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Analysis of the Potential Development of Salt Pond Agroindustry (Case Study in Asempapan Village, Pati Regency)

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Abstract

This study analyzes the potential for developing a salt pond agroindustry in Asempapan Village, Pati Regency. The main focus of the study is to evaluate the effectiveness of sales distribution and salt trade channels, considering the imbalance in sales between different pond areas even though the pond area continues to increase. The research method used is descriptive qualitative, with data collection through observation, interviews, literature studies, and documentation. This study explores the concept of agroindustry, characteristics of salt ponds, and the role of government in regulating the salt market mechanism. The discussion includes types of salt, production processes, and challenges and opportunities in developing the salt agroindustry in Asempapan Village. The salt pond industry in Asempapan Village, Pati Regency, shows great potential but faces challenges such as climate change and distribution inequality. Technology development, product diversification, human resource development, market expansion, and price stabilization are needed to increase competitiveness. Government policy support and multi-party collaboration are essential to create an ecosystem that supports the sustainability of this industry, including protecting small farmers from the dominance of large companies. The results of this study are expected to provide insight into optimizing the potential of salt ponds and improving the welfare of salt farmers in the region.

INTRODUCTION

Agroindustry comes from two words agricultural and industry which means an industry that uses agricultural products as its main raw material or an industry that produces a product that is used as a means or input in agricultural businesses. Udayana (2011) Agroindustry can be defined as an industrial activity that uses agricultural products as raw materials. This activity includes the design and provision of necessary equipment and services (Aurich et al., 2006; Dausch & Hsu, 2006). Thus, agroindustry covers various aspects, such as agricultural processing industry, production of agricultural equipment and machinery, provision of

agricultural inputs (such as fertilizers, pesticides, and herbicides), and services in the agricultural sector (Muhammad et al., 2018; Liao et al., 2022).

Salt is one of the national strategic commodities in the marine sector. The area of salt ponds in Indonesia is around 30,786 hectares and is located in various places in Indonesia, the largest on the islands of Java and Madura. From data from the Ministry of Marine Affairs and Fisheries, there are salt ponds on the island of Java covering an area of 10,231 ha (East Java outside Madura 6,904 ha, Central Java 2,168 ha and West Java 1,159 ha) and on the island of Madura 15,310 ha. Salt is also produced in the Province of West Nusa Tenggara 1,155 ha, South Sulawesi 2,205 ha, Sumatra and others 1,885 ha. Data from the Central Java Province Marine Affairs and Fisheries Service shows that the area of salt ponds in Pati Regency is around 2,721.491 Ha with a production volume from 2009 to 2011 of around 292,534.28 tons. Tambunan et al. (2012) Research on the physical aspects of salt ponds serves as one of the bases in determining the suitability of salt ponds. This process involves estimating the potential of land resources and assessing the quality required for aquaculture efforts through research on the physical aspects of salt ponds (Nagaraju et al., 2022; Tucker et al., 2008; Nagaraju et al., 2022).

The existence of salt ponds in Asempapan Village raises questions regarding the effectiveness of sales distribution in the salt pond business which is still less than optimal. Although the area of salt ponds in this village continues to increase every year, the production results fluctuate. This problem indicates an imbalance in sales between different pond areas. The focus of this study is to evaluate the salt trade route, which can vary in price depending on the connection and location of salt extraction. This study aims to analyze the potential for agro-industry development in the salt ponds of Asempapan Village.

Theoretical Basis

Agroindustry

Agroindustry comes from two words agricultural and industry which means an industry that uses agricultural products as its main raw materials or an industry that produces a product that is used as a means or input in agricultural businesses. The definition of agroindustry can be described as an industrial activity that utilizes agricultural products as raw materials, designs, and provides equipment and services for these activities (Suwandi et al., 2022; Elida tet al., 2023). According to Austin (1992), the agricultural agroindustry is able to make a very real contribution to development in most developing countries for four reasons, namely:

First, agricultural product agroindustry is the gateway to the agricultural sector. Agroindustry. The consequences of this backward demand are: a) Farmers are encouraged to adopt new technologies to increase productivity; b) The next consequence is that agricultural production and farmers' incomes increase; c) Expanding infrastructure development (roads, electricity, etc.).

Second, agricultural product agroindustry as the basis of the manufacturing sector. Third, agricultural product processing agroindustry produces important export commodities. Fourth, food agroindustry is an important source of nutrition.

Salt Pond

Salt ponds are areas where salt farmers can produce salt. Usually salt ponds are shallow artificial ponds, where the way it works is that seawater or other salt water will be put into a large pond before finally being left to evaporate naturally. The result of the evaporation of seawater or water is later salt crystals. Salt ponds are places where the process of seawater becomes salt by utilizing sunlight (Chanpiwat & Damrongsiri, 2024; Farrokhi et al., 2022). In addition to consumption, salt is also a

mixed ingredient in the glass industry, and the pharmaceutical industry is still Lots Again industries that use salt (Wasserman, 2021; Lv et al., 2024). Salt itself in Indonesia is widely needed in several industries, including for preservation and chemical mixtures. In addition, salt is also important for consumption. Many needs require salt, Indonesia must actively produce salt for national needs (Lestari et al., 2024; Montojo et al., 2024). However, what happens is that Indonesia still imports salt to meet national needs. Maulidi Molyono et al. (2021) According to data from the Ministry of Trade, the average per capita salt requirement is 4 kg, so around 2.87 million tons of consumption salt are needed per year, not including industrial needs and others.

Potential Development Salt Pond

The salt potential of Pati Regency is an opportunity to become a salt city because it has a coastline of ± 60 km with a width of 4 miles when measured from the coastline towards the sea. This coastal area stretches from the west, namely Dukuhseti District to the east in Batangan District. The potential for brackish water fisheries, for example, ponds with an area of $\pm 10,329$ Ha are located along the coastal area as well as the potential for freshwater fisheries resources that are increasingly developing. According to the Ministry of Maritime Affairs and Fisheries in 2015, Pati Regency had a pond area of 2,838 Ha with a production of 381,704 tons per year. There are 20 sub-districts in Pati Regency with four sub-districts that have the potential to produce salt, namely in Batangan District in Pecangaan Village, Mangunlegi Village, Lengkong Village, Jembatan Village, Bumimulyo Village, Ketitang Wetan Village and Raci Village. In Juwana District, it is spread across Bakaran Kulon Village, Langgeharjo Village, Genengmulyo Village and Agungmulyo Village. In Wedarijaksa District, it is spread across Tluwuk Village, Kepoh Village and Tlogoharum Village. And in Trangkil District, it is spread across Asempapan Village, Sambilawang Village, Guyangan Village, Kertomulyo Village, Tlutup Village and Kadilangu Village.

The huge salt potential in Pati Regency has several obstacles that make salt production less than optimal. Suboptimal production conditions make production competitiveness low. Given that the salt production period can only be carried out in the dry season, when the rainy season comes, salt farmers in Pati Regency will convert the salt table land into milkfish or shrimp ponds. Most of the coastal residents of Pati Regency work as salt farmers in the dry season and fish farmers in the rainy season. Almost every house has a private salt warehouse that is used to store their salt harvest when the price of salt is falling like now or when the factory where they deposit their harvest is overloaded with salt receipts. Salt marketing is usually carried out directly, namely from salt farmers selling to middlemen, then from the middlemen it will be sold to the factory owner to be processed into iodized salt after which it is sold outside the region according to the respective agents at each marketing location. The income received by each farmer will be different from other farmers depending on the amount of production produced and depending on the price set by the middlemen because the price at each middleman will not necessarily be the same. Setiani (2022) The low income of salt farmers is due to various factors, including some salt farmers who are still traditional salt farmers who have various limitations, such as access to capital and markets.

Role Government in Distribution

The role of government in regulating market mechanisms is very important to ensure economic stability and justice. The government has the primary responsibility to supervise and control market players, ensuring that prices of goods and services do not experience uncontrolled fluctuations. This includes establishing regulations that prevent monopolistic practices and hoarding of goods that can harm the community

(Faisal et al., 2025; Uddin, 2023). In addition, the government also plays a role in establishing market regulations that serve as a reference for economic players, aiming to create a fair market and protect consumers from detrimental practices. In terms of transparency, the government ensures that market information is well distributed to sellers and buyers, facilitating better decision-making by all parties involved in economic transactions (Song et al., 2023; Tan & Salo, 2023).

Furthermore, the government seeks to ensure healthy competition by preventing monopolistic practices and ensuring that the market operates on the principle of free competition (Ramadhan et al., 2023; Nadeem et al., 2025). This is important to maintain a balance between the interests of producers and consumers. In emergency situations or market instability, the government has the authority to intervene, such as determining prices or regulating the supply of goods, to ensure that the needs of the community are met (Bernardlauwers et al., 2024). Through these roles, the government seeks to create an economic environment that is stable, fair, and supports the welfare of society as a whole.

METHODS

This research on agroindustry was conducted in one of the villages located in Pati City, precisely in Asempapan Village. In addition to direct observation to the location, the research was enriched with information obtained from literature, articles, or previously existing data. This research was conducted to describe the potential for the entry of agroindustry into salt farming in Asempapan Village.

Types of Data and Research

The data used in this study are primary data and secondary data. Primary data is a type of data obtained directly by collecting information through observation, interviews, literature, and documentaries. Primary data is obtained through observation and interviews. Secondary data is data that is not obtained directly from the subject or object of research. Secondary data is obtained from literature and documentaries. Here is the explanation:

Primary Data

Observation: Observation is a process of systematic, logical, objective and rational observation and recording of various phenomena, both in real and artificial situations.

Interview: In the interview process, the researcher used an irregular interview process. Where the researcher intended for the informant to feel more comfortable in providing information that would later influence the research.

Secondary Data

Literature: Literature study was conducted by reading relevant literature materials that support this writing, including printed books and electronic sources such as internet data.

Documentary: Documentation study is conducted by accessing previous research reports and articles available on the internet, books, or journals that are relevant to the problem being discussed. In this method, the author only takes relevant data from relevant sources or documents.

Data collection

For data collection, direct observation methods were used at the research object location, and interviews were conducted with related parties who were directly involved in dealing with the problems that were the theme of the author's research.

In addition, the author uses a library method, namely by reading related news related to the author's discussion theme, as well as using documentary studies, where the author uses previous research references to seek validity in writing research.

Data analysis

In the data analysis process, in order to process the data found in order to easily describe the formulation of the problem. The author uses a qualitative descriptive method, namely presenting data obtained from the primary and secondary data processes to produce qualitative data based on literature and participant observation. However, the author only uses secondary data or document analysis methods, not interviews, given time constraints. This is intended to make it easier for readers to understand the data and be sure of the validity of the data.

RESULTS AND DISCUSSION

Salt is a white solid in the form of crystals that mostly consist of sodium chloride (>80%) and other compounds such as magnesium sulfate, magnesium chloride, calcium chloride and others. Salt has properties that can easily absorb water and has a density level of 0.8 - 0.9 and a melting point at a temperature of 801 °C.

Salt in chemistry is an ionic compound consisting of positive ions (cations) and negative ions (anions), thus forming a neutral compound (uncharged). Salt is formed from the reaction of acids and bases, where one or more hydrogen atoms in the acid are replaced by one or more cations of a base. Salt is one of the complementary needs for food and a source of electrolytes for the human body.

Types of Salt

Industrial salt

Industrial salt is a type of salt that has a sodium chloride (NaCl) content of up to 97%, with very minimal impurities such as sulfate, magnesium, calcium, and other contaminants. This salt has various uses, including in the oil industry, soda and chlorine production, leather tanning processes, and as a raw material in the production of pharmaceutical salt.

Table 1. Salt Quality Requirements for Industrial Raw Materials according to SNI 01-4435-2000

No	Test Criteria	Units	Requirements
1	The state	-	-
	-	-	Normal
	Smell	-	Salt
	Taste	-	Normal White
	Color	-	
2	Sodium Chloride (NaCl)	% (w/w) adbk	Minimum 94.7
3	Water (H ₂ O)	% (w/w)	Max 7
4	Part No late in water	% (b/b) adbk	Maximum 0.5
5	Pollution metal	mg/kg	-
	Lead (Pb)	mg/kg	Maximum 10.0
	Copper (Cu)	mg/kg	Maximum 10.0
	Mercury (Hg)	mg/kg	Maximum 0.1
6	Pollution Arsen	mg/kg	Maximum 0.1

Table salt

Table salt is a type of salt that has a sodium chloride (NaCl) content of 97% based on dry matter, with impurities such as sulfate, magnesium, and calcium reaching 2%, and other impurities such as light and sand of 1%. In addition, the water content

in this salt must not exceed 7%. Table salt is used for various needs, including for household needs, the food industry, the cooking oil industry, and in the process of salting and preserving fish.

Table 2. Quality Requirements for Consumable Salt according to SNI 01-3556-2000

No	Test Criteria	Unit	Condition
1	Water Content (H ₂ O)	% (b/b)	Maximum 7
2	The NaCl (sodium chloride) content is calculated from amount chloride (Cl)	% (b/b) adbk	Minimum 94.7
3	Iodine counted as potassium iodate (KIO ₃)	% (b/b) adbk	Minimum 30.0 ppm
4	The part that is not late in water	mg/kg	Maximum 0.5
5	Pollution metal	mg/kg	-
	Lead (Pb)	mg/kg	Maximum 10.0
	Copper (Cu)	mg/kg	Maximum 10.0
	Mercury (Hg)	mg/kg	Maximum 0.1
6	Pollution Arsen	mg/kg	Maxi

Pickling salt

Preservative salt is used in certain food processing processes. The addition of salt aims to achieve conditions that allow enzymes or microorganisms that are salt-resistant (halotolerant) to react, thus producing food products with certain characteristics.

Table salt

Table salt or sea salt is produced through a simple process of evaporation of sea water, which also leaves behind various minerals and other elements, depending on the water source used. These trace amounts of minerals can add flavor and color to sea salt. Therefore, the texture of sea salt available on the market varies; some are coarser and some are finer. This type of salt contains about 0.0016% iodine.

Table salt

Unlike sea salt, table salt is taken from underground salt reserves. The process of making table salt is more complex to remove minerals, and it usually contains additives to prevent clumping. Most commercially available table salt is fortified with iodine, an essential nutrient that occurs naturally in small amounts in sea salt. It does not contain iodine, as well as magnesium (Mg), calcium (Ca), and potassium (K₂).

Salt Production Process

Salt processing technology uses solar evaporation techniques. The salt making process based on interviews with resource persons Mr. Ahmad Amir as one of the pond owners in Asempapan Village has several steps, as follows:

Land clearing from disturbances

In general, in a one hectare area of pond land, in preparation the land is cleaned of plants and mud so that it does not interfere with the salting process.

Land drying

The pond land is then leveled with a tool called a gulu' so that the land does not crack. Usually done at the beginning of the dry season (April) every year.

Flow of sea water to pond land

Sea water is channeled to the pond area to be processed into salt through drying in a period of 2-3 days depending on the length of the sun's heat until finally the crystallization process occurs in the pond area and the water recedes so that it becomes salt from the crystallized sea water.

Harvest process

In the harvesting process called by the locals as the “penggarukan” process, when the sea water has receded and finally becomes salt. Salt is harvested using a tool called “garuk”, collected and then wrapped.

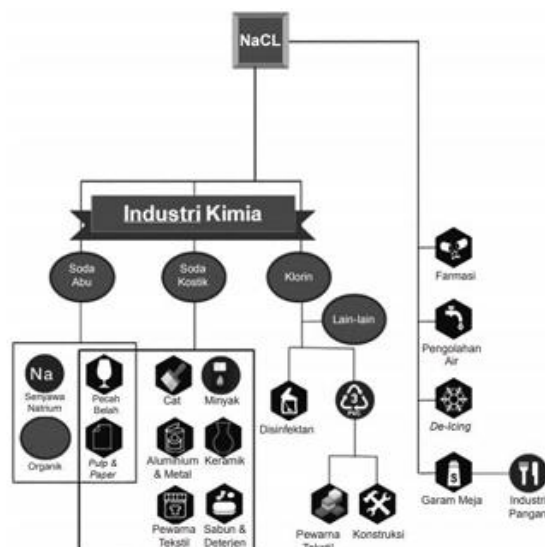


Figure 1. Use of salt



Figure 2. Documentation of the salt “raking” process in the ponds of Asempapan Village

Salt Trade

In general, the main institutions involved in the salt distribution chain from upstream to downstream are salt farmers, PT. Garam, importers, distributors, sub-distributors, agents, sub-agents, wholesalers, supermarkets, and retailers.

The salt distribution pattern shows a complex pattern. All business functions are involved in the salt distribution chain, including importers who distribute salt from abroad to Indonesia. The main institutions involved in the salt supply chain from

upstream to downstream are salt farmers, PT. Garam, importers, collectors, wholesalers, iodized salt producers, distributors, sub-distributors, retailers and consumers (Maflahah & Asfan, 2018).

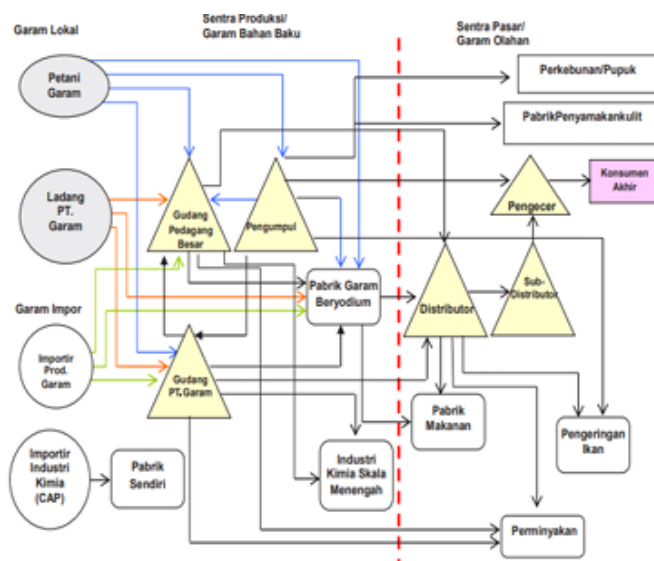


Figure 3. National salt distribution pattern based on Puska PDN 2012

The Salt Problem

Indonesia is an archipelagic country located in the tropics, consisting of more than 17,000 large and small islands and surrounded by oceans. With a coastline of 81,000 km, Indonesia has the second longest coastline in the world and an ocean area of 5.8 million km². The need for salt in Indonesia is a reality that continues to increase, with a growth of around 4.5 tons per year since 2022.

According to Mr. Ahmad Amir as a resource person, the distribution of salt trade cannot be said to be even and equally profitable between farmers and collectors. Price disparities still often occur in several salt owners who have connections with salt farmers who still sell their salt individually. Even though salt farmers can sell their salt to the salt industry or factory, they must go through an intermediary (*broker*) first, resulting in an unbalanced selling price between intermediaries (*brokers*) who can receive salt at a much cheaper price than farmers but can sell salt at a much higher price to the industry or factory that is affiliated with them.

Related to the improvement of the basic price of people's salt, it has been regulated through the Regulation of the Director General of Foreign Trade No. 02/DAGLU/PER/5/2011. The price of people's salt at the collector level or collecting point (bulk condition on trucks) that must be purchased by Importer Producers (IP) is a minimum of IDR 750/Kg for Quality I and a minimum of IDR 550/Kg for Quality II. However, this policy does not support the improvement of the performance of people's salt and is different from the previous policy, especially because there is no obligation for IP to absorb people's salt with a percentage of 50% of total production, there is no government purchase price (HPP), and there is no import time limitation period. This condition will actually weaken the position of people's salt because IP has no obligation to absorb people's salt. IP prefers to buy imported salt because the price is cheaper and the quality is better. Although IP buys people's salt, it is at a price below the HPP.

The minimum price policy for salt at the collection point puts pressure on the bargaining position of salt farmers against collectors. Farmers tend not to be able to obtain a decent price close to the price set by the government. Meanwhile, if the salt trade system is released and does not recognize quotas (imports), on the one hand it

will create national economic efficiency. But on the other hand, it can disrupt or even kill salt farmers, especially if the amount of imported salt is uncontrolled.

Potential Entry of Agroindustry

The entry of agroindustry into the salt farming sector is an important phenomenon that brings significant changes to salt farmers in Asempapan Village. Agroindustry, which is defined as an industrial sector that processes agricultural products to increase their economic value, can have both positive and negative impacts on salt farmers. Especially for salt farmers in Asempapan Village who do not fully understand the concept of agroindustry

One of the main impacts of the entry of agroindustry into the salt sector is the increase in economic value through product diversification. Agroindustry allows the processing of raw salt into more valuable products, such as iodized salt, industrial salt, and other derivative products. This provides an opportunity for salt farmers to increase their income.

On the other hand, with the presence of agro-industry, innovations in production technology have emerged that can increase efficiency and productivity. Evaporation technology, the use of automatic pumps, and salt processing with higher standards allow for improvements in the quality and quantity of salt production. In the long term, this can reduce farmers' dependence on traditional processes that are often slower and less efficient. However, the application of agro-industry technology also requires quite a large initial capital and training for farmers to be able to operate this new equipment. Thus, there are challenges related to the adaptability of farmers, especially for those with limited access to capital and technical knowledge.

The entry of agroindustry also affects the social structure among salt farmers. On the one hand, the emergence of agroindustry can create new jobs, both in the production and distribution sectors of salt derivative products. Traditional salt farmers can switch roles to become workers in the processing industry, or even participate in a wider agroindustry supply chain.

However, there is a risk that small salt farmers could be pushed aside by the dominance of big players in the industry. If the agro-industry is dominated by large companies that have easier access to markets and capital, small salt farmers may struggle to compete, especially if they do not have adequate support from the government or related institutions.

In addition, there is a change in land ownership patterns. Large companies may try to buy or rent land owned by small salt farmers, which can lead to the loss of independence of farmers and the occurrence of a process of "proletarianization," where farmers become laborers on their own land.

The salt sector is heavily influenced by natural conditions, such as rainfall and temperature, which play an important role in the process of seawater evaporation to produce salt. With the entry of agro-industry, the use of new technologies has emerged that can have an impact on the environment. On the one hand, agro-industry has the potential to reduce the environmental impact of traditional salt production practices that sometimes use chemicals or processes that damage coastal ecosystems. The use of more environmentally friendly modern technology, such as solar evaporation methods, can minimize these negative impacts.

However, in a number of In this case, agroindustry can also contribute to environmental damage. The uncontrolled use of large-scale technology can damage the balance of coastal ecosystems, such as the loss of mangrove habitat or increased pollution from industrial waste. Therefore, it is important to have strict regulations and the implementation of sustainable practices in the salt agroindustry.

The entry of agro-industry into the salt sector requires appropriate policy support. The government must play role important in create a supportive ecosystem for salt farmers, both through the provision of training, access to capital, and regulations that protect small farmers from the domination of large companies.

In Indonesia, salt farmer cooperatives have great potential in helping to balance the dominance of large agro-industry players. Cooperatives can act as a bridge between small farmers and large industries, by providing wider market access, technology training, and fairer profit distribution. The role of cooperative This very important in create sustainability an inclusive and equitable salt industry.

CONCLUSION

Based on the research that has been conducted, it shows that the salt pond industry in Asempapan Village, Pati Regency has great potential, the existence of a distribution chain from upstream to downstream certainly opens up potential employment opportunities for the surrounding community involved with collaborating companies in related sectors. However, in its management it still faces a number of challenges. Climate change factors greatly affect salt production results. To maximize the potential of salt ponds, it is better to use technology that can help accelerate the salt crystallization process and, in the process, does not only depend on the heat of the sun. In addition, the distribution of salt and profits that are not evenly distributed between farmers and collectors, as well as price disparities between farmers and brokers (intermediaries) are one of the inhibiting factors.

Continuous efforts in developing salt processing technology, product diversification to compete with imported products, and increasing human resource capacity are essential to develop this sector. Expanding market access and price stability are also issues that need to be considered so that salt ponds in Pati can be more competitive in the domestic and international markets considering that salt is a daily necessity and is widely used in various sectors. In its development, this sector requires appropriate policy support. The government plays an important role in creating a supportive ecosystem for salt farmers, both through providing training, access to capital, and regulations that protect small farmers from the dominance of large companies to prevent proletarianization. In addition, collaboration between the government, business actors, and academics is essential to create an ecosystem that supports the sustainability of the salt pond industry in Pati.

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