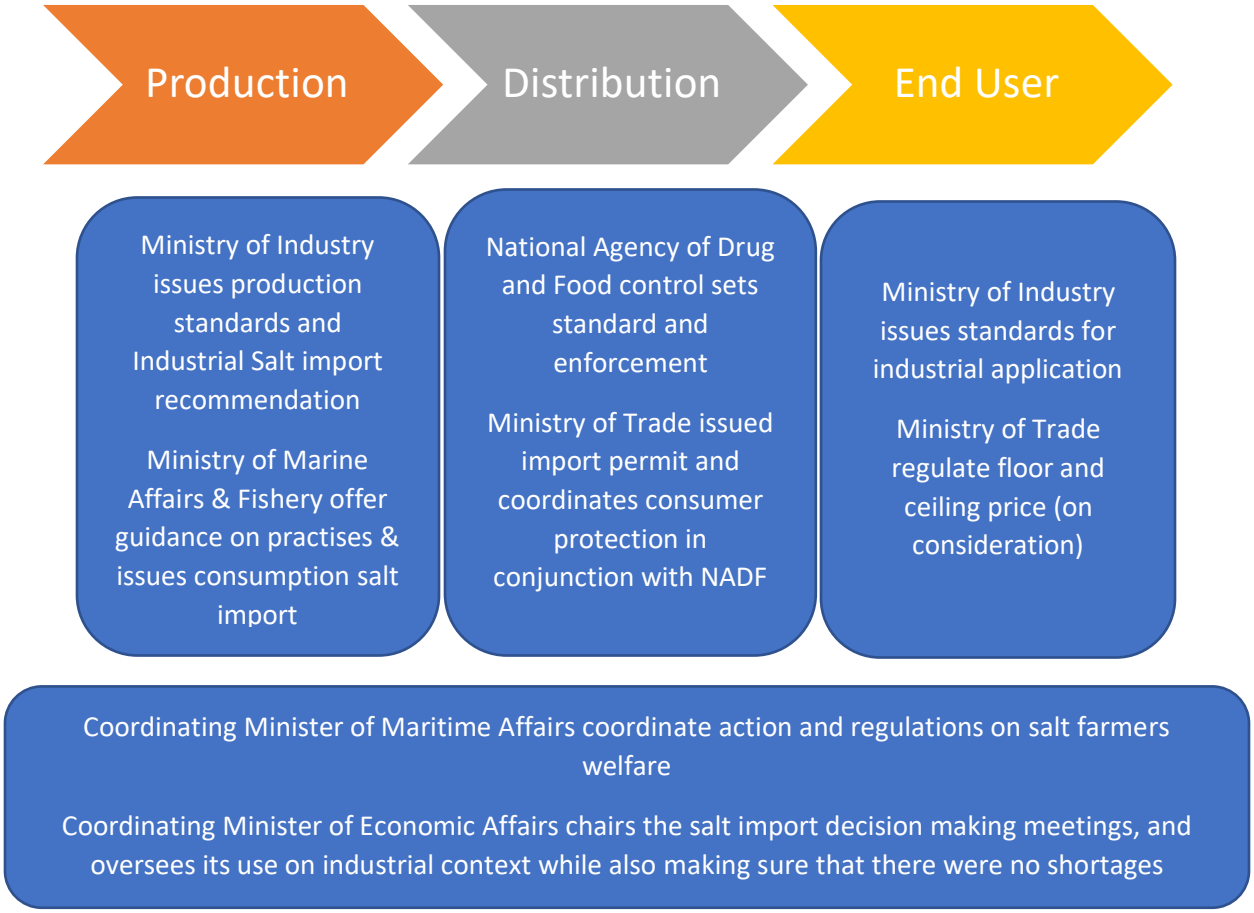
Source: Central Bureau of Statistic (2014)

Indeed, Madura Island salt is the number one source for salt iodine factories scattered across the province. The salt is first sent to a factory either in neighboring Surabaya city or to other surrounding regencies. After the salt is processed and refined, it is sold chiefly outside the province. That is, 65 per cent is sold to the remaining Javanese provinces (Banten, West Java, Central Java, and Yogyakarta), with

another 18 per cent going to Jakarta, 18 per cent going to Bali, and the remainder divided equally between North Sumatra and South Kalimantan (Central Bureau of Statistic, 2014).

Since salt is deemed essential for both industrial and domestic purposes, salt is heavily regulated in Indonesia, by different ministries as illustrated in Figure 7.

Figure 7. Regulation and governance of salt in Indonesia



The salt value chain in Madura is also subjected to various regulations controlling production. Producers first face local regulations mandating location and whether they are allowed to harvest salt or not. They have to conform with the Ministry of Marine Affairs and Fisheries guidelines on salt production. Following production, salt is graded (and priced) in accordance with the Ministry of Industry's salt designation and the Ministry of Trade's grading and pricing scheme. When salt is transported to a holding ground which is owned either by a trader or collector, producers must ensure that the salt has not deteriorated or is not contaminated, otherwise their goods will not conform with the Ministry of Industry's standards and will be refused. Finally, the iodine salt factories need to monitor product quality, since their product will either go to consumer markets or become an industrial raw material, and both require strict quality standards as mandated by the Ministry of Industry and the National Agency For Drug and Food Control.

In the background, the Coordinating Ministry of Maritime Affairs tries to ensure that salt producers, mostly the traditional ones, are able to secure a decent livelihood. While the Coordinating Ministry of Economic Affairs chairs salt import decision-making meetings attended by ministers from related fields, the Ministry also makes sure that there are no shortages of salt and monitors salt production/imports effects on inflation.

Profit Drivers in the Madura Island Salt Value Chain

Table 3. Profit drivers in Madura Island salt value chain

ACTORS	DRIVERS	EFFECT
Salt Producer	Higher production/hectare	Lower average cost
Salt Producer	Better seawater quality	Higher salt quality, higher salt price
Salt Producer	Increased water retention time in salt pans	Higher salt quality, higher salt price
Salt Producer	Higher prices due to a price floor	More income for salt producers
Salt Producer, Trader, Collector, Industry, Distributor	Availability of warehouse	Less price volatility
Salt Producer, Collector, Trader	On-field grading	Price differentiation, higher overall revenue
Salt Producer	Salt producer co-operative	Higher bargaining power, possible diversification of products.
Salt Producer	Product diversification	Possibility of higher price
Salt Producer	Use of geo-isolator medium	A higher salt quality
Salt Producer, Collector, Trader, Industry (except leather tanning and fish salting)	Better salt quality	A higher salt quality will help the salt producer to obtained higher prices, while it would lead to reduced cost for iodine salt industry
Salt Producer, Industry	Shorter value chain	A shorter value chain will increase margins
Salt Producer, Collector, Trader	Lower Import quota	A lower import quota means a bigger demand for domestic salt.
Salt Producer, Collector, Trader, Industry	Mandatory certification	A higher price
Salt Producer & Industry	Direct contract based buying	A better salt quality and quantity certainty
Salt Producer, Iodine Salt Industry	Branding & labelling	A higher price
Salt Producer, Iodine Salt Industry	Better packaging	A higher price

Table 3 lists the driving factors that contribute to actors' profit in the salt value chain in Madura Island. The table also explains the driver's effects and consequently, which actors benefited the most.

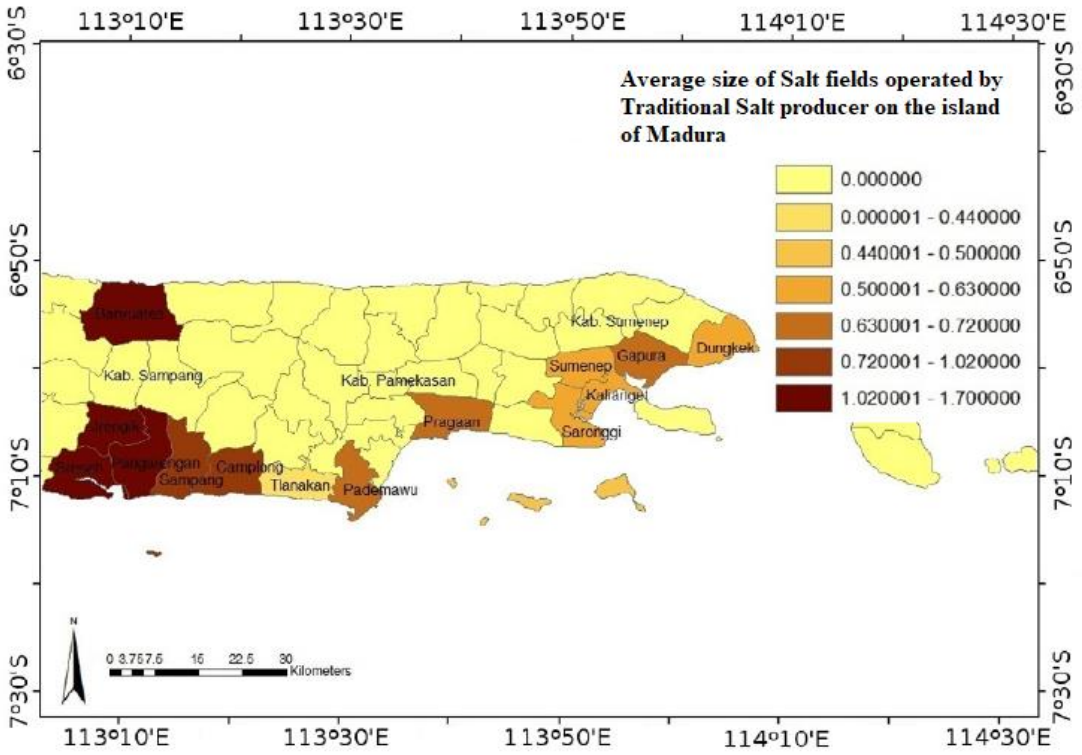
Assessing Performance of the Chain

Strategic fit

Salt is inherently a bulk, low price, commodity, so salt production is not price-responsive at all. Since Indonesia is typically a net deficit country in salt production, the key question has always been about quantity, given minimum quality standards. Therefore there are almost no incentives for the traditional salt producers to innovate, other than try to produce as efficiently as possible.

The salt producers on Madura Island are also not able to be more responsive due to the very small size of their landholding, with most less than 1 hectare of land (Figure 8).

Figure 8. Average salt field size on the Island of Madura (hectares)



Source: Bramawanto (2017)

On the other hand, as long as they aim for bulk pricing, with the domestic demand outstripping domestic supply, the demand for salt is fairly certain.

Therefore the strategic fit for the Madura Island salt value chain has the following characteristics: the demand for salt is very certain; the value chain has a low margin, particularly for the salt producer; there is no need for stock renewal, and there is no need for markdowns.

Unfortunately, the low margin also leads to the inability of small salt producers to accrue capital to enable them to store the salt and makes it hard for reinvestment to produce better quality salt. Low capital accumulation also means that there is no way to enlarge the salt fields. Therefore the only logical way for the bulk based salt value chain to improve is through trying to make the operation as efficient as possible, either in terms of production or its distribution (Chopra and Meindl, 2013).

Drivers of profit

Productivity. As shown in Table 4, Madura Island's salt productivity is already above the national average. However, its productivity is only 50 per cent of India's productivity (where 90 per cent of salt fields are also smallholders) and 48 per cent of Australia's productivity.

Table 4. The productivity of salt in various places

Salt Productivity (Ton/Hectare/Year)	Location	Source
126,18	Madura Island	Ministry of Fisheries and Marine Affairs (2015)
112,87	Indonesia	Ministry of Fisheries and Marine Affairs (2015)
224	India	MBA Rendezvous (2019) and US Geological Survey (2019)
233	Australia	US Geological Survey (2019)

Seawater quality. As the main ingredient of salt, the quality of seawater is the main driver of higher quality salt, and in particular, its impurities. Fortunately, the Island of Madura is located offshore from the Java mainland, and the regencies of Sumenep and Pamekasan can obtain much better seawater quality than the regency of Sampang which directly faces the Surabaya metropolitan area. When compared with salt fields on Java Island, Madura Island salt fields have distinct advantages.

Increased water retention in salt pans. Allowing the water to evaporate longer from 7 to 10 days in salt pans significantly increases the quality of the salt itself (Nurdiani, 2013). Unfortunately, unless there is a clear indication that there will not be a rainy day that might lower the result, most producers are unwilling to extend the evaporation time (Prihantini, 2015).

Price. The production cost of Madura salt can be compared with other places (Table 5).

Table 5. Salt offering prices/production cost

Salt Production Cost Rp /kg	**Location**	**Source**
734.3	Madura Island	Prihantini (2015)
965.29	Indonesia Avg.	Ministry of Trade (2019)
224	India (FOB)	MBA Rendezvous (2019)
350	Australia (FOB)	Leichhardt Industrials Pty Ltd (2019)

This shows that in comparison with the rest of Indonesia, Madura Island salt was able to operate at lower prices. Nonetheless, in comparison with other places in the world, the total cost was much higher.

In terms of storage availability, only the larger traders in Madura own salt storage. Therefore most producers rely on prompt pickups from collectors/traders who buy their salt. Producers who are enrolled in co-operatives may be able to store their salt in a co-operative warehouse, unfortunately, few co-operatives have their own warehouses (Nurdiani, 2013).

While co-operative membership also provides additional benefits such as grading services, working capital loans, training and bridging loans (Nurdiani, 2013), not many producers want to join co-operatives due to moral hazards perpetrated by co-operative leaders, and due to conservatism.

The use of a geo-isolator in salt production, as mandated by the Ministry of Fisheries and Marine Affairs, is not widespread due to uncertainty in purchasing by the collector. Some small-scale producers that did receive geo-isolator materials from the government stopped using it altogether once the material got damaged, due to the fact that collectors invariably did not differentiate the salt price between those that produced using geo-isolator with those which didn't. However, a few producers who have contract-based buying and certification were more receptive to use this material to improve salt quality.

There are some moves towards producers certifying and turning their salt products into credence goods. This could be done with minimum fuss since salt itself is already naturally farmed, and has almost zero carbon footprint (apart from transportation).

Overall, salt producers on Madura Island still rely on a long value chain due to an age-old tradition of dependence between the producer and the collector. Only a fraction of producers are able to break the barrier, and these people were mostly producers who were able to rent or worked on fields that were larger than one hectare. Nationally, a long value chain is a common occurrence, although it might be noted that due to the iodine salt industry concentration in East Java, the length of the supply chain and transportation cost are slightly lower for Madura's salt fields.

Major Constraints in the Madura Island Salt Value Chain

The Madura Island salt value chain faces several major constraints that could be grouped into four main categories.

Production side

There was a regulated floor price for salt at Rp 750/kg for K1 (NaCl content > 94 %) and Rp 550/kg (NaCL content 85 < x < 94), however this only applied to the salt import quota holder who had an obligation to buy domestic salt. Otherwise, the price is determined in the market and varies between collectors.

Madura salt produced by smallholder producers is of insufficient quality for direct usage by industry. Salt producers typically are only able to get 30 per cent of their salt to industrial quality level (NaCl higher than 97 per cent), another 30 per cent only barely adequate for consumption after prolonged re-processing at an iodine salt factory, while the rest is only good for fertilizer, leather tanning and fish salting (Alhayat, 2016). Smallholders also grapple with their inability to secure working capital, hence their inability to escape from the collector who acts both as their buyer and moneylender (Ardiyanti,

2016). The tendency for the smallholders to sell exclusively to collectors due to their cash for goods basis also leads to a monopsonistic type of market (Prihantini, 2015). Unless well-led and composed of dynamic members, co-operatives would simply atrophy into ineffective organizations that add more layers into the value chain.

Small-scale producers also do not have access to better technology and infrastructure that enables them to produce more efficiently with better quality. This leads to a minimum evaporating time since the quality of the salt is less important than the actual quantity itself (Nurdiani, 2013).

Value-adding system

Due to their inherently small scale and their inability (or unwillingness) to form a collective, small scale salt producers in Madura are unable to access the more lucrative artisanal salt market with credence certification as their fellow salt producers in neighboring Bali do (Himawan, 2016).

On the other hand, the act of branding and packaging of salt products were deemed to be a necessity for the iodine salt industry higher up in the value chain, since certification processes require a product to have a brand (Kusuma, 2011). This resistant-to-change trait, self-evident in small scale producers due to the costs of individual branding and the even greater costs of collective branding, has led to missed opportunities both in product diversification and product differentiation.

Rules and regulation condition

The rules and regulations differ among Ministries and there are often overlapping areas of authority. Therefore any policy and regulation that is conducted and formulated by the Ministry of Fisheries and Maritime Affairs needs to be synchronized with the Ministry of Trade and the Ministry of Industry (Munadi, 2016).

Some policy options such as guaranteed prices and import quotas are being considered. While a floor price and a ceiling price might offer a guaranteed price for small scale salt producers, this policy might lead to the unwanted market distortion such as flooding of the market or extreme scarcity. On the other hand, an unregulated import quota would inevitably lead to the demise of the small scale producer (Salim, 2016).

Feedback mechanism (flow of information)

One of the reasons that small scale salt producers are unable to produce higher quality salt is that almost no information or feedback reaches them from the industry. Most salt is handled by traders or collectors who also work as graders, selecting which batch of salt is to be sold to a particular customer. Meanwhile, the iodine salt industries which have various forms of packaging and salt labels are actively getting feedback from both end-user consumers and food and beverage industries that use their salt. A mismatch exists between the two and it is in the best interests of traders that the status quo is maintained. This is likely whilst traders maintain control over small producers' working capital needs and co-operatives' governance standards remain poor.

Suggested Interventions

Creating effective co-operatives

Only by having some sort of co-operative that collectivises a majority of salt producers in any given area, can producers create bargaining power by correcting asymmetries of information. A co-operative means that the producer might accumulate enough capital to construct and maintain warehouses (or lease one from subsidized government warehouses). A co-operative also implies that producers could access working capital loans from a banking institution, thus replacing the role of a collector. The co-operative would also be able to provide salt grading. This would benefit producers and the iodine salt industry as they could ensure their supply with definitive quality; the resulting efficiencies could be shared between the contracting partners. The cost of this intervention would be mostly borne by the producers themselves, although the legal cost could be met through government programs providing incentives for co-operative establishment. By setting up a co-operative, producers could also have a particular brand or even diversify their salt products into artisanal salt. However, careful attention must be paid to the governance and capital structures of these organisations. For instance, Indian milk producer companies established under federal companies law to create producer 'skin in the game' and irreproachable director leadership with no government investment have experienced significant growth since their establishment (see www.business-standard.com/article/companies/maahi-heats-up-dairy-market-in-gujarat-113061101004_1.html)

Grading at the producers level

Currently, only a small percentage of producers grade their salt in the field before it is bagged. By having a cheap portable analysis unit that could classify NaCl content, producers could have better bargaining power. This would benefit both the farmer and the rest of the value chain since the uncertainty concerning the quality of the salt is gone. The equipment to grade salt could be purchased through a government program providing incentives or loans. Establishing and refining grading protocols can be a function undertaken by groups in the early stages of co-operative formation; indeed, it can be a crucial first step in producers learning to work together (see Plunkett, 2012).

Better production technolgy through the use of geo-isolator

Better technology for salt producers could be obtained through low-cost measures such as installing HDPE plastic to cover the evaporating salt pans. These measures have proven to significantly increase the quality of salt. Unfortunately, if done without grading at the producer level, this measure would have no effect at all, since the salt would be priced the same as a lower quality product. This intervention definitely benefits producers, although all in the value chain would benefit from a higher quality of salt. The cost of the HDPE plastic could be met from the producer's pocket or in conjunction with a government program that covers a part of the price.

Certification and turning salt into credence goods

Certification and any credence attribute could only be obtained after the salt product has a specific brand with suitable packaging. While these methods could dramatically increase small-scale producer revenue, these actions also require additional capital and marketing skills that most of the time, single small scale producers do not possess. Therefore, it would be very advantageous for individual producers

to band together into one co-operative. This intervention in the form of making a singular item along with certification and credence goods would certainly benefit the producers and end consumers. The market for credence goods in salt is apparently a major opportunity since salt is considered an inelastic good, so accompanied by some credence support, producers could hike their product price much higher than ordinary salt. The first step of procuring establishment capital should be borne by the producers, although later costs could be borne by higher margins driven by end-user customer product prices that a disciplined, appropriately structured group could achieve. Another way to reduce marketing prices would be by selling certified salt through an online marketplace that facilitates smallscale sellers such as Tokopedia or Bukalapak.

A direct contract between producers and the iodine salt industry

The Ministry of Industry have signed a Memorandum of Understanding on 11th of August 2019 between 11 iodine salt industry processors to purchase 1.1 million tonnes of salt produced by small scale salt producers. This further reinforces the argument that the producers should band together in co-operatives to ensure that they gain a part of this assured contract. A co-operative is essential since it would prove next to impossible for the industry to go into contract with individual producers; that is, it reduces transaction costs of contracting between the factories and individual producers. A co-operative would also mean that producers could get bridging loans during the time when they deposit their salt with the co-operative. For example, some salt warehouses (built by the government, leased by cooperatives) have issued receipts for salt deposited that then could be used as a collateral for loans. Since 8 of the 11 processors are located in East Java, Madura salt producers are in an advantageous position to benefit from this agreement.

The creation of a Salt Board

To ensure good coordination across the industry, a Salt Board could be created, to bridge the different needs and wants of the various sectors. A Salt Board also could be tasked with allocating resources to further domestic salt welfare. The Salt Board would also serve as a clearinghouse for all regulations concerning salt. The Board would be constituted with representatives from producer, industry and concerned Ministries. A key task would be to facilitate feedback mechanisms for the producer, therefore serving as a link between industry and first-line producers. A possible funding option for the operation of the Board could be met by increasing the currently applied tariff on imported salt by at least 5 per cent since the difference between bound and currently applied tariffs of imported salt still leaves room for such an increase. A 5 per cent increase in this tariff could yield an additional 117 Billion Rupiah to be used in a targeted program. The creation of a Board implies careful study of those that have driven market development and product innovation (e.g. Zespri in New Zealand) and the many that have not. Again, careful attention to governance within the context of prevailing cultural and institutional settings is critically important.

Conclusion

The salt value chain on Madura Island serves as a microcosm of the Indonesian salt industry. Its geographical position confers both production and transportation advantages. Salt is a basic need both for consumption and industrial uses. The Government of Indonesia's intention to re-classify salt as a strategic good underlies this assumption. Nonetheless, the salt value chain in Madura Island shows endemic problems that mostly lie at the producers' level. Without the producer's willingness to start

banding together[2], whether in the form of a co-operative or a small firm, it would be next to impossible for these small producers to achieve critical mass and gather the means to better their technology, to have an independent label/brand, to market themselves, or create more bargaining power. Other actors in the value chain are not without fault, although it is clear that the haphazard and often overlapping nature of regulation does exacerbate the situation. The creation of a Salt Board could help alleviate this situation by providing coordinated regulation and responses to challenges that face salt as a commodity, whether in Madura, or the rest of the Indonesian salt industry.

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[2] As opposed to Bali for example, where there are higher levels of education, a more receptive community for banding together (subak system indicates a willingness to band together), and exposure to tourism.

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